A special edition devoted to Issues in IT and Innovation of Teacher Training Education

Guest Editors
Murni Ramli, Indah Widiastuti & Nur Arifah Drajati

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About the Journal

Overview

Pertanika Journal of Social Sciences & Humanities (JSSH) is the official journal of Universiti Putra Malaysia published by UPM Press. It is an open-access online scientific journal which is free of charge. It publishes the scientific outputs. It neither accepts nor commissions third party content. Recognized internationally as the leading peer-reviewed interdisciplinary journal devoted to the publication of original papers, it serves as a forum for practical approaches to improving quality in issues pertaining to social and behavioural sciences as well as the humanities.

JSSH is a quarterly (March, June, September, December) periodical that considers for publication original articles as per its scope. The journal publishes in English and it is open to authors around the world regardless of the nationality.

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The Introduction explains the scope and objective of the study in the light of current knowledge on the subject; the Materials and Methods describes how the study was conducted; the Results section reports what was found in the study; and the Discussion section explains meaning and significance of the results and provides suggestions for future directions of research. The manuscript must be prepared according to the Journal’s Instructions to Authors.

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Pertanika follows a double-blind peer-review process. Manuscripts deemed suitable for publication are usually sent to reviewers. Authors are encouraged to suggest names of at least three potential reviewers at the time of submission of their manuscript to Pertanika, but the editors will make the final choice. The editors are not, however, bound by these suggestions.

The Journal's peer-review process

Solicited manuscripts are usually sent to reviewers. Authors are invited to suggest names of at least three potential reviewers at the time of submission of their manuscript to Pertanika, but the editors will make the final choice. The editors are not, however, bound by these suggestions.

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1. The Journal's chief executive editor and the editorial board examine the paper to determine whether it is appropriate for the journal and should be reviewed. If not appropriate, the manuscript is rejected outright and the author is informed.

2. The chief executive editor sends the article identifying information having been removed, to three reviewers. Typically, one of these is from the Journal's editorial board. Others are specialists in the subject matter represented by the article. The chief executive editor asks them to complete the review in three weeks.

3. The chief executive editor, in consultation with the editor-in-chief, examines the reviews and decides whether to reject the manuscript, invite the author(s) to revise and resubmit the manuscript, or seek additional reviews. Final acceptance or rejection rests with the Editor-in-Chief, who reserves the right to refuse any material for publication. In rare instances, the manuscript is accepted with almost no revision. Almost without exception, reviewers' comments (to the author) are forwarded to the author. If a revision is indicated, the editor provides guidelines for attending to the reviewers' suggestions and perhaps additional advice about revising the manuscript.

4. The authors decide whether and how to address the reviewers' comments and criticisms and the editor's concerns. The authors return a revised version of the paper to the chief executive editor along with specific information describing how they have answered the concerns of the reviewers and the editor, usually in a tabular form. The author(s) may also submit a rebuttal if there is a need especially when the author disagrees with certain comments provided by reviewer(s).
5. The chief executive editor sends the revised paper out for re-review. Typically, at least one of the original reviewers will be asked to examine the article.

6. When the reviewers have completed their work, the chief executive editor in consultation with the editorial board and the editor-in-chief examine their comments and decide whether the paper is ready to be published, needs another round of revisions, or should be rejected.

7. If the decision is to accept, an acceptance letter is sent to all the author(s), the paper is sent to the Press. The article should appear in print in approximately three months. The Publisher ensures that the paper adheres to the correct style (in-text citations, the reference list, and tables are typical areas of concern, clarity, and grammar). The authors are asked to respond to any minor queries by the Publisher. Following these corrections, page proofs are mailed to the corresponding authors for their final approval. At this point, only essential changes are accepted. Finally, the article appears in the pages of the Journal and is posted online.
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A special edition devoted to
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Guest Editors
Murni Ramli, Indah Widiastuti & Nur Arifah Drajati

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Preface

The second International Conference on Teacher Training and Education (ICTTE) 2016 invites researchers, academicians, educators, practitioners, government agencies, and consultants around the world to attend and share their insights, perspectives and new trends of research which relate to the theme of the conference, “Strengthening IT and Innovation of Teacher Training Education in the Era of Global Competitiveness.” The conference, was organized by the Faculty of Teacher Training and Education, Universitas Sebelas Maret, was held in Surakarta, Central Java, Indonesia, from 23-24 November 2016.

Each of the full papers submitted to the conference was peer reviewed by at least two reviewers. There were 245 manuscripts submitted to the conference; however, due to Pertanika’s stringent peer-review process, only 24 were selected for publication in this special issue.

Our deepest gratitude goes to Dr. Nayan KANWAL of the Journal Division, and the team of Editorial Office, Pertanika, Universiti Putra Malaysia, for their wisdom and invaluable advice especially during the early stages of our own learning process of ensuring that manuscripts are suitable for journal publication. Through this experience, we have been able to deepen our knowledge of the demanding processes involved in the publication of Pertanika special issues.

Guest Editors:
Murni Ramli
Indah Widiastuti
Arifah Nur Drajati
Khresna Bayu Sangka
Cucuk W Budiyanto
Nurma Yunita Indriyanti

September 2017
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Review Article

Blended Learning to Activate English as a Foreign Language (EFL) Learners’ Autonomy

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ABSTRACT

In recent years, technology advancement has changed rapidly. Learners become digital natives as soon as they are exposed to ICT and it impacts their learning. A traditional face-to-face interaction only may not fit the learners’ profiles. Therefore, teachers should make use of ICT to support face-to-face interaction. In supporting face-to-face interaction with ICT, teachers may implement blended learning. Blended learning integrates the use of technology with the best features of face-to-face interaction. Hence, implementing blended learning encourages teachers to select teaching approaches that fit with the learners’ current profiles as digital natives. Digital natives do not belong to any particular generations but they have grown up using technology. This paper suggests how the implementation of blended learning benefits foreign language learners to foster their learning autonomy. Learning autonomy is vital in EFL context. Without learning autonomy, learners study in limitations. That way, improvement will hardly be achieved.

Keywords: Blended learning, digital natives, English language instruction, learning autonomy

INTRODUCTION

In the 21st century, language learners have instant access to the Internet. Instead of getting information from printed resources, language learners often prefer to have digital information from the Internet. Studies related to preferences in using printed or digital media have been conducted in the past few years. Pierce (2009) finds that the use of digital learning resources...
is increasing, while at the same time, the use of printed learning resources is decreasing. Digital resources are updated daily. They can be accessed from anywhere and at any time. Thus, digital resources are accessible and flexible. Consequently, learners perceive that the Internet helps their learning and it makes things faster and easier. Simultaneously, when accessing digital resources; learners are able to obtain information from printed books, recorders, film, and other learning resources since digital resources contain not only words, but also pictures and sound (Sudiran, 2015). Therefore, today’s language learners are often labelled digital natives, or the native speakers of the digital language (Prensky, 2001). Digital natives use technology such as computers, mobile devices, and Internet.

Learners’ current profiles are characterised by distant and technology-mediated learning. Technology brings a shift on the way learners communicate, collaborate, and learn (Miller, 2009). Technology also offers more modes that enrich learners’ learning experience (Rhode, 2009) so it is noticeable that they prefer learning with the assistance of technology (Cechova & Rees, 2013). Language learners’ learning preferences should be taken into account. Teachers are encouraged to adjust the language teaching from face-to-face instruction to the one that makes use of technology, such as blended learning. Adjustment is required since learners’ way of learning is not something static. Technology development changes the way education is perceived so it impacts educational system and practices (Klopfer, Osterweil, Groff, & Haas, 2009). Without adjusting teaching methods to learners’ profiles, academic success will be hard to achieve.

Blended learning is defined as a mixture of online and traditional face-to-face planned class activities (Kopecky, 2006). Gleason (2013) points out that blended learning can be beneficial for language learners. Learners take charge of their own learning with the support from the teacher. The teacher manages the learning environment and plans learning activities that allow learners to be autonomous. Implementing blended learning means both teachers and learners do not lose their autonomy since teachers can control the instruction and learners can learn on their own through online and computer-mediated activities. Tam (2000) finds that the fundamental benefit of blended learning is better learning flexibility. Outside the classroom, learners are allowed to independently determine the goal, content, pace and methods of their learning (Holec, 1981). Having the responsibility to take charge of independent learning fosters autonomy. Thus, blended learning suits learners’ profile as digital natives and fosters learners’ autonomy.

Blended Learning

ICT, which includes mobile and online learning, increases the opportunities for learners to achieve learning objectives. It helps learners to use a wide range of learning activities and resources. Blended learning is an effective learning strategy that integrates
the use of technology with the best features of face-to-face interaction (Krause, 2007; Singh, 2003). It is not merely about using technology because of its accessibility; it is about designing better ways of helping learners to achieve their goals and providing them with the best experiences; and it also includes supporting teachers to manage and administer the courses (Bath & Bourke, 2010).

Strauss (2012) states that blended learning is an approach when pedagogy unites face-to-face classroom methods with computer-mediated activities. By using computer-mediated activities, learners learn through visual information they way they prefer (Cechova & Rees, 2013). Teachers put learners at the centre of the learning process. Learners have the control over time, pace, path, and place of learning.

In blended learning, traditional face-to-face instruction is not replaced, but is optimised with the support of Information and Communication Technology (ICT). Hence, in the implementation of blended learning, the teacher combines face-to-face instruction and e-learning. This combination aims to suit the learners as digital natives. Without combining face-to-face instruction with technology-mediated activities, teaching digital natives will be a big challenge (Chang & Yee, 2009).

As stated by McCown (2010), at the beginning of any blended learning implementation, the teacher explains how the course will work, sets the expected outcomes, and demonstrates the technology-mediated activities. Following the face-to-face learning, learners learn through online activities outside the classroom. In these activities, the teacher monitors the activity continually and provides the learners with feedback. The feedback given can be in the form of correction or praise. Corrective feedback is effective for learners to understand the task better, while teacher praise is helpful to encourage a learner’s potential (Norlin, 2014). In both classroom and online activities, the teacher is able to evaluate learners based on face-to-face learning, as well as online or technology mediated learning.

By combining face-to-face and online or technology mediated learning, the teacher does not dominate the instruction. Instead, the teacher encourages learners to govern their autonomous learning since they take charge of the learning process outside the classroom. Hence, learning autonomy can be fostered through blended learning.

**Autonomous Learning**

Autonomous learning is commonly known as independent, self-directed, or self-governed learning. Autonomous learning happens when learners work on their own. They play a significant role in deciding their own learning directions, discovering their own resources, formulating their own problems, choosing their own courses of action, and evaluating the outcomes of that process (Healey, 2014). Learners become autonomous when they contribute to or involve in classroom activities and have
the capacity to control their goal, content, pace, and method of learning (Benson, 2006; Holec, 1981; Nunan, 1997).

Autonomous learners know how to improve their understanding since they will recognise when they need assistance. Moreover, they are able to monitor their improvement, as well as assess their achievement (Benson, 2003). As stated by Linn (1996), there are several traits of autonomous learners that teachers should encourage: 1) autonomous learners take accountability for their own learning. They decide the materials to study, to allocate time, and choose activities to accomplish the objectives. After selecting the activities, learners may experience difficulties and seek help to improve their independent learning; 2) learners know when to memorize, evaluate, and discuss material with a peer or a teacher; and 3) autonomous learners set realistic goals which they adjust based on feedback. Autonomous learners do not only set specific goals, but they also have certain ways to achieve the goal through their own chosen learning materials and activities.

By contrast to native speakers who innately acquire language, EFL learners learn through formal education. The use of the term learning shows the conscious learning process involving ability (Krashen, 1982). Hence, in the context of EFL education, learners should have the willingness and ability to promote their autonomy (Jingnan, 2011). Employing blended learning not only allows EFL learners to generate independent learning but also keeps pace with the development of technology.

The Practical Implementation of Blended Learning in EFL Class

In designing blended learning, teachers combine both face-to-face activities and technology-mediated activities. Face-to-face instruction is implemented in a situation when both the teacher and learners must be in the same place and same time (Black, 2002, p. 2). The teacher has the role to manage and determine the tasks and activities in the classroom. To support that face-to-face instruction, teachers can utilise several technology-mediated tools to enhance EFL learners’ language skills and learning autonomy.

Technology-mediated media are commonly divided into two categories: synchronous and asynchronous communication tools. A synchronous enables real-time communication. Audio-video conferencing, instant messaging, Twitter, and Skype are some examples of synchronous social media. Both synchronous and asynchronous tools offer different benefits. Synchronous tools offer direct feedback. On the other hand, asynchronous media are not time bound (Perveen, 2016, p. 21) so learners can learn on their own pace at their leisure.

In the context of EFL classes, the teacher conducts face-to-face instruction in order to introduce new materials or activate learners’ prior knowledge. As stated by Walpole and McKenna (2007), contents, process, and product are the bases to implement blended learning in differentiated instruction. Contents deal with the standards learners should master.
The materials given in classroom instruction are the basis for learners’ independent learning by using technology outside the classroom. Meanwhile, process has to do with activities learners should perform. The learning activities in the classroom can be moved online through design of relevant digital materials. Thus, materials given in the classroom and digital materials are complementary. Once the learners perform the activities on certain content, they are allowed to demonstrate the product.

**Listening Class**

YouTube videos can be used as an aid in a listening e-class conducted outside the classroom where learners join by utilising digital media. Unlike a traditional listening class in which learners listen to an audio chosen by the teacher and answer listening comprehension questions, out-of-class learning as a feature of blended learning offers more learning flexibility to satisfy learner’s different learning preferences and encourages their autonomy. YouTube videos include visual clues, music with lyrics, or other items that may help and motivate learners in understanding and performing the tasks (Balagiu, Zechia, & Patesan, 2016). In the process of face-to-face instruction, the teacher assigns the learners to small groups and plays a YouTube conversation video. The learners watch the video and pick up a few key points in the conversation. Each group presents the results of their subsequent discussion while other groups give comments.

For out-of-class activities, each learner chooses any conversation video. Individually, they listen to the video, find the key points, transcribe them, and edit the video with the transcript on it. To evaluate learners, the teacher checks the learners’ transcription results. By allowing learners to choose any video they are interested in on the highest-trafficked web-based video platform, YouTube; the teacher fosters learners’ autonomy since they take responsibility for deciding the learning resources themselves. Furthermore, learners’ different preferences and different traits of learning can be satisfied since YouTube allows learners to learn the target language by continuously listening and watching videos of various styles and genres of language (Alimemaj, 2010).

**Speaking Class**

According to Brown and Yule (1983), speaking in the target language is regarded as one of the most problematic aspects of language learning. To lessen their burden, teachers are encouraged to facilitate learners’ spoken English. Conference Call, one feature of Skype can be utilised to reinforce language learners who always encounter difficulties in speaking (Elia, 2006). Before joining a Conference Call, the learners are to practice speaking many times so that they will be well-prepared and feel less nervous. Moreover, both the teacher and learners should make sure the internet speed required to use Skype. It was found that to avoid lag, Skype Conference Call requires
128kbps/128kbps as the minimum internet speed (Lee, 2013).

Skype, as a synchronous tool, can be utilised by learners to develop their speaking skills. In contrast to Facetime and Google Duo, which offer a simple video call, Skype offers more features. Skype can be used to make telephone conference and video calls over the Internet to transfer files and chat (Sheppard, 2006). While engaging in Skype meaningful conversation, learners are able to interact, modify, and elaborate their input (Long & Doughty, 2009).

As learners are expected to be able to communicate in real-life communication, speaking has to do with authentic activities. Speaking practices in the classroom may not reflect real-life communication, so learners also need to learn in a different authentic learning environment. Ryobe (2009) found Skype as advantageous to develop learning autonomy, as well as intercultural awareness, the basis for communication. Hence, Skype can be utilised to encourage learners to communicate with communities. After the learning process in the classroom, the teacher asks the learners to discuss any topic through a Skype Conference Call with their peers. Learners will communicate with less effort and hesitation if the teacher allows them to prepare for their participation in every Skype conference. Moreover, by interacting with peers through Skype, learners practice two-way communication that enhances comprehension, as well as production. The peer discussion is used to foster learners’ self-governed learning, as well as to facilitate learners’ real-life speaking practices.

**Reading Class**

In relation to learners’ profiles as digital native, blogging can be utilised to enhance learners’ reading skills. Blogging is an online medium and a computer-mediated tool that facilitates a learning community (Blackstone, Spiri, & Naganuma, 2004). According to Campbell (2003), there are three types of blog that are appropriate for educational purposes: 1) the tutor blog, 2) the learner blog, and 3) the class blog. The tutor blog is run by the class teacher who alone can post reading materials for learners. Meanwhile, the learner blog is run by learners. Each learner posts different materials for others to read. The learner blog is beneficial since each learner has control over time, pace, path, and place of learning. Unlike the tutor and learner blog, the class blog is run by the teacher and the learners collaboratively so that everyone has autonomy within the same blog.

Instructors can utilise the tutor blog to post supplementary reading in the form of whole reading passages or just hyperlinks. These passages or hyperlinks guide learners in their autonomous learning (Campbell, 2003). Learners are then able to write comments on the teacher’s posts based on their reading comprehension. In addition, learners can share reading passages based on their interest through the learners’ blog so that peers get more reading exposure. The learners’ blog is effective to foster autonomy
since it becomes each learner’s personal space. Each learner is responsible to decide on content subject matter and volume, and the time to publish (Lee, 2010). Autonomy is given to each learner to regulate their learning. With the class blog, either the teacher or learners can be the learning resource so that learners have a great sense of autonomy. There will be multiple learning resources since learners, collaboratively with the teacher, share reading materials to discuss (Campbell, 2003). Unlike learners’ blog, the presence of the teacher in the class blog allows a monitoring process so that the materials shared are all appropriate.

**Writing Class**

Blog as one type of online and computer-mediated tool and as a learning platform is seen as an appropriate media in enhancing learners’ writing competence through blended learning approach (Blackstone et al., 2004). In the traditional writing class, learners produce their writing in a piece of paper that can be shared only with the teacher or peer alone. Through the use of blog, the learners are able to share their writing logs to many readers at once (Wagner, 2003). The learners are also able to get feedback on their writing since there is an Add Comment feature so that both the teacher and peers can leave their opinions, questions, or thoughts. Moreover, as digital natives, learners prefer blog writing since there is technology and Internet involvement. To improve learners’ writing skill, it should also be noted that encouraging learners to first read a lot on others’ blogs is needed since “the writing process followed a similar development to that of reading” (Tavares, 1990). The lower the reading skill, the lower the writing skill will be.

**CONCLUSION**

As digital natives, learners nowadays prefer learning through modes that are accessible and faster. Consequently, language instruction should accommodate the current trend by combining classroom instruction with technology-enhanced activities, or blended learning. Through the implementation of blended learning as the response to learners as digital natives, teachers are able to provide opportunities for learners to learn language outside the classroom by utilising technology.

In order to foster learners’ autonomy by implementing blended learning, the teacher needs to involve learners into setting clear learning goals and determining learning activities, tasks and assignments. Once the teacher allows the learners to learn at their own pace and according to their preferences, learners will be autonomous. Autonomous learners are self-directed and are able to decide their own resources, and evaluate the outcomes of their learning process. Considering learners’ current profiles as “digital natives” and the effectiveness of blended learning, EFL teachers should re-examine the way they teach language skills so that learning activities will better suit learners and foster their autonomy. Teachers are also expected to not only implement
blended learning to teach language skills separately but also to teach integrated skills and other language components.

REFERENCES


Review Article

Massively Multiplayer Online Role Playing Game (MMORPG): An Alternative Medium in English Language Teaching (ELT)

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ABSTRACT

Nowadays, students are no longer regarded as cyber immigrants, instead they are cyber natives who deserve technological use in many fields of study including learning English. In other words, the use of technological media is obligatory for English teachers. One of the newest, though not the most popular, forms of media applied in ELT is video game. Commonly, video game used in ELT is the offline ones, yet, today, online learning is also encouraged. Hence, MMORPG (Massively Multiplayer Online Role Playing Game) is seen as a promising medium to facilitate students in learning English online. In this plenary paper, the researchers conduct literature review of a fair amount of research about the implementation of MMORPG in ELT. The aims of this paper are to identify: (1) the advantages and disadvantages of MMORPG; (2) the procedures in implementing MMORPG; and (3) the obstacles in the implementation of MMORPG in ELT.

Keywords: ELT, MMORPG, technology

INTRODUCTION

Video game is a new form of popular culture which has potential in the future in the term of how it is used in diverse contexts (Gee, 2007). Video game itself is defined as a game played with the medium of computer or gaming consoles that uses some types of video output (Calvillo-Gámez, Cairns, & Cox, 2010). Video game offers free engagement of the players to result
in outcome through some competitions either with the other players or just by him/herself (Juul, 2005), with the main purpose to get some pleasure (Calvillo-Gámez, 2009). Furthermore, video game is defined as a game with interactive experiences which put focus on the gameplay (Lee, Karlova, Clarke, & Thornton, 2014) and the environment (Calvillo-Gámez et al., 2010).

The popularity of video game raises the attention and awareness of English teachers to research on the effects and implementation of video game as teaching and learning medium in ELT (deHaan, 2011). The effects of video game, either positive or negative (Alshawi, 2016; Melorose, Perroy, & Careas, 2015; Prot, Anderson, Gentile, Brown, & Swing, 2014) on the players as learners, is a very popular variable to be researched on. In implementing video game in the classroom, many researchers have used several genres of video game: music video game (deHaan, 2011), mobile video game (Whittaker, 2013), edutainment video game (Wallden & Soronen, 2004), and other genres. All of the stated genres of video games are commercial video games and offline; however, Lynch (2004) encourages learners to learn online since online learning provides a lot of benefits. Therefore, as an alternative genre of video game, massively multiplayer online role-playing game (MMORPG) can be implemented in ELT.

Massively multiplayer online role-playing game (MMORPG) is an online game genre developed to connect and engage many users (Reinders, 2009), in the form of avatars (characters inside a game), to interact both with the artificial world, as well as the other players as if they live in the real life. The interaction in MMORPG is repetitive and it allows each player to communicate and exchange information in a particular language, mostly English, (Bryant, 2007; Kongmee, Strachan, Montgomery, & Manninen, 2003; Pickard, 2010) and shape what is called as “affinity space” (Gee, 2003), in which the communal interest is able to create such an open and tolerant collaborative environment by fading away the interpersonal and inter-cultural barriers among the players (Godwin-Jones, 2014), yet at the same time they were exposed to cultural knowledge (Zheng, Newgarden, & Young, 2012). The immense communication in MMORPG is seen as an ideal setting to learn and practice English (Bryant, 2007; Crystal, 2001).

The artificial world inside MMORPG is what Kolbert (2001) called as “escapist fantasy”, in which the players could escape themselves from the real world into a fun and mesmerising fantasy life; however, at the same time, MMORPG is regarded as a “social realism” (Kolbert, 2001). Similar to the single-player game, this genre also focuses on players carrying out quests with distinguishable goals. However, the most distinguishable factor differ from a single player video game is on the collaboration among users to accomplish a goal (Achterbosch, Pierce, & Simmons, 2008; Kongmee et al., 2010). Kongmee et al. (2010) added that within MMORPG, players are not only to accomplish a variety of quests and raise the individual level,
but they are also required to participate in teams or guilds to finish several missions. Thus, the players need to cooperate well with the other players, as well as exchange information among them.

MMORPG has a significant role in affecting the learners’ language learning. Based on Alqahtani’s (2016) research, the game played in an MMORPG requires good awareness and active intelligence of the players. These requirements occasional improvement of the players’ problem solving skill, imagination, and collaborative relationships (Peterson, 2012a). Furthermore, playing an MMORPG ensues the development of memory and speed thinking, planning skill, and initiative sense. Kongmee et al. (2012) found that MMORPG has successfully incorporated the students in a teamwork to do their assignments since their motivation rose and attitude changed. However, Gentile (2009, 2011) found that once the students started to spend a lot of time playing video games, they would find themselves addicted. Peterson (2012a), through the use of “NineRift”, found that the learners actively involved in playing the MMORPG and they could use diverse types of interactional strategies. However, instead of shaping empathy, this interaction has to be monitored well since based on Kallunki’s (2016) survey, MMORPG often contains informal, impolite, and harsh words (Thorne, Black, & Sykes, 2009) which are called “toxic language” or “trash language” which relate to negative social activities (Godwin-Jones, 2014).

Linguistically, MMORPG roles well in affecting the learners’ English skills (Suh, Kim, & Kim, 2010). In this research, modified MMORPG is used. There are several stages the students were required to complete. Each unit contains different activities, such as reading stories, watching animations, and completing quizzes. Every stage aims the students to practice listening, reading, writing, and speaking skills by competing each other, either one on one or group to group. After each game, the students are provided with an instant feedback including answer confirmation, a tally of correct answers, and commentary on incorrect answers, which allow the learners to recognise their level of achievement. It was found that the students who learned using MMORPG would eventually show higher scores in listening, speaking, reading, and writing than those who studied in a traditional classroom setting. First of all, video game maintains the players’ interest in learning English and it provides implicit learning similar to how the children learn which is effective for second and foreign language learning (Singhal & Rogers, 2002; Slater, 2002). Based on Peterson’s (2012a) research, the communication system of MMORPG, both through written and oral communication, decreases the players’ anxiety raises the players’ risk-taking in using language at the same time. In playing any video game, the students are to deduce certain words by looking at the context and cotext (Alshawi, 2016; Godwin-Jones, 2014), while video game
provides vocabulary retention instead of memorisation (Alshawi, 2016). Based on the research by Rankin, Gold, and Gooch (2006), online game demonstrates improvement of the players’ confidence, while giving them exposure to spoken language at the same time. Reinders (2009) stated that videogame offers a lot of potential to motivate students to write a wide range of text types since it provides an extensive amount of texts to be read (Purnomo, 2015). In addition, Kallunki’s (2016) survey results showed that MMORPG is effective in teaching the students grammar and punctuation as the school supplement. He also added that reading a quest-text is far more interesting than in the classroom.

Based on the expounding about the nature of MMORPG and review of related literature above, MMORPG is seen as a promising tool to be implemented in teaching and learning language. However, there are several considerations the teacher should take into account before implementing MMORPG in ELT: (1) What are the advantages and disadvantage of MMORPG? (2) How should MMORPG be implemented? (3) What are the difficulties encountered in using MMORPG?

The Advantages and Disadvantages of MMORPG

According to Delwiche (2006), in the 1980s, the studies on video games were always related to the hazardous effects of video game toward the players’ ‘body and soul’. Video game was mostly regarded as a threatening machine with addictive effects. As a result, the studies were used to warn people to avoid this machine. Delwiche (2006) then added that in the recent years, fortunately, studies on video game have begun to emphasise on the positive effects of video game including its educational benefits.

The advantages of MMORPG use in the English classroom are mainly derived from the nature of MMORPG that are fun and interactive, as well as rich in linguistic knowledge (Zheng et al., 2012). First of all, the students are the centre of the teaching and learning processes; they are the players, and the ones who do the interactions (Prensky, 2001; Suh et al., 2010). This opportunity enables the students to fully engage in the linguistics richness and cognitively challenging environments of MMORPG (Sylvén & Sundqvist, 2012). MMORPG, with its specially designed environments, characteristics, and features, increases the learners’ motivation and confidence, lessens their anxiety, creates relaxed and low stress atmosphere to use the language (Gee, 2003; Reinders & Watana, 2015); thus, the engagement of the students becomes greater. Other factors that increases learners’ engagement are their psychological needs and wants to identify themselves through their avatars by virtualising and customising it, and construct their own second life as they please (Bers 2001; Lee & Hoadley 2007). In addition, according to Krashen’s notion of language acquisition, the lower the barrier, the higher the input the students could get. In other words, MMORPG can enhance the
students’ language acquisition. MMORPG, at certain degree, requires the players’ critical thinking to solve the problems which usually is done in a short period of time. As the nature of MMORPG which is repetitive, the students will use their critical thinking constantly, and hence MMORPG increases the students’ critical thinking and problem solving skills. At a certain degree, MMORPG also improves the students’ leadership skills (Bonk & Dennen, 2005; Childress & Braswell, 2006).

MMORPG provides the learners with opportunities to learn and use the language. The players also engage in a diverse forms of interaction, whether it is direct or indirect. In other words, MMORPG also improves the students’ pragmatic competence. Moreover, if the students play game with the native speakers, they will soon find their communicative competence increases (Reinders & Watana, 2015). MMORPG, with a certain complexity, also supports the cognitive processing and the development of strategic skills (Mitchell & Savill-Smith, 2004). The repetitive trait of MMORPG should be taken into account because it provides the students with overlearning which will lead to the automatisation and consolidation of knowledge and skills in the memory. Hence, the students can focus on understanding and practising the new knowledge and skills (Gentile & Gentile, 2008) as the nature of MMORPG is well-sequenced in levels of increasing difficulty, complexity, or pace (Paraskeva, Mysirlaki, & Papagiann, 2010). Finally, MMORPG gives an instant feedback to the players’ decision, action, and experimentation (Dickey, 2005), by which the students can instantly notice their errors and mistakes and revise them instantly without any fear due to the fact that MMORPG is accessed in a distance and with no face-to-face interaction (Gee, 2003).

In addition, the interaction will not just end as the players stop to play, for they will discuss and once again interact to the other players or communities outside the game regarding the game they play on. They usually share their problems and solutions with the other players, negotiate to make an arrangement inside the game, and other forms of social interaction in a worldwide online forum (Gee, 2003). Some gamers even create and consume game-related texts outside their playing such as tutorials, video game guide (walkthrough), fan fiction, and fan art (Chik, 2014) which are termed by (Apperley & Walsh, 2012; Consalvo, 2007) as “paratexts” or “attendant discourse” (Sykes & Reinhardt, 2013). As a result, the gamers can gain literacy experience since these kinds of texts are rich in the lexical items use and structures, and are of many genres, and practical for learning and practicing English, other than being imaginative and creative (Gee & Hayes, 2011).

Video game researchers are usually gamers who gain a lot of benefits from their play, especially in learning a language. In other words, the researchers may possess subjectivity in conducting the research for they believe that video game is an absolutely effective learning tool for learning language.
Although at certain degree, subjectivity can be used to draw the researcher’s inner experience by which the researcher can understand better the subject they research on (Schneider, 1999), controlling the researcher’s subjectivity is clearly needed (Gilbert, 1998).

In order to control the researcher’s subjectivity, video game researchers should at least understand the disadvantages of video game in ELT. Playing games in a classroom is not suitable for those who do not put interest in it (Eskelinen, 2012) and may fill the classroom a great noise (Talak-Kyrik, 2010). Once the players get overused in playing video game, it can consume their time to work individually. At certain degree, the use of video game in ELT results in an atmosphere that it is not a real learning for video game takes away much the concentration of the students. In more specific, the students tend to concentrate more on the gaming progress rather than on the learning progress (Reinders, 2009). MMORPG may also make the students do not concentrate on a more serious matter like exams. Additionally, video game will be not effective anymore when the students feel bored with the game play (Palanova, 2010).

Specifically, video game also influences players toward learning English in many ways. The effectiveness of video game in making the players learn English is still difficult to measure since it happens in such unconscious condition (Alshawi, 2016; Eskelinen, 2012). Video game also gives influences in a deeper part of learning language. Based on Eskelinen’s research, video game contains a great number of video-game-based vocabularies. Moreover, the content of a video game is often in the form of informal language which may bring bad social communication (Thorne et al., 2009). The vast number of texts included in video game often makes the players exhausted and frustrated instead of making it effective for the players to learn (Eskelinen, 2012). Table 1 below summarises the advantages and disadvantages of MMORPG:

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student-centred learning</td>
<td>Noisy learning</td>
</tr>
<tr>
<td>Enhancing motivation and confidence</td>
<td>Waste of time</td>
</tr>
<tr>
<td>Improving language acquisition</td>
<td>Not a real learning</td>
</tr>
<tr>
<td>Shaping critical-thinking and problem-solving</td>
<td>Disregarding serious educational-matter</td>
</tr>
<tr>
<td>Sharpening leadership skill</td>
<td>Hard to measure</td>
</tr>
<tr>
<td>Providing a real-life context to learn and practice language</td>
<td>Containing toxic language</td>
</tr>
<tr>
<td>Automatizing knowledge and skill through repetitive learning and practice</td>
<td>Resulting bad social communication</td>
</tr>
<tr>
<td>Giving instant feedback</td>
<td>Containing exhausting and frustrating texts</td>
</tr>
<tr>
<td>Triggering extra learning through paratexts</td>
<td></td>
</tr>
</tbody>
</table>

Table 1
Advantages and Disadvantages of MMORPG
MMORPG: An Alternative Medium in ELT

The Procedure of MMORPG Implementation

Based on the aforementioned research, the procedure to implement MMORPG inside the classroom is not clearly stated yet. According to Felicia (2011), conducting a video game requires three phases: briefing, playing, and debriefing.

Briefing. Before the implementation of video game, in this context is MMORPG; the teacher should make a clear learning objective and purpose (Talak-Kyrik, 2010), an apt game should be chosen based on the students’ level and characteristics (whether they are old or young, serious-minded or light-hearted, and highly motivated to learn or not), the teacher should make apt activities and materials. The teacher should know the appropriate time to implement the game, and teachers need to link them up with the syllabus and text book (Musbalat, 2012).

Playing. In this phase, the teacher has to explain all the necessary procedures and rules clearly and slowly (Talak-Kyrik, 2010); the teacher should gain students’ attention (e.g., cut scenes, music, or character speech), assign students into teams (Talak-Kyrik, 2010), and while the students play the game and the teacher monitors using a tool called Elephant which can save chat logs and record other game information (Godwin-Jones, 2014); when the teacher facilitates the students, guidance should be provided to thems (e.g., cut-scenes, NPC speech, hint books, cheats and walkthrough), and the teacher should be consistent. If necessary, use a timer to make sure that everyone has the same amount of time to answer (Talak-Kyrik, 2010) a list of questions that students will need to answer using the information provided in the game; all standard classroom rules and procedures should be observed when playing games (Talak-Kyrik, 2010).

Classroom Activity. Albeit the fact that gaming is a part of learning constellation (Sykes, Osko, & Thorne, 2008), if it is implemented inside the classroom, certain activities have to be chosen in order to raise the effectiveness of the MMORPG. Hence, teacher should incorporate face-to-face teaching and learning and online media through blended learning (Gleason, 2013). Sykes (2013) suggests creating “wrap-around” activities for a game such as oral or written report on gaming experience, discussion based on the game either in certain theme or in general, journaling, quizzes or exercises based on game terminologies or vocabularies, or skits based on characters.

If teacher desires deeper and/or more effective learning, one (if it is allowed by the game developer) can modify or extend an MMORPG (Godwin-Jones, 2014) for a particular linguistics purpose. The modification can be done in both gameplay elements, such as creating additional tools to the game, writing all-new scenarios, providing more detailed feedback, adding chat log, or creating new items (Calvillo-Gámez et al., 2010; Mitchell & Savill-Smith, 2004; Prensky, 2001), and
environment elements such as adding voice chat, modifying the voice recordings and sound effects, lip-syncing, and creating 3D animation (Calvillo-Gámé et al., 2010), with either extensive professional help or individually by game-authoring template or tool (Godwin-Jones, 2014).

**Debriefing.** Debriefing is the post-activity in the implementation of video game which is as essential as the main activity. In this phase, a connection should be made between the curriculum and the game after play, the teacher provides feedback, and assessment should be conducted after play. Assessment can be done, as suggested by Collentine (2011), with video recording of game players or eye-tracking methods. However, this method is time-consuming (Godwin-Jones, 2014).

**Figure 1. Three Phases in Implementing MMORPG in Classroom**

**MMORPG Implementation Obstacles**

Despite the effectiveness of video game and MMORPG in the classroom, the teachers have to take into account the obstacles that may make the ELT fail. There are several obstacles involved in using video game in the classroom (Wastiau, Kearnet, & Van den Berghe, 2009):

- **Cost.** Video game is often expensive.
- **Play Time.** An MMORPG requires a great amount of play time which is hard for the teachers to adjust the play time based on the school timetable.
- **Exclusivity.** Most of the MMORPGs are not specially developed to be used for educational purpose (Kirriemuir & McFarlane, 2003) as most of them are used for commercial purposes. Since MMORPG is not exclusively designed for teaching and learning language, it contains a lot of inappropriate contents.
- **Assumption.** Some other teachers still regard MMORPG as a video game that is a hazardous machine that can spread “mischief” for the students.
- **Credibility.** Not many talk about the use of video game yet (Campos, de Oliveira & Brawerman-Albini, 2013). Consequently, some people still doubt the credibility of its use.
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**Hard to Master.** Teachers spend more time in mastering MMORPG (Kirriemuir & McFarlane, 2003).

**Hard to Assess.** Teaching and learning with MMORPG is too complex.

**Technical Problems.** Technological tools require complex interrelated utilities.

Although there are many researchers who have found the obstacles of video game implementation in ELT, no researchers have conducted studies to solve the aforementioned obstacles.

**CONCLUSION**

This library research was conducted to inspire English teachers about an alternative medium they could use in their English language teaching in order to grasp modernity, adapt with cyber native students, as well as create a good and effective ELT class. This medium is termed massively multiplayer online role-playing game (MMORPG), which is part of broad teaching and learning media called video games. Here, MMORPG is termed as *alternative* since it is not too good and not too bad medium, yet it has applicability in ELT. In other words, MMORPG has so many advantages as well as disadvantages which require teacher to apply it wisely as otherwise, the class may become ineffective. Most of the advantages and disadvantages of MMORPG are derived from the fun nature of MMORPG. It can make the players learn and practice English on their own in a real-life context and in a motivating atmosphere, in which the players can acquire language better. However, the fun factor of MMORPG also makes the learners addicted, which will further trigger them to imitate anything in the game including the toxic languages used. This will eventually result in bad social communication. Hence, one of the wisest choices teachers can opt for is to follow a certain procedure which comprises of briefing, playing, and debriefing.

Briefing process requires the teacher to make preparation before the students play the MMORPG in the playing process. In the playing process, the students also do the classroom activities that had been designed by the teacher based on the MMORPG played. Afterwards, in the debriefing process, the teacher provides feedback for the students and assesses them. However, the teacher needs to overcome the obstacles in implementing MMORPG in ELT in order to maximise its effectiveness.

Finally, this literature review can be used for other researchers to find the gaps in the previous studies in relation to the use of MMORPG in ELT. First of all, a comparison between the effectiveness of video game and other teaching and learning media is needed for teachers to determine the effective of MMORPG. Psychologically, in relation to MMORPG, researchers can study to what extent the subjectivity affects their research. Pedagogically, the effectiveness of ELT methods that can be implemented together with MMORPG is still unclear. Finally, the obstacles found by other researchers are still left unsolved, and this opens up a big opportunity for any researcher to seek.
for the best solutions and maximise the implementation of MMORPG in ELT.

REFERENCES


Literacy Practices of Vocational Engineering Pre-Teachers in Surveying and Mapping

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ABSTRACT

Surveys carried out in some countries show that more than half of labours have inadequate literacy skills to work in environments with knowledgeable society. Hence, as an institution orientating to workforce supply, vocational education is expected to instil a habit of literacy practice, which will encourage the improvement of graduates' literacy competence. This study aims to discuss literacy practice in vocational engineering education, which supports the mastery of engineering literacy. In this research, literacy practices focus in the surveying and mapping fields. This study was carried out using semi-structured interview. Participants in this study were three tutors were from the Vocational Engineering Education Department. Data collected were results of the interviews, students’ fieldwork reports, and field observation. Findings from this study indicated that a habit of reading manuals or standards in engineering was considered low. Meanwhile, handwriting literacy habit was rare. Moreover, practical students tended to make detailed engineering design using computer applications. Communication ability to transfer information and ideas related to the results of vocational works was good, supported with technology-based presentation media.

Keywords: Engineering literacy, literacy practice, vocational education, surveying and mapping

INTRODUCTION

Literacy comprehension based on the field of expertise has not been significantly taken into account in vocational education in many developing countries. Surveys carried out in some countries depict that more than half of 25-64 year-old labourers with vocational upper secondary or post-
secondary non-tertiary education have few literacy competencies to work in environments with knowledgeable society (The Organisation for Economic Co-operation and Development [OECD], 2013, p. 51). Based on the findings of a research carried out by the World Economic Forum Global Agenda Council on Employment (Klosters, 2014), issues relating to skill, matching skill and skill mismatching still dominate problems in labour. The need to train workers to be skilful, critical, and familiar with the technology becomes an important issue in many countries to ensure that their citizens are competitive enough in the market in the globalisation era (Friedman & Friedman, 2007).

Vocational education is one type of education that focuses on the preparation of learners to have specific competencies, skills, behaviour and cooperative attitude, as well as social responsibility, and therefore enabling the young generation to take part in the economy, empower social cohesion, and become responsible citizens (Wang, 2012, p. 48). The characteristics of expected outputs from vocational education are: (1) to have professional vocational skills, (2) to have thinking ability, sensitivity, and art ability, and to show excellent moral commitment, (3) to have an ability to solve problems in real life, and (4) to have critical thinking ability and ability as an agent of change (Wagiran, 2012, p. 2601).

As a labour fulfilment-oriented educational institution, vocational education is expected to provide a broad range of skills, one of which is to strengthen numeracy and literacy skills, which are often weak for students in vocational programmes and are increasingly important in the labour market (OECD, 2011). As such, this instalment in the learning environment is expected to encourage the improvement of graduates’ literacy competencies, which later make them more ready to work and adapt to the working environment. This study aims to investigate the existing literacy practices in the vocational engineering field, which is necessary to guide tutors and authorities of education institutions in making efforts to help learners perform more literacy practices needed. The development of literacy in vocational field that increases learners’ job-related and income-generating knowledge and skills, including essential elements of functional literacy and numeracy, can assure the social well-being of citizens (Popov & Manuel, 2016, p. 24). This paper sheds a light on the literacy practices of vocational structural engineering, especially in surveying and mapping. The constructs were developed based on the circumstances of one of the vocational engineering education institutions in Indonesia.

This paper is structured as follows. We begin by considering the literacy condition of society in general and then focusing on the practices in vocational engineering education. We, further, consider the model and dimension of the literacy in the vocational engineering education field. Since the literacy practices under question are in the field of engineering, the subsequent discussion focuses on literacy in the fields of surveying and mapping. We,
afterward, consider how the need for literacy in the field of engineering is reflected in students’ written reports.

The Literacy Condition of Society

The notion of literacy is an ability to read, write and use arithmetic symbols. In reference to this definition, data from UNESCO (UIS UNESCO, 2015) revealed that the average literacy levels of people above 15 years old are 86.3% in the world, and 70.2% in Asia. Meanwhile, the literacy level of Indonesian people is reported to be higher, that is 99% for the 15-45 years old (BPS1, 2016). However, a literacy test on the aspects of understanding, using and reflecting reading results in writing in 2012 put Indonesia in the 64th ranking with 396 points (The average score is 496) (OECD, 2013). The government has continuously made efforts to improve literacy competencies of its society. Through the Ministry of Education and Culture, the government has targeted an average literacy level of society of 96.10% and a PISA score of 414 in 2019 (The Ministry of Education and Culture of Indonesia, 2015, p. 50). To reach the target, the government has started the school literacy movement (Gerakan Literasi Sekolah, GLS) in educational institutions in order to develop them to become organisations for learning which make all members lifetime learners. This movement is carried out to foster learners’ reading habits and improve their reading skills, and therefore, knowledge can be mastered well (Direktorat Pembinaan SMK [DitPSMK], 2016, pp. 2-3). In the vocational education programme, improvement of literacy competence is considered as part of the basic competencies of working to meet industrial needs. These efforts are realised with language skill reinforcement of vocational school students as one of the strategic policies to achieve the programme of ‘Indonesia Smart’ (The Ministry of Education and Culture of Indonesia, 2015, pp. 32-33).

Literacy in the Vocational Engineering Field

The National Adult Literacy Survey (NALS) (Kirsch, 2001) defines literacy as an ability to understand and conduct written information in daily activities, whether at home, at the workplace, or in the society, in order to achieve the goals and develop the knowledge and potential of an individual. Literacy competencies, based on each discipline, need to be involved as competencies provided in vocational education (Bak, 2015, p. 50). To reach the target, the government has started the school literacy movement (Gerakan Literasi Sekolah, GLS) in educational institutions in order to develop them to become organisations for learning which make all members lifetime learners. This movement is carried out to foster learners’ reading habits and improve their reading

1Central Bureau of Statistics
Literacy competencies will have an effect on literacy levels by each discipline, one of which is literacy in the engineering field, which is known as engineering literacy. Engineering literacy is defined as an individual’s ability to use, manage and master technology (Rhodes, 2003). Literacy related to the area of expertise needs to aim at developing learners’ competencies to be involved in social, semiotic and cognitive practices in accordance with what experts have done in a certain field. Any attempts to develop literacy related to the certain field will further work at optimum when they are performed in learning contexts and environments which are suitable for each discipline (Zhi, 2014, p. 444).

Nonetheless, the literacy practice of vocational engineering education does not seem to receive much attention. A few prior studies have been done to investigate it in some areas. Among other, Parkinson and Mackay (2016) investigated the literacy practices of trades training in Carpentry and Automotive Technology. They identified that students were faced with spoken language practices, which differed from everyday language in being highly technical, and read a wide variety of texts, including complex professional texts. Hare and Kulog (2015) analysed the students’ skill level of visual literacy in architectural education. They proved that visual literacy could be enhanced by means of other branches of art within the architectural education. Hallajow (2016) conducted a study to understand Syrian university students’ electronic literacy practices and the factors influencing these practices. The findings revealed that Syrian university students used a variety of languages in their electronic literacy practices and some technical issues were identified as the factors influencing these practices. In this study, literacy practices in the vocational engineering field, especially in surveying and mapping, were reviewed from four basic competencies as four models of literacy according to Freebody and Luke (2003).

Literacy Models and Dimensions in the Vocational Engineering Field. Freebody and Luke (2003) postulated that effective literacy needs four basic competencies as four models of literacy. Those four competencies are equally important and do not have to be recognised respectively, or hierarchically. The first competency is beatable able to understand the context of the text, which involves recognising and using features like the alphabet, voice, spelling, conventions, and text pattern. The second competency is understanding and arranging meaningful text, which involves comprehending and arranging written, virtual, and oral texts in a certain culture, institution, family, society, country, etc., and describing a scheme. The third competency is using texts functionally, or for certain purposes. This is the ability to find out that texts have different cultural and social functions, both inside or outside educational institutions. This function is closely related to how text is composed, intonation for pronouncing text, the degree of formality of text, and the order of text components.
The fourth competency is analysing text critically, that is, understanding and acting based on the knowledge that texts are not neutral. Texts represent certain points of view and can influence people’s ideas.

Literacy does not only focus on reading and writing but also on some ways in which people compose meanings by creating symbols, which they do by themselves through various modes and media. This literacy, using a multimodal approach, will make a symbol as a combination of meaning and form (Heydon, 2007). Literacy in the vocational engineering field has more tendencies to involve symbols related to the elements of technology and measurement.

Vocational engineering literacy covers three dimensions which are interdependent and inseparable, namely knowledge, critical thinking and problem-solving, and skill. The knowledge dimension includes recognition of a great use of technology for daily life, understanding of basic concepts and types of technology, and understanding that all types of technology have their risks. The critical thinking and problem-solving dimension comprises directing important questions related to the benefits and risks of technology usage and participating in decision-making related to the development and usage of technology. The dimension of skill consists of competency in operating devices and ability to identify and find solution for any problems dealing with technology (Becker, Hodge, & Sepelyak, 2010, p. 3).

METHODS
Research Design
In order to explore vocational engineering literacy practices, this research was carried out using semi-structured interviews in the Gadamerian hermeneutic approach (Gadamer, 1989). A hermeneutic approach was taken because the aim of this study was to explore the experiences of vocational engineering tutors with students’ literacy practices.

Participants
Three tutors from the Vocational Engineering Education Department were nominated as the research participants. The tutors taking part in this study met the inclusion criteria: they had already taught in the vocational engineering field, especially in surveying and mapping, for 10 years at the minimum. We regard the tutors as expert informants, who, besides having teaching experience for a number of years, have also worked as professionals in surveying and mapping trades. They have both an expert’s insight into the literacy, as well as a tutor’s insight into the aspects of that literacy that are problematic for students. The research objectives were explained to the participants, who were later interviewed individually by the researcher.

The tutors are expected to provide information about all literacy tasks students engage in, some efforts which tutors have done to familiarise the students with literacy,
written, read, or spoken, as well as the difficulties which students faced in literacy.

**Procedures**

This research was interpretative. In-depth interviews were carried out with each tutor. Open questions were posed to the tutors in accordance with the character of hermeneutic inquiring, which is interpretive and not governed by predetermined questions (Geanellos, 1999, p. 24). This approach was selected to get a broad and inclusive idea of all the literacy tasks students engage in, in the first instance, without limiting the focus by referring to specific contexts or genres. This allowed the interviewer to ask more specific questions in response to the information that each tutor had provided.

The first interview focused on the educational background of each participating tutor, including working experience in engineering. Additional information included experiences in improving literacy, both general and particular engineering ones. The subsequent interview focused on tutors’ experiences in observing students’ literacy practices in the engineering field today. Literacy practices seen from reading and writing activities are related to particular tasks according to the learned engineering field. Information obtained related to students’ difficulties in understanding literacy in the engineering field during learning and when practising in real working life.

**Data Analysis**

Data in this study were analysed using the model from Geanellos (2005). This model reflects Gadamerian philosophy and hermeneutic principles by using pre-understanding, the hermeneutic circle and "openness" (Johansson, Hanson, Runeson, & Wahlin, 2015, p. 244). Data from the interviews were transcribed. The transcripts of the interviews were repeatedly read in their entirety to appreciate the whole text (all interviews) in relation to its parts (individual interviews).

The first level of interpretation was the reduction, which was finding specific meanings from the whole texts. Several thousand words were thus reduced to several hundred specific meanings. Then, the second level of interpretation was integration. Here, common elements were identified and grouped into sub-themes. The third level was aggregation, in which sub-themes with shared meanings were clustered under themes. Finally, throughout all the interpretation, a reflection was engaged. A meta-theme was developed by simultaneously focusing on the fragments, sub-themes, themes and full texts (Geanellos, 2005).

The author also collected a small corpus of students’ writing, including in particular, ten examples of the students’ field notes and ten examples of students’ final reports. These were transcribed and analysed for discourse features such as personal/impersonal language, mood, and students’
understanding of engineering literacy. Interactions between numbers, texts and diagrams, and sketches in the students’ field notes and the final reports were also considered. The course books that students in the surveying and mapping course read were also studied. These data sources were supplemented by on-site observations.

RESULTS

A thematic overview of the vocational engineering tutors’ experiences with students’ literacy practices is described in Figure 1 below.

Figure 1. A thematic overview of the vocational engineering tutors’ experiences with students’ literacy practices

Meanwhile, the relation between literacy dimensions for each basic literacy competence and their related activities observed in this research was composed in Table 1.

Table 1
The relation of basic literacy competencies, literacy dimensions, and related activities

<table>
<thead>
<tr>
<th>Basic literacy competence</th>
<th>Literacy dimension</th>
<th>Related activities (that support literacy practices)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognising and using text patterns and features</td>
<td>Knowledge</td>
<td>Reading course book, manufacturers’ specifications, tools’ manual book, work safety guidance, and to apprehend the concept of technology</td>
</tr>
<tr>
<td>Critical thinking and problem-solving</td>
<td>Related activities (that support literacy practices)</td>
<td></td>
</tr>
<tr>
<td>Skill</td>
<td>Operating technology appropriately based on the text patterns listed in the tools</td>
<td></td>
</tr>
</tbody>
</table>
Anis Rahmawati

Thus, vocational engineering students drew upon a wide range of sources in learning and using some activities to support basic literacy competencies achievement. Furthermore, the discussion focused on the current literacy practices in surveying and mapping which are described as themes and sub-themes, as illustrated in Figure 1. The comments here are based not only on the interviews from Katty, Willy, and Bian (three of the surveying and mapping tutors) but also on a small corpus of 10 students’ field notes and final reports.

### Table 1 (continue)

<table>
<thead>
<tr>
<th>Basic literacy competence</th>
<th>Literacy dimension</th>
<th>Related activities (that support literacy practices)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composing written and oral texts along with drawing schemes</td>
<td>Knowledge</td>
<td>Composing written field notes containing data, tables, and schemes by the purposes</td>
</tr>
<tr>
<td></td>
<td>Critical thinking and problem-solving</td>
<td>Composing written field notes containing data, tables, and schemes based on the available technologies to achieve the goals</td>
</tr>
<tr>
<td></td>
<td>Skill</td>
<td>Composing written and oral procedures containing work implementation, problems, and solutions</td>
</tr>
<tr>
<td>Using texts for specific purposes</td>
<td>Knowledge</td>
<td>Composing written field notes containing data, tables, and schemes by employing technology</td>
</tr>
<tr>
<td></td>
<td>Critical thinking and problem-solving</td>
<td>Composing work reports in the forms of tables and schemes by employing technologies</td>
</tr>
<tr>
<td></td>
<td>Skill</td>
<td>Composing written field notes containing data, tables, and schemes by employing technology</td>
</tr>
<tr>
<td>Analysing texts</td>
<td>Knowledge</td>
<td>Understanding the course book, manufacturers’ specifications, tools’ manual book, and work safety guidance according to their functions</td>
</tr>
<tr>
<td></td>
<td>Critical thinking and problem-solving</td>
<td>Using texts in the field of vocational engineering based on their functions, i.e. for asking questions, making decisions, as well as solving problems related to surveying and mapping subjects in the vocational engineering field</td>
</tr>
<tr>
<td></td>
<td>Skill</td>
<td>Using texts in the field of vocational engineering based on their functions in order to utilise vocational engineering technology</td>
</tr>
</tbody>
</table>

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Recognising and Using Text Patterns and Features

Learning activities in the current vocational field put the emphasis more on skill mastery than practical activities. Meanwhile, literacy mastery was sometimes ignored. According to Katty, one of the surveying and mapping tutors, in the Surveying and Mapping practical course, basic literacy competencies in utilising text features and patterns in the dimension of knowledge and critical thinking were implemented in reading the course book, manufacturers’ specifications, tools’ manual book, and work safety guidance, to apprehend the concept of technology. Detailed working steps of taking land data and procedures for operating surveying devices were explained in the course book. Meanwhile, the dimension of skill was implemented in the measuring process by reading needles on the measuring instrument. Unfortunately, most students think of a vocational course as merely a practical course, so they maintained that reading was not sufficient in the vocational course.

Willy: “Most practical students obtained information from the explanation of tutors on the procedures for using devices. They did not read directly from the course book. Through intensive guidance and training, most of the practical students could set and operate field measuring device well. It needs more efforts and appropriate strategy from tutors to encourage active reading and aid understanding of their students.”

Composing Written and Oral Texts along with Drawing Schemes

Based on the interviews with tutors, characteristics of the Surveying and Mapping course were done by taking land’s data first (surveying stage), followed by composing the sketch of a map based on the data (mapping stage).

Bian: “Students practicing their abilities in composing written texts by arranging written fields notes and final reports on the results of the survey, both in tables and pictures. Pictures in field notes usually were drawn manually, while pictures in the final reports were drawn with the help of computer application. They also constructed their ability in composing oral texts by presenting the results of the survey.”

Oral presentations on the implementation and the results of work were done at the end of learning activities. Through these activities, practical students were accustomed to communicating actively and effectively by using technical and sub-technical vocabulary that professional surveying workers use. Therefore, having the ability to talk like a professional has a function of being able to communicate both on-site while working, and in more informal situations (Parkinson & Mackay, 2016, p. 41).

Furthermore, the results of field measurements were manifested into images as media for presentation. Numeric field data were not easily understood. Therefore,
images could help ordinary people with limited engineering literacy understand the results of surveying and mapping. To be a master in vocational literacy, a student needs the ability to conduct, understand and communicate measurements. Holmes and Woodhams (2013) examined learning processes taking place at a construction site. Practical students interacted with and learned directly from various parties involved in the construction process including construction workers (bricklayers), foremen, and supervisors. In such an interactive learning process, students involved visual means like detailed engineering design, diagrams, and tables.

Using Texts for Specific Purposes

Based on the in-depth interviews with the surveying tutors, related activities that support basic literacy competence of using texts for specific purposes in the dimension of knowledge and critical thinking were performed in the activity of understanding the meaning contained in surveying manufacturers’ specifications and tools’ manual book, as well as course books, according to their functions. These books consist of many symbols or patterns which are specially applied in surveying and mapping technologies. Being literate in surveying fields means that students have the ability to break the written code of a system of symbols specific to these fields (Bhola, 1995, p. 4).

Bian: “I always told to students to read the manual book and course book before entering course class. There are so many symbols and pattern that used in surveying and mapping. Worse understanding of that symbols will bring difficulties in surveying process as well as mapping. However, most students showed that they disliked reading. Only a few members of them that read course book and almost no student read tools manual book. Tutors have to give oral briefing dealing with the process of surveying, tools operation procedures, till mapping procedures. If there is information needed, they tend to ask either the instructor or the peer.”

Willy indicates that students’ literacy practice in writing has been going well enough. Students were familiar with composing written reports, both reports of field data and scientific writing papers. Calculations and sketches of calculation results were written in the reports. However, when composing, they were still dependent and required intensive guidance. Some symbols in surveying and mapping were used improperly. Improper utilisation of measuring devices was a crucial factor in surveying and mapping. Mistakes in using measuring devices would automatically generate false data, and hence, the measurement results would not meet the real conditions in the field.

Analysing Texts

The interviewees noted that the ability to analyse texts in the dimension of knowledge, critical thinking and problem-solving was carried out through activities in understanding the course book,
manufacturers’ specifications, tools’ manual book, and work safety guidance in the field of vocational engineering based on the context of surveying and mapping technology. Meanwhile, the ability to analyse texts in the dimension of skill was carried out through interpreting data of the results of measurement into sketch pictures of the location. Activities like interpreting data, calculating distances and angles, and drawing the sketch based on calculated distances and angles were also performed.

Katty: “Many students said that it was hard to understand the specification or manual books. That is why they dislike reading that books.”

Willy: “Oral briefing given by tutors in the front of course session. This briefing gives students information about how to operate tools, take data measurements, and compose a location drawing sketch base on that data. However, in fact, in the stage of reports preparation, students still need intensive guidance to interpreting data measurements and translate them to be a sketch of a map. When students were asked to read a sketch of the map from a measurement, they can read but not fully understand the meaning of the sketch.”

**DISCUSSION**

Literacy is now seen as the foundation for life skills ranging from basic oral and written communication to the ability to solve complex scientific and social problems. Globalisation today has become the entrance gate of the promulgation of technology around the world. Technology is a means to facilitate humans’ activities. However, in order to make use of technology properly and effectively, users would have to understand the working procedures of technology which are put in manuals, whether in the forms of words, pictures, the combination of words and pictures, or videos. Here, good literacy competence, in the context of literacy in the engineering field, is required in order to understand the manuals.

Manual books, as well as standards book, are usually written in the highly condensed language, which needs experience and insider knowledge to decode and understand. The manual books also impose challenges to students because they were written in a foreign language, or even translated into Indonesian, while and some might have been poorly translated. These often make students reluctant to make use of the manuals and standard books as their source of information, and prefer asking questions and getting explanation from their tutor, whereas in the real work field they should be able to solve the problem of tools or calculation methods through the standard books.

The main finding from this research was that reading practice has been given less attention among vocational engineering students while reading skill plays an important role in making someone a lifelong learner that will enable them to adapt to any working environment. In order to enhance the literacy skill of vocational students, efforts to help students perform more literacy practices through their daily
learning activities are necessary. The relevant parties that can be involved in these efforts are tutors, education institutions, and the government. The involvement of each party is crucial in the effort to develop literacy reading habits, as listed in Table 2:

Table 2
The involvement to develop literacy reading habits

<table>
<thead>
<tr>
<th>Government</th>
<th>Educational institution</th>
<th>Tutor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy (e.g., school literacy movement)</td>
<td>Implementing the government’s policy</td>
<td>Instructing students to read the literature before giving explanations</td>
</tr>
<tr>
<td>Providing facilities and infrastructure</td>
<td>Providing facilities and infrastructure that support reading habits</td>
<td>Referring students to the corresponding literature</td>
</tr>
<tr>
<td>Monitoring the implementation of the policy</td>
<td></td>
<td>Monitoring and evaluating students’ activities in literacy</td>
</tr>
</tbody>
</table>

After improving students’ reading habits, what needs to be done next is to improve their ability to understand the text. Being able to read a text does not mean that a student can understand it. The student needs the ability to analyse text to find the meaning. Parkinson and Mackay (2016, p. 42) recognised that reading involves more than being able to decode the words. Being able to understand and communicate measurements is one ability that should be learned to master vocational literacy (Popov & Manuel, 2016, p. 24). Literacy practice which enables students lead to their fuller participation in economic and civic life could be reached through the application of a literacy programme that imparts not only reading and writing skills but also professional and technical knowledge (Bhola, 1995, p. 12).

The skills of speaking, literacy, and counting would be useful for workers’ career development. Skilful workers who want to develop their career need to do various and more complex tests. These tests require the skills of speaking, literacy, and counting. Technology and safety standard improvements also need good literacy skills. Literacy skills affect the safety and security of the workplace. People with a low level of literacy are high-risk as they cannot read and understand the safety and security instructions, particularly at high-risk workplaces such as farming, manufacture, and transportation constructions (Campbell, 2008, p. 3).

CONCLUSION

The research findings on literacy practices in surveying and mapping show that the basic competencies in recognising and utilising text patterns and features through reading habituation of literature related to technology have rarely been implemented. The ability to compose written texts and use them for specific purposes in three literacy
dimensions has been well implemented through activities in composing written field notes and final reports. Practices dealing with the ability to analyse texts in the dimension of knowledge and critical thinking have been implemented in some activities like searching for information relevant to workplaces which will be produced through course book and other sources. In addition, interpreting data resulting from measurement activities has also been carried out. However, the dimension of skill still has to be improved, especially in making students familiar with solving problems related to technology through available texts like manuals.

ACKNOWLEDGEMENT

We acknowledge the time, thought, experience and insight of the tutors interviewed in this study.

Note: All names quoted are pseudonyms.

REFERENCES


Wagiran. (2012). Mewujudkan paradigma Vocational Education For All (VOEFA) melalui strategi kerjasama sinergis [Achieve Vocational Education For All (VOEFA) paradigm through synergistic cooperation strategy]. *International Seminar Reformulating the Paradigm of Technical and Vocational Education*, 2599–2611.


Development of the Science Skills of Lower Secondary Students in a Chemistry Laboratory Experiment

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ABSTRACT

The aim of this study is to determine the existence of science process skills (SPS) on the topic of reaction rate. The research design used survey as the methodology. The sample contained 40 students from Grade 11 at one senior high school in Karanganyar, Indonesia. The science process skills of the students were assessed using a performance assessment and observation sheets. The instrument used for performance assessment is a rubric that consists of descriptions of four levels of performance, comprising low, medium, high and very high. The science process skills assessed were observing, data recording, communicating, inferring, experimenting and data interpreting. Results showed that the highest value for science process skills was achieved in communication and the lowest in data recording.

Keywords: Chemistry, problem solving, reaction rate, science process skills

INTRODUCTION

The chemistry curriculum generally combines numerous abstract concepts, and they are the centre of learning Chemistry and any other fields of study (Taber, 2002). These concepts are very important since advanced Chemistry, science concepts or science theories are not easy to understand if the underlying concepts are not really comprehensible for the students (Ayas & Demirbaş, 1997; Nakhleh, 1992; Nicoll, 2001; Zoller, 1990). Chemical characteristics that are abstract indicate that learning chemistry requires a high level of critical thinking skills (Fensham, 1988). The constant interaction between the macroscopic and microscopic levels...
of thinking is considered important with respect to the chemical characteristics that are a challenge for those who are beginning to learn Chemistry (Bradley & Brand, 1985). The language of the chemists can be a barrier to the understanding of chemical because the language is symbolic and alphabetic (Sliwka, 2003). The characteristics of chemistry are conceptual, and frequently obtained from rote learning (reflected from recall, which is efficient for exam). Understanding requires a conceptual comprehension to be achieved in a meaningful way. Therefore, students demonstrated their understanding in their answer sheet, while the researchers found misunderstandings; they have learned by memorising certain parts of basic chemistry that they do not understand at every level (Johnstone, 1984).

Johnstone (1991) states three levels of chemistry that should be learnt explicitly; sub-microscopics, macroscopics and symbolics, and the relationship among those levels which should also be learnt, as shown in Figure 1. Moreover, the interactions and distinctions between them are important characteristics in Chemistry and are necessary to understand the concepts. Therefore, the difficulties found by the students at a certain level will affect the other levels as well. Johnstone (1984) and Sirhan (2007) explained that the students would find it difficult to learn the concepts’ characteristics in Chemistry, along with the represented concepts (macroscopic, microscopic, or representative). As a result, the method used by the learners potentially contradicts the nature of science and influences the teacher’s use of the traditional method (Johnstone, 1980).

Science process skills can be developed using appropriate educational activities since it requires the students to perform critical thinking and scientific enquiry. In order to broaden their knowledge, the students should be accustomed to finding out ‘how to know’ instead of ‘what to know’ as early as possible, even when they are still in elementary school. Laboratory experience allows students to develop their problem solving and science process skills to provide conceptual development and promote a scientific attitude and scientific enquiry. The process skills play a role in the emergence of these skills; moreover, the mastery of operational outcomes should be considered as the foundation of their understanding of science. The cardinal philosophy guiding the science educational scenario is built by a strong belief and practice during the teaching and learning process. This research deals with the conceptual details of science process skills combined with the indicators, and it purposely addresses the challenges leading to global excellence in education (Sheeba, 2013).

Figure 1. The Chemistry Triangle (Johnstone, 1991)
Development of the Science Skills

The accumulated and systematised body of knowledge, which is the ‘product’ of science, has a dynamic counterpart, method of inquiry, which is the ‘processes’ of science. It means that the combination of processes and products create the science, and they are related each other.

Process skill is commonly defined as the cognitive process by which the learners are engaged during the learning process. Meanwhile, the product skill is created by the use of the process skills by the learners. The learners emphasise process skills in science, and, as a result, it is called process skills in science. Furthermore, it is also defined as the reflection of the method used while producing information on science; this is divided into intellectual skills, associated psychomotor skills and effective skills focusing on the all aspects of learning science. The skills pertain to several domains, including the cognitive domain, and include comparing, communicating, inferring, predicting, using number relations and time/space relations, and making operational definitions, framing hypotheses, controlling variables, interpreting data, generalising, raising questions, applying, quantifying, evaluating, designing investigations, and finding relationships and patterns.

Akinbobola and Afolabi (2010) view science process skills as the cognitive and psychomotor skills used in problem solving, problem identification, data gathering, transformation, interpretation and communication. According to Ozgelen (2012), science process skills are the thinking skills that scientists use to construct knowledge during problem solving and result development. This indicates that the skills are integral and natural to scientists. They are the instrument for the study and generation of scientific knowledge; whereby science learning and development of science process skills are integrated activities. The science process skills, along with the knowledge those skills produce and scientific values and habits of mind, define the nature of science (Funk, Fiel, Okey, Jaus, & Sprague, 1995).

The literature review illustrates that science process skills can be developed by the students in authentic learning (Keys & Bryan, 2001). The teachers need to adopt an enquiry-based approach to teach science as part of the teaching and learning process. Remziye, Yeter, Sevgül, Zehra and Meral (2001) found that the use of an enquiry-based approach significantly improve students’ science process skills and behaviour. Bilgin (2006) explained that the students would more successfully achieve science process skills and have a more positive behaviour regarding the science itself, compared with the ones experiencing the traditional method when the teaching-and-learning activities and practice process are conducted at once. Burak (2009) investigated the relation between science process skills and the use of a laboratory that is efficient and the science in Chemistry.

SAPA categorises the science process skills into two kinds, which are basic and integrated. Basic skills that provide the foundation for learning are used particularly for basic cognitive function in elementary
school. Moreover, these skills also build the foundation for the advanced skills and problem solving abilities. They represent the foundation of scientific reasoning that learners are required to master before acquiring and mastering the advanced, integrated science process skills. The basic science process skills are interdependent. This indicates that investigators may display and apply more than one of these skills in any single activity (Akinbobola & Afolabi, 2010; Funk et al., 1995). The basic science process skills, which are defined by the American Association for the Advancement of Science (AAAS), are observing, classifying, measuring using time/space relations, using number inferring, communicating and predicting.

The integrated science process skills used in problem solving cover several skills such as identifying variables, constructing tables of data and graphs, describing relationships between variables, acquiring and processing data, analysing investigations, constructing hypotheses, operationally defining variables, designing investigations and experimenting (Funk et al., 1995). Integrated contextually means that the learners are told to combine the basic process skills for greater expertise and flexibility to design the tools during the phenomena investigation, which leads to the realisation and achievement of integrated science process skills.

In fact, some teachers have limited time to implement laboratory experiments. This leads to students having difficulties when performing laboratory experiments (Utami, Saputro, Ashadi, Masykuri, & Aminah, 2016). Science process skills not only need to be achieved by scientists but by every individual, otherwise it is difficult to be successful in life (Rillero, 1998). Many students fail to understand that the results of the reaction and reaction rate are different concepts (Kousathana & Tsaparlis, 2002). Demircioglu and Yadigaroglu (2011) conducted a study to determine the effects of the use of laboratory methods on students’ understanding of the rate of chemical reactions showing significant differences in students’ achievement at the level of chemical reactions between experimental groups taught by teaching laboratory methods and control groups taught by traditional approaches. Scientific enquiry activities effectively enhance students’ learning achievements and integrated science process skills (Lati, Suparson, & Promarak, 2012).

In learning about the chemical reaction rate, students conduct experiments in a laboratory on the factors that affect the rate of reaction. The students observe the effects of surface width and concentration affecting the reaction rate. While conducting an experiment, an assessment regarding the science process skills is conducted including observation, communicating, inferring, experimenting and interpreting data. This study is guided by the objective to determine the science process skills included in the chemistry practical examinations on the factors influencing the rate of reaction.
METHODS
Science process skills can be acquired and developed through activities in the practical chemistry sessions on factors that affect the rate of reaction. In practical work, an opportunity to test the application of scientific procedures, manipulative abilities and scientific skills is available. This research used the survey method. The population was 40 students of a Grade 11 class at one senior high school in Karanganyar, Indonesia. As for the students’ characters during the learning process, they were found to get easily bored while learning, with most of them did not pay attention in the period of learning, and they lacked the ability to repeat the material that was submitted by the teachers. The observation illustrated that the level of students’ activity in learning was also low, which could be clearly seen when discussions were taking place, whereby only a few students asked questions or indicated his/her mind, and there was little work at the time of the discussion.

The science process skills were assessed using performance assessment. Performance assessment uses a rubric consisting of descriptions of four levels of performance for a given standard, each of which is assigned a score ranging from low to high. The performance assessment of the science process skills includes observation, recording data, communicating, inferring, experimenting and interpreting data (Marzano, Pickering, & McTighe, 1993). The rubric for the science process skills can be seen in Table 1.

Table 1
Rubric of the science process skills

<table>
<thead>
<tr>
<th>Science Process Skills</th>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation and recording data</td>
<td>1. There are graphs and tables</td>
<td>4 = If 5 indicators appear</td>
</tr>
<tr>
<td></td>
<td>2. Labelled correctly</td>
<td>3 = If 4 indicators appear</td>
</tr>
<tr>
<td></td>
<td>3. The results and data are recorded clearly</td>
<td>2 = If 3 indicators appear</td>
</tr>
<tr>
<td></td>
<td>4. Organized so it is easy for the reader to see trend</td>
<td>1 = If 2 indicators appear</td>
</tr>
<tr>
<td></td>
<td>5. There is a written description of the data</td>
<td>4 = If 5 indicators appear</td>
</tr>
<tr>
<td>Communicating</td>
<td>1. They always listen to the explanations of friends who are presenting</td>
<td>3 = If 4 indicators appear</td>
</tr>
<tr>
<td></td>
<td>2. They always appreciate the opinions of friends in discussions, whether received or unacceptable</td>
<td>2 = If 3 indicators appear</td>
</tr>
<tr>
<td></td>
<td>3. The students communicate (greet each other) politely to all their group of friends</td>
<td>1 = If 2 indicators appear</td>
</tr>
<tr>
<td></td>
<td>4. The students have discussions with all their group mates</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. They always accept criticism and suggestions from friends in discussions</td>
<td></td>
</tr>
</tbody>
</table>
RESULTS AND DISCUSSION
The purpose of the experiment on the factors that influence the reaction rate in this study is to determine the effects of concentration on the reaction rate and the effect of surface area on the reaction rate.

Effect of concentration
The students conducted experiments on the effect of concentration on the rate of reaction by mixing two solutions; sodium thiosulphate (Na$_2$S$_2$O$_3$) and hydrochloric acid (HCl). The solution of sodium thiosulphate was given in various concentrations. Then, the glass beaker was placed on a paper with a large cross mark based on their size. The students recorded the reaction time of the solution, i.e. how long it takes or the time taken for the mixture to turn turbid and for the cross mark on the paper to no longer be visible. Based on their observation and record of data, students would take note of the time required for the reaction.

Then the students determine the faster reaction, as well as the low or high concentration of sodium thiosulphate. In this case, it is the high concentration of sodium thiosulphate. This is because substances that contain large concentrations have a greater number of particles, so the particles are arranged more densely than in the low concentration substances. The particles have a more dense structure, and would often collide with the particles arrangement
Development of the Science Skills

than tenuous, so there is the possibility of a greater reaction.

Influence of Surface Area

In the experiment on the effect of surface area, students mixed eggshell/calcium carbonate (CaCO$_3$) with a solution of hydrochloric acid (HCl) in a container that was covered by a balloon. The reaction produced a gas that expanded and filled up the space in the balloon. The time taken for the balloon to become upright was recorded for the variations, which were for the crushed eggshells and those in an intact form. From this experiment, the students identified the reaction rate to see which of the two had a faster reaction, the eggshells that had been crushed and those in the intact form. The substance reacts faster in powder form than when the substance is in the form of chips. This is because the substance in powder form has a much wider field so that collisions are more likely to occur. The total surface area of a substance is enhanced when it is in pieces of a reduced size. The more refined a substance is, the greater the rate of reaction will be because the reacting surface area is even greater.

From the experiments, it is understood that (1) students were not able to discuss the results of the laboratory work as intended, and (2) students were not able to conclude the experiment done exactly as intended. Based on the interview of the students, it should be noted that the students did not have enough time to answer the questions and analyse the answers completely. If there was any discrepancy with the theory, the students were not able to provide a critical analysis. The theory included in the report is still not appropriate to the purpose of the laboratory experiment (too wide or too little). The chemical reaction that occurs still has a lot of mistakes.

In the laboratory, the students actively performed the experiments and cooperated with their friends in the group. The results showed that the average yield of the science process skills obtained by the students are as follows: observation and recording data (63.8%), communication (92%), and inference (71.8%), experiment (63.8%), and interpretation of data (65%). Some students still find it difficult to conduct the experiment. Figure 2 indicates the students’ science process skills results based on the rubric.

![Figure 2](image)

Figure 2. Students’ science process skills results based on the rubric
For the observation of the obstacles encountered by the students during the experiment, the students were given observation sheets. From the observation sheets, it was clear that the students did not understand how to write a hypothesis in the lab report. In writing the report, there were students who did not describe their observations. As for the indicator of the students who were able to answer questions to analyse the experiment properly, they did not have enough time to open any book to add to the answers and analyse them.

According to Siska, Kurnia and Sunarya (2013), the application of an enquiry model on a reaction rate can significantly improve science process skills, with an average result of 71.9%. The highest score was achieved on the prediction skills, while the lowest score was on communication skills. According to Harlen (1999), the mastery of science process skills allows students to have a deeper concept and know the content, and equips them for acquiring content knowledge later on. Content knowledge is efficiently acquired and understood when it is obtained through enquiry using science process skills. A science curriculum emphasising science process skills could potentially enable the students to improve critical thinking skills, creative thinking and decision making. These skills can be transferred to other disciplines (Halim & Meeran, 2012).

According to Rauf, Mansor, Rasul, Otman and Lyndon (2013), the process of teaching and learning science has additional advantages, providing chances for the inculcation of the science process skills. It also provides students with the opportunity to learn independently when acquiring some of the skills. The use of various teaching approaches is in juxtaposition with each other. The science teaching-and-learning process is a dynamic process, in which movement from one teaching approach to another occurs and does not necessarily always occur in an orderly sequence. Hence, the use of various teaching approaches in a single lesson can create more opportunities for the inculcation and acquisition of science process skills in the classroom. Ong, Tuang, Yassin, Baharom and Yahaya (2013) concluded that students’ mastery levels do not reach the two-thirds standard for overall science process skills, basic and integrated science process skills, as well as for each of the particular 12 science process skills, namely the skills of: (1) observing; (2) classifying; (3) measuring and using numbers; (4) inferring; (5) predicting; (6) communicating; (7) using space-time relationship; (8) interpreting data; (9) defining operationally; (10) controlling variables; (11) hypothesising; and (12) experimenting.

**CONCLUSION**

A laboratory chemistry experiment on the topic of reaction rate can enhance the science process skills that help students to learn to understand the concept of the effect of concentration and surface area on the reaction rate. Students discover knowledge with measures such as scientists, and it makes the students active and helps to
improve their observation and record of data observation, experimentation, interpretation of the data, as well as communication and inference of the experiment results. The results showed that the highest value of science process skills is for communication skills and the lowest is for the collected data. The acquisition of science process skills allows students to learn through investigations and empowers them to act on information to generate solutions to problems.

REFERENCES


Practices of Inquiry-based Science Education: Case Study of Thailand’s Junior High School

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ABSTRACT

Inquiry-based science education (IBSE) has become a prominent approach in science educational reform in all countries. This research is a case study to analyse the practices of IBSE in the science class of one Junior High School in Chiang Rai, Thailand, as part of the overseas teaching practicum project conducted by SEAMEO. Respondents were two Filipino teachers of the English Programme Class, and have worked for three years. Adaptation of IBSE in the curriculum was captured by analysing the Thai’s science curriculum. The concepts of IBSE were analysed in the teachers’ syllabus and lesson plans. A series of classroom observation was also done to check the real practices of IBSE, while all activities were noted and recorded. Additional information on teachers’ perspectives on IBSE had been obtained through structured interviews. Analysis was based on the Tafoya’s concept of inquiry levels to examine the type of inquiry. The research confirmed that the concept of IBSE has been written in the lower secondary science curriculum in Thailand. Both teachers have shown relatively good perspectives on science and IBSE, and commonly applied the structured inquiry, in which teachers still dominate the learning process, but students have also been involved.

Keywords: Inquiry-based science, junior high school, Thailand

INTRODUCTION

Teaching meaningful science is a real challenge for secondary teachers in many countries. Designing an innovative science class will not be possible if the teacher, as the architecture of instructional design, does not have adequate knowledge and skills of the science curriculum and pedagogical
strategy. As proposed by Shulman (1987) in his paper, teachers should acquire a basis of knowledge for teaching, i.e. aggregation of knowledge, understanding, skills, and technology, of ethics and disposition, of collective responsibility, as well as a means for representing and communicating it.

To improve the quality of lesson planning, routinely the teacher will break down the national curriculum into practical lesson plans in detail by working individually or in a team of teachers. Teachers are required to consider the principles of teaching and learning science, such as it should be an active, innovative, creative, effective, and meaningful learning process. Science learning is expected to change students’ mindset and attitudes, develop thinking skills, promote scientific behaviour, and provide an opportunity for them to achieve the best learning outcomes that match the targeted competencies.

However, the quality of science education also depends on students’ perceptions, behaviour, and attitudes relating to science. Students, according to the research carried out by Meyer and Crawford (2015), assume that science is as a way to find out about things, reading a book, making progress, as well as doing experiments and quizzes. Following their participation in scientific activities, students are able to enhance their understanding of the scientific processes and of the active role of the scientist in observing, analysing, and making inferences. In fact, science is not only a subject at school, but it also includes various activities for changing views of what scientists do, and the demystification of the actual process of becoming a scientist.

In the current progress, following the concept of STEM education, science is taught as an integrated course, in which technology, Mathematics, language, and other subjects are set integrative to be studied under specific themes. The integration of science with other subjects is a method that can create meaningful learning, enrich students’ learning experiences, deepen their understanding, as well as change their attitudes and soft competencies about science facts by identifying and applying a method which can appropriately be integrated with the teaching and learning process (Berlin & Lee, 2005; Nikolova & Stefanova, 2014).

School science could be considered in the views of: (1) scientific process, which is systematic, empiric, and logical; (2) tentative scientific product; (3) scientific behaviour such as being open-minded, curious, sensitive to the environment, responsible, cooperative, creative, and innovative; and (4) application of the technology, values of scientific knowledge and the existence of human beings as the users of technology (Lukum, 2013).

Science Education in Thailand
The way in which science achievement can be improved in order to nurture students’ science literacy is a current challenge for all countries. The level of science literacy is argued to be parallel with the advance progress of the economy and technology of the country, as many scholars cite the
PISA (Program for International Student Assessment) result as the prime metric to categorise countries’ statuses comparatively. Some Asian countries (Singapore, Japan, Taiwan, China, Vietnam, Hong Kong, and Korea) are occupying the top ranks in the attainment of science literacy, which makes them the benchmark for others in science education. Those countries spend a lot of budget to promote science education, and reform science schools to be more inquiry-based (Koh & Lee, 2007; Ogura, 2013; Rahim, 2013).

There are four South East Asian countries assessed in PISA; two countries (Singapore and Vietnam) ranked in the top of PISA league and two others (Thailand and Indonesia) in the low ranks. Thailand ranked the 54th among 72 countries, according to PISA 2015, and Thai students scored 421 in science literacy, which is higher than Indonesian students who scored 403.

Science is one of the main subjects in Thailand (EP-Nuffic, 2015). Science education in this country aims to enhance students’ desire to search for knowledge, enhance their interest and capability in science, and ensure that students are able to learn at any time and any place continually throughout their lives (Office of the National Education Commission & Office of the Prime Minister Thailand, 2003). Science education in Thailand emphasises scientific knowledge, nature of science, and relationship between science, technology and society.

According to Sothayapetch (2013), the promotion of science education in Thailand seems to be progressively developed. Thai science education emphasises procedural knowledge or scientific processes, and the science curriculum is relatively similar to the PISA framework. Sothayapetch also stated that Thai teachers conducted more experiments in the school laboratory. It can be assumed that inquiry-based learning has become one of the prominent approaches to learn science in Thai classrooms.

**Understanding Inquiry-based Science Education**

The idea of inquiry-based science education (IBSE) was introduced and developed a long time ago, and it is widely adopted in the science curriculum of most of the countries. The concept was originally developed from the idea of John Dewey, in which he stated that science should be set as the subject matter and as method as well (Dewey, 1964). In other words, it can both be a pedagogic strategy for teaching science and learning content as well (Abd-El-Khalick, Lederman, Mamlok-Naaman, & Hofstein, 2004). Furthermore, Heinz and her colleagues highlighted the science inquiry as three different ideas in education: (1) a set of skills to be learned by the students; (2) a cognitive understanding of the processes of inquiry such as the logic of a controlled experiment; and (3) a pedagogical strategy (Furtak, Seidel, Iverson, & Briggs, 2012).

The definition of IBSE has been progressively formulated and associated with the goal and the needs of science learning, but it tends to be associated with a series of similar steps which actually
reflect the scientific method that is usually practised by the scientist. The general steps of inquiry consist of identifying problems, posing research questions, reviewing literature, generating hypotheses, planning investigations, experimenting, collecting data and information, constructing models, communicating the results, and forming coherent arguments (Linn, Davis, & Bell, 2004; Rundgren, 2017).

The National Research Council in the USA defines scientific inquiry in the National Science Education Standards (National Research Council, 1996) as learning science that follows the method used by scientists in studying natural phenomena and suggests an explanation based on evidence obtained through the investigation. The inquiry also leads students in increasing knowledge and understanding of science, as scientists can study and understand natural phenomena.

In the inquiry-based learning, students learn how to pose questions, conduct investigations and collect evidence, develop explanations based on the data obtained, as well as communicate and maintain their conclusion (National Science Teachers Association, 2003). Scientific inquiry is a powerful way of understanding science contents (Wenning, 2011). Inquiry enables students to ask questions, formulate predictions, make observations, describe objects, collect and analyse data, develop scientific principles, synthesise laws, construct explanations, and communicate their ideas to others in the science learning (Tze-Jiun & Nurzatulshima, 2014).

**Level of Inquiry**

How to apply inquiry-based learning in science classrooms had been discussed years ago by Tafoya, Sunal, and Knecht (1980) who divided inquiry into four levels: confirmation inquiry (level 1), structured inquiry (level 2), guided inquiry (level 3), and open inquiry (level 4). Those levels are distinguished based on the responsibility of teachers and students to do activities in three main stages of stating or identifying the problem, selecting the procedure, and formulating the solution (Table 1).

<table>
<thead>
<tr>
<th>Level of inquiry</th>
<th>Problem</th>
<th>Procedure</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmation/Verification</td>
<td>Teacher</td>
<td>Teacher</td>
<td>Teacher</td>
</tr>
<tr>
<td>Structured inquiry</td>
<td>Teacher</td>
<td>Teacher</td>
<td>Student</td>
</tr>
<tr>
<td>Guided inquiry</td>
<td>Teacher</td>
<td>Student</td>
<td>Student</td>
</tr>
<tr>
<td>Open inquiry</td>
<td>Student</td>
<td>Student</td>
<td>Student</td>
</tr>
</tbody>
</table>
Tafoya’s idea was explained further by some scholars, such as in the work of Zion, Cohen, and Amir (2007). They elaborated structured inquiry, as research problems, questions, hypotheses and complete instructions at each stage of procedures are readily stated by a book’s instructions or the teacher. Students need to execute the working plan, gather data, analyse, and make a conclusion. Then, guided inquiry as the teacher comes with problems and students determine the process and solutions to solve the given problems. Students are able to construct new knowledge in the inquiry process and gain their understanding and transferable skills. Students can use their developing knowledge and conceptual understanding to dig more deeply into the key ideas of science. The last is open inquiry, in which the teacher defines the knowledge framework and lets the students define questions, problems, or hypotheses, design their own experiments or investigations, analyse and communicate their learning (Zion & Mendelovici, 2012; Zion, Cohen, & Amir, 2007).

Wenning (2007, 2011) offered more complex levels/stages of inquiry, where they divided inquiry-oriented teaching approaches into six levels considering students and teacher authorities, i.e. discovery learning, interactive demonstration, inquiry lesson, inquiry laboratory, real-world application, and hypothetical inquiry (Wenning & Khan, 2011).

According to Rundgren (2017), who analysed the implementation of IBSE in European countries, the rise of science and science education is a global culture. He argued that there are cultural differences in science education in different countries. It can be argued that science concepts will remain the same all around the world, but the practices of science education will not be the same. Local variation and differences regarding foci and applications of science in different cultures must be respected. Cultural differences in how science education is conducted does not only relate to superficial features, but is related to the very heart of what science education means among teachers and also educational practices.

We did a case study to analyse the practices of IBSE in one lower secondary school in Thailand to answer the following questions: What is the concept of IBSE in the lower secondary science curriculum in Thailand? What are the perspectives of teachers on science? What are the practices of IBSE in the science classroom? What kind of assessment is done to measure students’ learning outcomes?

METHODS
This research is a case study carried out on July 21st to August 10th 2016 at Chiang Rai Municipality School 6, located in Rimkok District, Muang District, Chiang Rai Province, Thailand, during the South-East Asia (SEA) Teacher Project organised by SEAMEO. There are two optional courses in this school, i.e. Science-Mathematics (SM) and English Programme (EP) (Figure 1). EP is a programme with foreign teachers, and English is the language of instruction.
Two teachers are assigned for each course: a main teacher, and an assistant teacher called a Learning Support Assistant (LSA). The main teacher is responsible for preparing the lesson plans, delivers and transfers the content knowledge, nurtures the skills needed, and conducts assessment. Meanwhile, the task of the LSA is to assist the main teacher by taking care of the students, collecting students' phones before learning activities, doing administrative jobs, managing the students' schedule, helping the foreign teacher to control and manage the class during the learning activities, and helping the foreign teacher to translate some teaching materials if there are some difficulties in understanding the concepts taught.

Our research focused on EP classes. Two teachers from the Philippines were purposively selected as the respondents. One has a bachelor degree in Physics education (Teacher A, female, 30 years old), and the other graduated with a bachelor degree in Health education (Teacher B, male, 28 years old). Both have worked for three years with 20 hours per week in this school. The experiences of both teachers would relatively be similar as they are assigned as foreign teachers in the same EP classes and have to make use of the same curriculum.

We carried out document analysis of the science curriculum, syllabus, lesson plan, and assessment sheet to get data on how the IBSE concepts are adopted in Thailand’s science curriculum, syllabus, and teachers’ lesson plans. A structured interview was done with the teachers to capture their perspectives on and practices of science learning they carried out in their classes. In the personal interview, we applied two methods; for teacher B, we read the list questions to him in a face-to-face setting and recorded his answers. In case of teacher A, due to certain inconveniences, we were not able to do a face-to-face interview, hence she wrote the answers and sent us back by email. To analyse the results of the interview, we stressed on certain terms used by teachers which represent the concept of science, science teaching and learning, and the IBSE.

Figure 1. Distribution of two programmes at Junior High School
Science learning processes were observed during nine meetings so as to gain information on the real practices of science learning delivered by both teachers (Table 2). Moreover, field notes enriched with visual recording were taken during the learning process in all the observations. All data were analysed accordingly, and then the existence of IBSE principles and type of inquiry applied in the classroom were also checked. Students’ learning outcomes were analysed based on the products of students’ projects and the assessment.

### RESULTS AND DISCUSSION

#### Analysis of Science Curriculum of Thailand

The Basic Education Core Curriculum 2008 is the current curriculum applied in all Thai schools. Science is one of the main subjects offered from primary level. It generally covers knowledge, scientific processes, thinking skills, and scientific attitudes. Science will enable students to learn with an emphasis on linking knowledge with processes, acquiring essential skills for investigation, building knowledge through investigative processes, seeking knowledge and solving various problems based on diverse data and evidence (Table 3).
The main strands of the science curriculum in Thailand are: 1) living organisms and the process of life; 2) life and environment; 3) substances and the properties of substances; 4) force and motion; 5) energy; 6) earth changing processes; 7) astronomy and outer space; and 8) natural science and technology (Table 3). Each strand consists of one or two standards to be achieved at the end of learning process. Strand 2 (Life and Environment) and Strand 7 (Astronomy and Space) are only taught in Grade 9. Some strands are learned in Grades 7 and 8. Low secondary science is taught twice a week, each in 120 minutes, which is 40 minutes per hour.

The structure of the science curriculum in Thailand is unique as the strands or topics are constantly on the same themes from primary to secondary. The differences are found in the depth of the content, the psychomotor skills to be developed, and the behaviours and attitudes to be nurtured. However, the attitudes or behaviours that should be nurtured are relatively similar from primary to secondary.
Primary school science puts the stress on how to stimulate the curiosity of young children about science phenomena surrounding them. Students will learn about general concepts, facts, and characteristics of living things, substances and materials, simple forces and motion, and physical performances of earth, by posing questions which will express students' curiosity and interest. Students also do observation, exploring, communicating, writing and drawing the objects (Figure 2).

<table>
<thead>
<tr>
<th>Domain</th>
<th>Intended Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cognitive</strong></td>
<td></td>
</tr>
<tr>
<td>Understand</td>
<td>general characteristics of living things and the existence of diverse living things in the local environment; the phenomena and changes in materials in the surroundings; natural forces; forms of energy; physical properties of soil, rock, water, air, the sun and stars;</td>
</tr>
<tr>
<td><strong>Psychomotor</strong></td>
<td></td>
</tr>
<tr>
<td>Posing questions</td>
<td>living things, materials and objects as well as various phenomena in the surroundings.</td>
</tr>
<tr>
<td>Observing, exploring, verifying</td>
<td>observe, explore and verify with the use of simple instruments</td>
</tr>
<tr>
<td>Communicating</td>
<td>communicate what has been learned through story-telling</td>
</tr>
<tr>
<td>Writing and drawing</td>
<td>writing or drawing pictures</td>
</tr>
<tr>
<td>Applying</td>
<td>scientific knowledge and processes in life and search for additional knowledge;</td>
</tr>
<tr>
<td>Implementing</td>
<td>implement the projects or work assignments as prescribed or in accord with their interests</td>
</tr>
<tr>
<td><strong>Attitudes</strong></td>
<td></td>
</tr>
<tr>
<td>Enthusiasm, interest, kindness, care, concern</td>
<td>show enthusiasm, interest in learning and appreciation of the environment around them; show kindness and care and concern for other living things</td>
</tr>
<tr>
<td>Grade 6</td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>structure and function of various systems of living things and relationships among diverse living things in different environments</td>
</tr>
<tr>
<td>Understand</td>
<td>properties and distribution of groups of materials; states of substances; properties of substances and causing change in substances; substances in daily life; simple methods of separating substances; effects of force on objects; pressure; basic principles of buoyancy; properties and basic phenomena of light, sound and electrical circuits; characteristics, components and properties of the Earth's surface and atmosphere; relationship between the sun, Earth and the moon; which affects natural phenomena</td>
</tr>
<tr>
<td><strong>Psychomotor</strong></td>
<td></td>
</tr>
<tr>
<td>Posing questions</td>
<td>ask what is to be learned; give estimates of several possible answers;</td>
</tr>
<tr>
<td>Planning, Investigating, and verifying</td>
<td>plan, investigate and verify by applying tools and devices</td>
</tr>
<tr>
<td>Analyze data, communicating</td>
<td>analyze data and communicate knowledge obtained from investigation and verification</td>
</tr>
<tr>
<td>Applying</td>
<td>scientific knowledge and processes in life and search for additional knowledge;</td>
</tr>
<tr>
<td>Implementing</td>
<td>implement projects or tasks as prescribed or in accord with their interests</td>
</tr>
<tr>
<td><strong>Attitudes</strong></td>
<td></td>
</tr>
<tr>
<td>Enthusiasm, determination responsibility, care, honesty</td>
<td>show interest, determination, responsibility, care and honesty in seeking knowledge</td>
</tr>
<tr>
<td>Aware and respect</td>
<td>are aware of the value of knowledge of science and technology; show appreciation, honor and respect of inventors' rights to their achievements</td>
</tr>
<tr>
<td>Recognition and concern</td>
<td>show recognition, care and concern as evident in conscientious behavior for utilization, protection and conservation of natural resources and the environment</td>
</tr>
<tr>
<td>Constructivist</td>
<td>work constructively with others; be ready to express their opinions and recognize views of others</td>
</tr>
</tbody>
</table>

*Figure 2. Science Learners’ Quality of Grade 3 and Grade 6*
Primary science also covers the practical part of science, i.e. doing some experiments or projects which are totally guided by the teacher. Hence, it can be assumed that the low level of inquiry has been commonly opted as one of the learning strategies in Thailand’s primary schools. The differences between lower and upper primary science activities can be noticed in the different type of psychomotor activities. The sixth graders are expected to develop higher-level activities, i.e. estimating, planning the experiments, carrying out investigations, and analysing data (Figure 2).

<table>
<thead>
<tr>
<th>Domain</th>
<th>Intended Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>characteristics and main components of cells of living things; relationship of function in various system; genetic transmission; biotechnology; diversity of living things; behavior and responses to stimuli in the environment; components and properties of solutions; pure substances; transformation of substances through change of their state; solution forming and chemical reaction; frictional forces; moment of forces; variety of motion in daily life; rules for energy conservation; energy transfer; heat equilibrium; reflection, refraction and density of light; relationship between electrical quantities; principles of electrical domestic circuits; electrical energy and basic principles of electronic circuits; change processes of the Earth’s crust; geological sources; factors affecting atmospheric changes; reactions within the solar system and effects on various things on Earth; importance of space technology; relationship between science and technology; development and effects of development on quality of life and the environment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Psycomotor</th>
<th>Posing Questions: pose questions with prescription and control of variables; Estimating: give estimates to several possible answers; Planning, Investigating, Verifying, Analyzing, Evaluating, Creating: plan, investigate, verify, analyze and evaluate data conformity and create bodies of knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicating</td>
<td>Communicate thoughts and knowledge obtained from investigation and verification through verbal or written presentation, display, or application of information technology.</td>
</tr>
<tr>
<td>Applying</td>
<td>Apply scientific and technological knowledge and processes in life and seek additional knowledge.</td>
</tr>
<tr>
<td>Creating</td>
<td>Create projects or work pieces in accord with their interests.</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Interest, curiosity, responsibility, caring, honesty: show interest, determination, responsibility, care and honesty in investigating and seeking knowledge by applying instruments and methods that provide reliable results. Respect to science: aware of the value of scientific and technological knowledge applied in daily life and livelihood; show appreciation, honor and respect of inventors’ rights to their achievements. Recognition and concern: show recognition, care and concern, as well as appreciation behavior for utilization and conservation of natural resources and local environment. Constructivist: work constructively with others; be ready to express opinions and acknowledge views of others.</td>
</tr>
</tbody>
</table>

Figure 3. Science Learners’ Quality of Grade 9 (lower secondary)

The concepts to be understood at the lower secondary level are more complex and detailed, whilst the skills of inquiry that students have to acquire are also extended, as students have more opportunities to apply the complicated steps of inquiry. It absolutely provides more student autonomy. On the contrary, the teachers’ authorities or guidance are decreased gradually in this level. It can be concluded that free inquiry is being introduced at this level. This is revealed by the type of hands-on activities that lower secondary students have to do. At the highest level of psychomotor activities of Grade 9 (equal to Grade 3 of lower secondary), students are targeted to create
a project or work piece suitable with their interests. In this activity, students apply the highest level of inquiry (Figure 3).

The common steps of science activities determined by the Thai science curriculum in all levels of school start with teachers posing questions, and this is actually the first step of the inquiry process (Figures 2 and 3). Students in the primary level will be trained to use basic scientific methods to explore their basic scientific process skills. The skills will then be expanded to integrated scientific process skills at a higher level of school by doing some investigations and free project activities.

**Science Teachers’ Perspective and Practices**

Both respondent teachers are Filipino, who essentially have their own cultures which may directly or indirectly influence their thoughts and perspectives on science. They might belong to at least three kinds of cultures, i.e. Philippine, Thai, and global perspectives. However, science teachers, regardless of their nationalities, will probably show the common perceptions on science and science education. In this research, the impacts of culture, particularly the original culture of respondents, are not carefully considered. However, we tend to regard the school culture of Thailand as more important than the original cultures of the teachers.

Teachers A and B have different styles of teaching and perspective on science (Table 4). Teacher A seems to have a very strong perception of what science education means. This is revealed by the words she used to define science: *a body of knowledge for living thing survival, constructive or destructive, a way to answer the curiosity of nature phenomena, and how the universe works*. She also focuses on hands-on activities as a prominent approach to learn science. Meanwhile, Teacher B said science is a fun study of natural phenomena. He also described himself as a facilitator of science learning, and thought that science should be contextually learned (Table 4).

**Table 4**

*Teachers’ perspective on science and science teaching*

<table>
<thead>
<tr>
<th>Question</th>
<th>Teacher A</th>
<th>Teacher B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is your perspective</td>
<td>*Science as a body of knowledge for me has a vital role in our survival;</td>
<td>*Science is fun. Science is a study about natural phenomenon, all things</td>
</tr>
<tr>
<td>about science?</td>
<td><em>not just to humanity as well as to everything as a whole. As what one of</em></td>
<td><em>that happened in nature.</em></td>
</tr>
<tr>
<td></td>
<td>*the Seven Environmental Principles states: everything is connected to</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>everything else. Science could become destructive and constructive to</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>all living organisms. Ever since, I am always fascinated by how</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>magical and mystical our world is. Only science was and is able to</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>satisfy my curiosity about the world. It is an important building</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>block for us to understand how the universe works</em></td>
<td></td>
</tr>
</tbody>
</table>
2. What is your perspective about science learning?

As a secondary school science teacher, school curriculum should always allow students to explore and learn through hands-on experiences. Students from this generation needs more tangible activities for them to appreciate and realize the significance of knowing the science concepts. Learning these concepts should be based on how students can apply what they are learning in their everyday life. The school itself must also embody the usefulness of science ideas not just the literal concepts of it.

Some initiatives can be done by the students such as creating environmental awareness campaigns and other methods of addressing pollution.

Teacher as a facilitator in science learning should give the students any instructions to understand the environment around them. Science learning is contextual learning, students can learn from their environment.

3. What is the aim of science teaching and learning?

As a science teacher, I always put into my mind that I have a key role in preserving the world. It is not just about who can memorize every single word in the science book. It is about how the people (students in this case) will make use of what they know to save our dying world. Teaching science is all about innovation but it should not end there. The end goal for it should be on the conservation of all life forms.

Science teaching and learning is to help students understand science concepts, so they have science skills, knowledge, and value, then apply it in their real life.

4. How is your method to teach science?

For me, the strategy that I use will depend on who is my audience. But personally, since I am a visual learner, I prefer videos, experiments, and group activities. Most of the time, after the lesson proper I give students practice worksheets just to check how much they have absorbed from the lesson. If necessary, reinforcement is needed it will be addressed first prior to the next set of tasks. Once everything is relatively on track, we will proceed to a more rigorous yet enjoyable question and answer portion. I always encourage the students to raise a question whether or not it is related to the topic. Formulating questions triggers the brain to reason out and make conceptual connections.

Teacher A has realised her important role, that she is a main actor of a long-term investing process of preserving the next generation, who will be the citizens of the future world. She shows strong initiative and understanding of how science strongly impacts on the preservation of human life. She believes that the aims of teaching and learning science should be related to the effortful conservation of the place of human beings. In contrast, Teacher B sees science as knowledge, skills, and attitudes that students have to apply in the real world.

The perspective of teachers on IBSE can be found in their answers to the fourth question on how to teach science (Table 4 (continue))
4). Teacher A suggested a process in which students will first be stimulated to enjoy science then to pose inquiry questions. She applied certain steps on her science class, beginning with showing the visual representations of science concepts, doing group-based experiments and other activities. Teacher B did not clearly describe his steps in teaching science, but both often presented video and did reinforcements through motivational words or rewards.

According to Panjwani (2015), teachers focus on student autonomy as most prominent in their perception of inquiry-based approaches to science teaching. Teachers also assumed that content knowledge of the curriculum and its connection with the real world is as important as student autonomy. This argument agrees with what both respondent teachers of the present research expressed about contextual learning based on phenomena in students’ daily life, and hands-on experiences.

Yuenyong and Narjaikaew (2009) said that a key goal of science education in Thailand is to help and facilitate students to think about and relate science, technology and society. To actualise the vision proposed in the educational reform of Thailand, the science curriculum should be relevant to learners’ real-life experiences.

Both respondent teachers cooperatively designed one document of syllabus for each semester. The first page of the syllabus is a general description of the topic of science covered in one semester. The second page informs the standard of science learning for each grade and semester, the time allocation in one semester, and the minimum standard of students’ achievement in formative and summative tests.

Based on the syllabus analysis, it was found that, in the early grade of lower secondary, students are taught the topic of how to learn science, which is an introduction on the meaning of science, scientific methods and attitudes that scientists should have, and the role of science in promoting wellbeing in human life. During this session, students will learn inquiry-based science as a content and a method.

Analysis of IBSE practices based on the Lesson Plan and Classroom Activities

Though teachers have different perspectives on developing a lesson plan, they have to deal with the rules of four points: a) topic or content, objectives (cognitive, affective, and psychomotor); b) activities of 3I, i.e. Introduction (routine activity, motivation), Interaction (activity proper), and Integration (post-activity discussion, generalisation, assignment); c) key ideas; and d) evaluation or student assignments.

According to Wong and Wong (2009), teachers pose some initial questions to draft a lesson plan, such as what will be studied and obtained by the students after the lesson, how to facilitate students to achieve learning objectives, and how to do evaluations. Meanwhile, Cicek (2013) argued an effective lesson plan is to manage the classroom and time allocation by directing students with routine activities from the beginning to the end of the class.
The IBSE activities of respondent teachers were checked based on the main steps of inquiry, i.e. identifying problems, posing research questions, reviewing literature, generating hypotheses (if needed), investigating to collect data and information, constructing models, communicating the results, and forming coherent arguments.

An example of a lesson plan constructed by one of the respondent teachers shows that the science learning process has applied part of an inquiry-based learning process (Figures 4a and b). One lesson plan document consists of topic forms of energy, electricity, and solar system. In the topic of energy, students learn about energy with a set of activities provided by the teacher. During activity 1 (topic: similarities), students are directed to identify different forms of energy by sharing their ideas about energy and different forms of energy ("Students are expected to participate and share their ideas to the class"). In the next step, students pose questions by sharing their opinion ("The teacher will call on some volunteer students for their insights and opinion"). Activity 2 consists of the third step which is to generate hypotheses or argument based on the facts found by students. Students work in group, and then make illustration to generate hypotheses ("Using an A4, the group must illustrate one system that will show the at least five forms of energy that is being transformed to another energy").

The fourth step is to do investigations and collect data. This step is done during activity 3, whereby students are asked to fill in the workbook individually within the given time limit, and communicate the results ("Students are expected to answer and hand over their work promptly").

During activities 4 to 9, students are assigned to do relatively similar steps of inquiry as in activities 1 to 3, but for different topics; topics on electricity in activities 4 to 6, and the ones on solar system during activities 7 to 9. This started with identifying topics from power point slides or videos, filling in the workbook (collecting and analysing data), and finally communicating the results.

In the evaluation part, students have to show the transformation of energies through drawing. At the end of the learning process, the teacher will do a confirmation of the concepts by giving a summary, and asking some students to express some important points they have learned (Figure 4a). Based on the workload of teachers and students, it can be said that although the activities are mostly student-oriented, the teacher’s guidance is relatively crucial.
Lesson Plan 11  
Subject: Science  
Matthayom: 3  Time: 6 periods  
English Program, Chiang Rai Municipality School 6

1. Contents  
   * Forms of Energy  
   - Transformation of Energy  
   - Kinds of Energy  
   * Electricity  
   - What is electricity  
   - Factors of Electricity  
   * Solar System  
   - Nine Planets  
   - Characteristics of each planets

2. Objectives  
   During the session, the students will be able to  
   - Cognitive  
     * Identify the different forms of energy;  
     * Compare each form of energy;  
     * Define electricity;  
     * Give examples of sources of electricity;  
     * Cite common hazards of electricity;  
     * Identify the factors involved on electricity;  
     * Explain the characteristics of each planet;  
     * Show some advances related to space;  
   - Psychomotor  
     * Show the transformation of energies through drawing;  
     * Answer the activities in the workbook and textbook;  
     * Participate actively in doing the group and individual outputs;  
   - Affective  
     * Share one’s experiences and ideas to the class; and  
     * Listen attentively as others express their ideas.

3. Activities  
   Activity #1 Discussion on Energy  
   - The teacher will show a power point presentation on the different forms of energy.  
   - In here, some examples of energy transformations will be given to the students.  
   - Students are expected to participate and share their ideas to the class.  
   - The teacher will call on some volunteer students for their insights and opinions.  
   - This lesson will serve as a review for the students

Figure 4a. The first page of the lesson plan prepared by the teachers
Activity #2 Output on Transformation Energy
- The students will be asked to work in groups of three.
- Using an A4, the group must illustrate one system that will show the at least five forms of energy that is being transformed to another energy.
- They are to use a car as their system.
- They are to do this until the end of the session.
- They have to submit by next day
- The members of the group are expected to contribute in the output for their group.

Activity #3 Textbook Activity on Energy (page 107-109)
- The students will be asked to answer the activity in their Textbook on Energy found in pages 107-109.
- They are to do this individually and within the given time limit.
- They are to submit their Textbook by the end of the session.
- Students are expected to answer and hand over their work promptly.

Activity #4 Video on Static Lucian
- The teacher will show a video clip on electricity.
- The video shows a boy sliding down a plastic slide in a public park.
- After reaching the bottom of the slide his hair stood up.
- This phenomenon shows a static electricity.
- After watching the video clip, the teacher will call on some students to share to the class what they have in mind.
- The teacher will point out some key ideas given by the students.
- The class will also be expected to listen attentively and to give their ideas.

Activity #5 Video on Electric Shock
- Another video clip will be shown to the students.
- This video is about a common event related to electricity, which is electric shock.
- A boy was electrocuted after unknowingly touching a grounded pole.
- It took a long time for bystanders to notice his situation.
- When someone took him out of the people, he was not harmed.
- After watching the video clip, the teacher will call on some students to share to the class what they have in mind.
- The teacher will point out some key ideas given by the students.
- The class will also be expected to listen attentively and to give their ideas.

Activity #6 Textbook Activity on Electricity (page 145-146)
- The students will be asked to answer the activity on Electricity found in their Textbook on page 145-146.
- The students will work individually and within the given time limit.
- The teacher rounds around to check the progress of the students and to be of guidance to students need clarifications.
- The students are expected to answer the activity diligently and to submit their work promptly.

Activity #7 Discussion on Solar System
- The teacher will show a power point presentation on Our Solar System.
- A thorough discussion of each planet will be given to the students.
- They are expected to listen attentively and to jot down important points in the discussion.
- Some volunteer students will be called to share their ideas to the class.
- The teacher will enrich the concepts shared by the students. Students will be asked to answer the activity on Electricity found in their Textbook on page 145-146.

Figure 4b. The second page of the lesson plan prepared by the teachers
Following Tafoya’s idea, it can be said that the inquiry process shown in the given lesson plan is categorised as structured inquiry, where problems and procedures are both provided by the teacher, and students formulate the solution. The observation of the science classroom indicates similar inquiry activities as constructed in the lesson plan. Both teachers have adopted the IBSE and applied the structured inquiry level (Table 5).
### Table 5
The level of inquiry practised in the observed classes

<table>
<thead>
<tr>
<th>Class</th>
<th>Topic</th>
<th>Level of Inquiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 3.12</td>
<td>Energy</td>
<td>Structured Inquiry</td>
</tr>
<tr>
<td>M 1.9</td>
<td>Mixtures</td>
<td>Structured Inquiry</td>
</tr>
<tr>
<td>M 1.12</td>
<td>Mid-term Test</td>
<td></td>
</tr>
<tr>
<td>M 1.9</td>
<td>Solutions</td>
<td>Structured Inquiry</td>
</tr>
<tr>
<td>M 1.11</td>
<td>Solutions</td>
<td>Structured Inquiry</td>
</tr>
<tr>
<td>M 2.11</td>
<td>Earth</td>
<td>Structured Inquiry</td>
</tr>
<tr>
<td>M 2.10</td>
<td>Earth</td>
<td>Structured Inquiry</td>
</tr>
<tr>
<td>M 1.10</td>
<td>Solution</td>
<td>Structured Inquiry</td>
</tr>
<tr>
<td>M 2.12</td>
<td>Soils</td>
<td>Structured Inquiry</td>
</tr>
</tbody>
</table>

Inquiry-based learning involves students actively participating in the learning activities that are related to knowledge development such as orientation, formulation of a hypothesis, experimentation, and conclusions (Joyce & Calhoun, 2009), which exist in the practices of science learning of both the respondents. However, the step to nurture student’s ability to pose questions as the fundamental step to do investigations remains lacking.

Both the teachers have applied what the science learning and teaching process should be, such as to follow the general 5E instructional model introduced by Lin et al. (2014). The model involves a systematic learning and teaching strategy which consists of: 1) engagement, students use learning activities to make relations between prior knowledge and newly introduced concepts. The teacher demonstrates certain activities or poses questions to hold the interest, attention and motivation of students; 2) exploration, students use their hands-on experiences to discuss science concepts and skills. It is necessary to afford students adequate time to explore the ideas or situations that they face during the engagement phase; 3) explanation, this phase helps students create and develop scientific concepts and skills. Teachers ask students to explain the concepts or skills that they have observed or learned through previous activities. The teachers draw a conclusion and introduce formal science concepts to students; 4) elaboration, students apply the scientific concepts they have learned in a new context. Students may gain better comprehension of the information they have learned; 5) evaluation, teachers evaluate students’ understanding to assess educational outcomes. Evaluation should be carried out as a part of each phase of the learning activities (Lin et al., 2014).

For example, in the first observation in M 3.12, students did some activities to learn about energy. First, students were asked to give attention the teacher’s powerpoint presentation about different forms of energy, and then they were encouraged to share their ideas, insights, and opinions about energy to the class. This indicates the engagement phase. The exploration phase occurred when the students worked in group and made illustration about energy. Then, the teacher called on some volunteer students to present their work, which is the explanation phase. The elaboration phase took place when the students completed the activity in their workbook and wrote the answer in the whiteboard. In the evaluation phase, students showed the transformation of energies through drawing.
Assessment and Student Performance

Assessments are used to measure students’ learning outcomes (Liu, Lee, & Linn, 2010). Most of the assessment system used in Thai science classes is to test students’ understanding of science concepts, and strongly focuses on ensuring a long-term retention of the concepts (Table 6). Teachers assessed the students’ understanding with paper tests in multiple choices or essays in their workbooks and worksheets, which mostly test low level of cognitive process, i.e. remembering or recalling the concept.

Table 6
Criteria to assess the output and group work

<table>
<thead>
<tr>
<th>Criteria of Outputs (poster, mind map, journal, etc.)</th>
<th>Score</th>
<th>Criteria of Group Work</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content/ Relevance</td>
<td>15</td>
<td>Delivery</td>
<td>9</td>
</tr>
<tr>
<td>Creativity</td>
<td>7</td>
<td>Content</td>
<td>6</td>
</tr>
<tr>
<td>Promptness</td>
<td>3</td>
<td>Teamwork</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>Total</td>
<td>20</td>
</tr>
</tbody>
</table>

On some occasions, the teacher used authentic assessment. Authentic assessment is one which aims to evaluate students’ abilities in real-world contexts such as when the teacher demonstrates an event, case, or problem in the real world and the students have to explain their ideas and thoughts about the case or problem and relate their ideas to the learning concept, so they learn how to solve real-world problems. The students are often directed to make posters, reports, presentations, and do performances or role play as the tasks. An example of students’ poster in the energy topics (Figures 5a and b) indicates conformity with the task given by the teacher in the evaluation phase. The products made by students point out the creativity proven by the representation of concepts acquired, and the critical thinking as result of inquiry-based learning processes.

![Figure 5](image-url)

*Figure 5. Students’ project 3D-Poster for science illustration: (a) Chemical potential energy, (b) Gravitation potential energy*
The assessment that the teachers conducted in the science class (Table 6) showed conformance with the assessment in the science inquiry. Geier et al. (2008) explained that when students have an opportunity to interact with inquiry tools and engage in science-classroom activities, they would demonstrate improved learning in assessment closely related to the learning activities and curriculum. Therefore, in addition to evidence of learning on project-produced assessment, evidence of progress is also needed in the assessment.

According to Pravalpruk (1999), the assessment of science in Thailand is mostly assessing knowledge and recalling of scientific facts, processes of science and scientific skills, application of scientific knowledge, as well as attitudes and habits of mind acquired through science education. The assessment procedures are in the form of students’ work and reports, practical tests, teacher observation of practical work during the semester, open-ended paper-and-pencil tests, and parents’ and peers’ comments and critiques. Results of the assessment will be converted into scores to measure students’ learning outcomes.

CONCLUSION

The structure of the science curriculum in Thailand has already adopted the inquiry-based science education concepts as widely known, although it does not mention the term precisely. The curriculum starts by introducing the basic concept and method of science, and ends with the application of science as knowledge and methods to solve problems and address science in the interconnection between the society and technology.

The practices of inquiry learning by teachers, as an interpretation of the Thai science curriculum, were also shown as the partial steps and can be categorised as structured inquiry. However, based on the classroom observations, it can be concluded that inquiry has probably been a school culture of the observed school. Enlarging the area of studying and the number of teachers participating should enable us to analyse the teaching culture of Thailand’s science teachers, and also recognise whether or not the IBSE has become a school culture in Thailand.

ACKNOWLEDGEMENTS

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REFERENCES


Introducing Indigenous Culture into Online-based Courses

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ABSTRACT

Batik, the fabled cloth, is native to the Southeast Asian society. It is known both as an art and craft, which is employing wax-resist, dye-painting techniques that are applied to the fabric. This paper proposes a viability study for an online course offering batik learning. The discussion summarises contemporary online course platforms, as well as course providers. Despite the fact that other components may be involved in the delivery, the approaches predominantly rely on the use of web-based communication to convey the course materials. A case study research method was employed to discern the phenomenon in a granular view. The study explores the viability of offering the existing, on-campus batik course from an international unit of a respectable university in Indonesia, as an online course. The paper focuses on four aspects, including the instructional delivery, market feasibility, consideration of the legal aspect and operational feasibility of the course. Providing it as an online course, however, might not be as simple as converting the course material into digital versions. The paper concludes with the potential advantages of an online course for the university.

Keywords: Cross-cultural learning, distance learning, ICT in education, online course, viability analysis

INTRODUCTION

As the collectively regarded arts and other manifestations of human intellectual achievement (Oxford Dictionaries, 2017), indigenous culture is native to a particular group of people or society. Each indigenous culture is distinct and unique to the extent that it marks the identity of the society and
accentuates the community’s dignity. Batik, the fabled cloth of Southeast Asian origin, has endured a generation-long history. It is known both as an art and craft, which is employing wax-resist and dye-painting techniques that are applied to the fabric. This technique has been adopted in various societies worldwide (Oparinde, 2012; Shaari, 2015), whereas each local culture’s peculiarities influence the design and development of each area’s products.

The practice of batik printing has been spread and taught worldwide (Firsta, 2015; HedaBatik, 2015; Hotcourses, 2017; Nicholev, 2013). Reports on traditional culture artifacts in online learning material, however, are rarely found in the international publication outlets. Most of the literatures about batik, for instance, focus on the technical perspective of the painting technique (Situngkir, 2008), the commercial considerations (Anwar, Supadi, Lahab, & Afuan, 2013), or batik as a representation of civilisation (Elliot, 2013). Among the few pieces of literature available, the idea to provide electronic learning material on traditional culture is introduced (Omar, 2014). This work, however, does not adequately address the feasibility analysis of the educational presentation of traditional culture in the internet marketplace and the competitive advantages potentially acquired by the course provider.

Meanwhile, the development of internet connections has transformed education into a completely novel landscape. Internet access has established a ubiquitous marketplace for education with a novel perspective on the learning experience (Schulte, 2011). Generic online courses diminish the need to attend classes in person as a result of its capability to enable worldwide access to course material. Specifically crafted online courses, in this manner, establish a particular segment of online-based students who are beyond space and time boundaries (Simonson, Schlosser, & Orellana, 2011).

Amid the development of massive-open-online-course (MOOC) platforms (Annabi & Muller, 2015), the competition among online education providers have been becoming fiercer. The open-access online course platform offers ‘virtually every course’ for the public free of charge (Fricton et al., 2015). Most of them claim to be supported by top universities (Coursera, 2016; edX, 2016) or delivered by the reputable universities themselves (Parr, 2015). The growth in distance learning providers could have been facilitated by the advancement of free distance learning platforms (Coursera, 2016; Global, 2016; mooc.org, 2016; Moodle, 2016). The number has been increasing significantly for the last two decades and counting. On the one hand, the development of the speed of connectivity and widespread internet connections may have helped to accelerate the accessibility of online courses worldwide. On the other hand, while open education provides a quality learning experience, the threat to conventional higher education institutions is imminent. As it is primarily delivered through the internet, an online course differs from conventional education (Carr-Chellman & Duchastel,
2000). In addition to being a supplement for classroom courses, the online course could be used as a standalone curriculum (Limited, 2016) that has the potential to be more efficient, less costly, with reusable material, and more comfortable for the learners.

Providing online courses, however, might not be as simple as converting course materials into digital versions (Stevens, 2013). Let alone marketing a new course in the cloud marketplace. This paper will assess the viability of introducing a particular cultural artifact as an online course. Of specific interest is the possibility of a university delivering an online course on Javanese batik and the potential competitive advantage that could be acquired by the organisation. In order to obtain a comprehensive understanding of the subject, the case of an existing course offered by Universitas Sebelas Maret, a state university at the epicentre of the Javanese batik industry in Central Java, Indonesia, was explored. The study focuses on four aspects of assessment, including the instruction delivery, market feasibility, consideration of the legal aspect, and operational feasibility. A granular view of the case is expected to shine a light on the viability of the development of e-learning course materials.

**BATIK, THE LITERATURE**

Batik is a cultural artifact indigenous to the Southeast Asian region and a representation of society’s wisdom that is rarely represented in international publication outlets. Scholarly publications on batik seem to overly concentrate on batik from technical perspectives (Legino & Forrest, 2016). The advancement in classifying downloaded images based on categories of batik (Minarno, Munarko, Kurniawardhani, Bimantoro, & Suciati, 2014), for example, is hardly related to the preservation of batik as a cultural artifact. Rather, it emphasises the neural network algorithm for image pattern recognition.

Seemingly fundamental information about the philosophical knowledge and traditional patterns of Javanese batik pertinent to Central Java, interestingly, was derived from an old manuscript dating back to the colonial era of early 1900 (Haake, 1989). Batik was appreciated as an ancient method of fabric decoration, practiced and inherited across generations all over Asia. The name was derived from the processes associated with applying vegetable dyes to plain cloth using an inverted drawing technique (Situngr, 2008). Wherein, melted wax is applied to cloth to create the pattern that will be white.

Despite the dispute between Indonesia and its neighbouring country about the origin of the cultural artifact, the existence of batik has been recognised as one of the world’s intangible cultural heritage items (Chong, 2012; Heritage, 2009). The safeguarding of such cultural heritage, therefore, requires the involvement of the global community. Indeed, batik, both as an industrial commodity and cultural merchandise, has been attracting the general public. The Indonesian export of batik-painted fabric, for example, was recorded
as skyrocketing within five years after the investiture of batik as the Masterpiece of Oral and Intangible Heritage of Humanity in 2009 (Center, 2014).

METHODS
A case study research method (Yin, 2003, 2009, 2012) was carried out in an on-campus course offered by a university in Surakarta, Indonesia. A document review (Stake, 2005) was conducted on the course materials listed on the website and other related information published on the official website of the university. A descriptive analysis (Miles, Huberman, & Saldana, 2014) of the course curriculum, the duration of the course, targeted participants and the course fee was carried out to discern how the course was designed and delivered. The investigation also examined the number of students who participated in the past courses, their countries of origin, and their motivation for attending the course.

RESULTS AND ANALYSIS
The idea to enhance an on-campus cultural course was drawn from a contemporary course offered in the marketplace. An eleven-day batik short course offered by an Indonesian university (Office, 2016) introduces a Javanese batik exploration directly at the heart of the batik industry in Solo, Central Java, Indonesia. According to the provider’s promotional flyer, the batik short course mainly targets foreigners. It offers both course materials delivered in class and excursion to batik industries. The course, therefore, requires students to stay in Surakarta, Central Java, for the duration of the course. The analysis of presenting the course as an online course will be discussed in the following sub-sections.

Table 1
Case study data

<table>
<thead>
<tr>
<th></th>
<th>1st Round Course</th>
<th>2nd Round Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum</td>
<td>Philosophy, batik-making practise, industry visit</td>
<td>Philosophy, batik-making practise, industry visit</td>
</tr>
<tr>
<td>Targeted participant</td>
<td>Overseas students</td>
<td>Overseas students</td>
</tr>
<tr>
<td>Course duration</td>
<td>10 days</td>
<td>6 days</td>
</tr>
<tr>
<td>Course Fee</td>
<td>$300</td>
<td>$300</td>
</tr>
<tr>
<td>Participating Students</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Participating student’s nationalities</td>
<td>Yemen, Sierra Leone, Rwanda, Nigeria, China, Madagascar, Mozambique, Suriname, Tanzania</td>
<td>Malaysia, Madagascar, Australia, UK, Sierra Leone, Rwanda</td>
</tr>
</tbody>
</table>

Instruction Delivery
According to the data presented in Table 1, the batik course offers a combination of basic cognitive knowledge of batik and the practical aspects of batik making. The course materials include the philosophy of batik, types of batik, various batik motifs,
batik production and colouring techniques, and a visit to a batik industry. Further exploration of the course material reveals that each topic of the batik course has the potential to be presented online in various delivery formats (Ghirardini, 2011).

Table 2
*The characteristics of the topics in the batik course material*

<table>
<thead>
<tr>
<th>Topics</th>
<th>Offline</th>
<th>E-Learning Delivery Format</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Simple learning</td>
</tr>
<tr>
<td>Philosophy</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Variety of batik</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Introduction to batik making</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>The batik design</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Batik making</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>The use of batik</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Industry excursion</td>
<td>✓</td>
<td>X</td>
</tr>
</tbody>
</table>

The detailed topics of the batik course and their associated delivery formats, presented in Table 2, identify that each topic of the course could be represented as online course materials in the form of a simple learning format, interactive material or webcasting. Regardless, the topic of an industry excursion may not be represented as a simple learning format such as presentation slides or documents, but live video streaming is possible to provide learners with the learning experience of working in batik workshops. Indeed, delivering the aforementioned topic of the batik course would fit into the cognitive domain of Bloom’s taxonomy (Krathwohl, 2002).

Resource requirements and infrastructure availability at both ends would be the main consideration in providing e-learning course materials (Ghirardini, 2011). Instruction designers would face a trade-off in decision making as to whether provide the batik course materials as a fully online course, or in a blended learning format. The fully online materials would reduce the need for human resources from the automatic responses of the learning management systems. The internet connection infrastructure requirement, however, will result in high usage spikes as a result of the interactivity of the contents. A blended learning format, in contrast, would spend less internet bandwidth, but requires dedicated instructors to interact with the course participants.

Market Feasibility

The analysis of the two rounds of batik courses in Table 1 indicates that the course has attracted international students. Due to the $300 course fee and the requirement to attend the course in person, it is understandable that course participants would spend more
for travel costs and accommodation during their stay in Solo, Central Java. The course participants represent a wide range of countries throughout the world. Despite the fact that the students may have been staying in Indonesia prior to the course, their motivations to join the class and having the personal experience of a batik-making class represent the general public’s interest in such a course.

Since a batik course seems to gain a specific market segment worldwide, the providers of a batik course may not solely be Indonesian education providers. In addition to community-based batik workshops in Indonesia (Firsta, 2015), a number of overseas course providers have listed batik-making courses as on offer (Batik, 2017; HedaBatik, 2015; Hotcourses, 2017). Even though the number of participants joining those courses could not be obtained, arguably, batik courses have attracted people to learn under offline circumstances. An online batik course, in this regard, would potentially gain audiences and attract more learners.

**Consideration of the Legal Aspect**

While online learning is boundary-less education by nature, the course-provider university is bound to the regulatory bodies of the respective country. With regard to the Indonesian university, it has an obligation to conform to the regulations of the Ministry of Education of the Republic of Indonesia. According to the regulations of the Ministry of Education (Kebudayaan, 2012, 2013), distance learning provided by higher education for the international market may only be offered by an ‘A’ accredited department. According to the National Higher Degree Accreditation Body of the Republic of Indonesia (BAN-PT), the Sebelas Maret University is an ‘A’ accredited institution. The university has achieved this ‘A’ accreditation for a total of 29 out of 62 departments ([BAN-PT], 2014). This achievement could become a point of strength of the university. Moreover, the Ministry of Education of the Republic of Indonesia encourages distance learning that advocates the provision of courses endorsing local wisdom (Kebudayaan, 2013). In this regard, a batik course would fit the characteristics of local wisdom preserved in the Javanese society.

**Operational Feasibility**

Drawn from the course provider’s information, as depicted in Table 1, most of the course participants were foreign students that had been in Indonesia throughout the duration of the course or prior to the commencement of the course. Given that such course is potentially attractive to foreign students rather than the local ones, the online course should address the market residing outside Indonesia. Therefore, it is mandatory that the delivery of the course is bilingual, with English as the main language.

The online course requires a set of dedicated resources, be they human or infrastructure. The main difference between an online and offline course is the delivery of the course materials (Bryant, Kahle,
Introducing Indigenous Culture into Online-based Courses

& Schafer, 2005; Simonson et al., 2011). Whereby, the delivery mechanisms for the two-course types are distinguished by the requirement for resources, as well as the business model. The comparison between the requirements for campus-based and online courses is suggested in Table 3.

Table 3
*The comparison of resource requirements*

<table>
<thead>
<tr>
<th>Resources</th>
<th>Campus-based</th>
<th>Online</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course convener</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Tutor</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Quality assurance</td>
<td>✓</td>
<td></td>
<td>Ensuring the quality of the course</td>
</tr>
<tr>
<td>Graphic designer</td>
<td>✓</td>
<td></td>
<td>Designing the graphics required for content delivery</td>
</tr>
<tr>
<td>Server and network access</td>
<td>✓</td>
<td></td>
<td>The server to manage both the platform and the active course content</td>
</tr>
<tr>
<td>Room &amp; supporting infrastructure</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course material</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Course handout</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With regard to resource requirements, it can be comprehended that offering courses online is a project that requires resources from many specialties (Stevens, 2013). It is not merely an IT project; rather, it involves many resources ranging from a course convener to web programmers. The resources work hand-in-hand to prepare and deliver the course regardless of their skills and departments. In this regard, Sebelas Maret University comprises various departments that are relevant to such resource requirements. The delivery of the course could become a project supported by the departments of the university.

**DISCUSSION**

Batik has been acknowledged as part of the cultural heritage of Indonesia (UNESCO, 2009) and is associated as such by the public in general. In this regard, while it is also suggested as a painting technique (Elliot, 2013; Situngkir, 2008) that could be practiced elsewhere, batik, as a manifestation of an intellectual achievement of the society, remains the Javanese of Indonesia’s daily life. Despite modern types of machinery having been used in recent textile production, the traditional processes of batik making have endured across generations. On the other hand, batik, as a cultural artifact, possesses specific characteristics that are intriguing both for education and as a tourism experience. The art and processes of batik making could be exhibited as an attraction for tourists (Anwar et al., 2013) or as something to be observed by passionate students. Batik
maintains particular philosophies, as well as characteristics that could be delivered in a class or as written course materials.

The development of e-learning platforms has enabled multimedia (video, audio, and still pictures) to be embedded into web contents (van Rooij & Zirkle, 2016). The learning materials, therefore, could be delivered using such media. Most of the learning materials could be delivered either as texts, still pictures or videos, or via video conference. The e-learning platforms would facilitate students to obtain the experience of an industry excursion while remaining in their room on the other side of the world. The graphical interface of the platforms, for instance, is becoming less complicated yet powerful (Stevens, 2013), and distinguishes online courses from traditional courses. Such capabilities enable providers to focus more on the design of the course, rather than on the development of the web interface. This also improves the interaction of students with the course convener.

While it is considered feasible to bring the course on batik online, the provision of such a course may be beneficial both for the university and the community practicing the cultural industry. The potential advantages of the provision of an online batik course are elaborated as follows.

The Advantages of the University Emphasising brand identity
Developing an online course on batik philosophy and batik making addresses the need to engage with a particular market that may not be being catered for by competitors. It is specifically developed based upon a local culture that has been acknowledged worldwide. Higher education tends to follow a homogenous marketing strategy; therefore, the university needs to develop targeted strategies focusing on relationship building and bonding (Dennis, Papagiannidis, Alamanos, & Bourlakis, 2016).

Building brand identity has to be aligned with the organisational business processes and services delivered (Ghodeswar, 2008). It is argued that a well-positioned brand should have a competitively attractive position supported by strong associations to a particular desirable attribute. Indeed, the aim to associate the institution with being ‘a world-class university that has built upon the local cultural identity’ requires underlying support from within the organisation’s products/services.

Establishing a network of international students
The target market of the batik course is foreign students in particular. Despite the fact that the export of knowledge and education services may not be directly generating income, offering courses for international students has potential for reaping advantages from overseas institutions (Johnston, Baker, & Creedy, 1997). Since the batik course aims at a particular market segment, it is expected that the students will help to enhance the value of the course through international associations leading to the leveraging of the marketable qualification and the demand for the course.
The literature advocates higher educational institutions engaging in various activities in order to increase their internationalisation (Chen, 2008); this ranges from academic programmes/curricula, scholarly research and international collaboration to the export of knowledge. Developing a course that is widely accepted could become an entry point into the academic programme of internationalising activities. The design of the online batik course could be embedded with the information of Janavese traditional art to tempt international students to experience the culture and other tourist attractions in person by attending the campus-based courses.

Increasing incoming traffic
Since web-based ranking better reflects the web presences of scholarly activities, introducing a web-based cultural course would likely direct traffic to the institution’s website and increase the visibility of the university. While initially intended to promote web publication, the Webometrics ranking of the world’s universities is now a major reference for the global performance and visibility of the universities (Lab., 2016). The website does not only cover the e-journals and repositories but also informal scholarly communications.

Webometrics analyse universities or research centres upon four unique indicators (Aguillo, Ortega, Fernández, & Utrilla, 2010), namely, the number of web pages (size), number of external links from main search engines (visibility), number of documents (rich file) and total number of scholarly entries (scholar). The latest update from the Cybermetrics Lab (2016b) mentions that it enhances the policies by counting the number of mentions on the social networks of the so-called Web 2.0. Indeed, the engagement of overseas students on the batik course and subsequent mentions in their social media would be beneficial to attract incoming traffic to the university.

The Advantages for the Community
While the benefits reaped by the university may not be materially quantifiable, the course would be economically advantageous to the community involved in the activities. Indeed, to obtain the intended objectives, the course can be designed as two sections: online and offline. The online course section conveys the conceptual contents of batik makings, such as the philosophy of batik, the varying patterns of batik and the introduction to the processes of batik making. The offline section is essential to deliver the experiences of batik making and life in the traditional batik-making community. Wherein, the section of the course requires the students to visit Solo in Central Java, Indonesia and experience the course in person. Such experience in the vicinity of batik-making communities would potentially promote the tourism industry, enhance the sales of batik handicrafts and absorb workforces.

CONCLUSION
A culturally based online course could potentially benefit the university, the
traditional batik community, and even worldwide learners. The provision of an online course on traditional culture would strengthen the university’s identity, establish a network of international students, increase incoming traffic and potentially generate additional income. Furthermore, the potential advantages for the community are the promotion of the tourism industry by attracting visitors, making way for increasing sales of arts and memorabilia, and absorbing workforces.

Despite the fact that this paper argues for the prospect of introducing an indigenous cultural course to the electronic learning community, this study is merely on the viability of the course. Further analysis on the financial aspects should be done comprehensively prior to elevating the cause to be a real project. Indeed, it would be beneficial to use the current on-campus course on batik as the role model during the development of the e-learning materials.

REFERENCES

Introducing Indigenous Culture into Online-based Courses


The Model to Increase the Entrepreneurial Performance in Creative Industries Using Entrepreneurial Orientation and Social Capital Development Approach

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ABSTRACT

The current research objective is to test the model of Social Capital and Entrepreneurial Orientation towards Entrepreneurial Performance of the creative industries in a developing country. The research specifically aims to contribute to the entrepreneurship theories on creative industries. The samples are the creative entrepreneurs in the design, fashions and crafts businesses in several cities in the Central Java province, Indonesia. Results of Partial Least Squares (PLS) inferred that, firstly, there is a positive and significant influence of social capital on Innovativeness, Competitive Aggressiveness and autonomy. Second, there is a negative and significant influence between social capital and, Proactiveness and risk-taking. Third, there is a positive and significant influence of Innovativeness, Proactiveness, Competitive Aggressiveness and autonomy in entrepreneurial performance. Risk-taking, however, only provides an insignificant positive influence toward performance. It can be concluded that Innovativeness, Competitive Aggressiveness, and Autonomy of the creative industries are important toward entrepreneurial performance; however, entrepreneurs should also need to consider their position in the competition by increasing social capital and taking into account the risks that might emerge when taking such a decision. The research brought implication in developing a robust approach by government and entrepreneurship education institutions to enhance entrepreneurship.

Keywords: Creative industries, developing country, entrepreneurial orientation, entrepreneurial performance, social capital
INTRODUCTION

Many governments of developed countries are now starting to focus on improving creativity in order to grow their economies (Flew, 2005). Creative industries have been proven to provide a significant contribution to propelling these industries forward and thereby boosting the national income. In a developed country like the US, these industries provide a significant multiplier effect on economic growth by generating employment and supporting welfare distribution at various levels of employment (Chaston & Sadler-Smith, 2012). In the future, the development of creative industries needs to be supported to boost national production. Based on data from Badan Pusat Statistik [BPS - Statistics Indonesia (2016)], from 2010 to 2015, the GDP levels of the creative economy rose from 525.96 trillion rupiah to 852.24 trillion rupiah (an average increase of 10.14% per year). These industries created jobs, with the creative economy grew on average by 2.15% per year and the number of workers in the creative economy in 2015 totalled to 15.9 million people. In the same year, the top three destination countries for creative economy commodities were the United States (31.72%), Japan (6.74%), and Taiwan (4.99%). Based on the statistics, it can be inferred that the creative economy is growing, yet the industry needs further improvement. Thus, it is timely for research to strengthen and increase the capability of creative industry companies (Irjayanti & Azis, 2015).

Among many factors, Entrepreneurial Orientation (EO) has been cited mostly for its significant influence on the entrepreneurial performance (Rauch, Wiklund, Lumpkin, & Frese, 2009). The managerial styles of companies in this industry need to adhere to EO characteristics. However, unlike other industries, creative industries have distinctive characteristics: they are labour intensive and have special managerial style (Chaston & Sadler-Smith, 2012). Because of the low capabilities of SMEs in creative industries to compete in the global markets, it has been thought that the entrepreneurial capacities of these industries need to be improved (Tambunan, 2011). Development of strategies and management capabilities are expected to enhance the capacities and the rate of success of these businesses. Based on the ideas discussed above, the current study aims to contribute to the development of creative industries in general, globally, and specifically to the upgrading of the entrepreneurial capability of entrepreneurs in the creative industries of developing countries.

Theoretically, the growth of creative industries in developing countries has been perceived to be important because of the significant contributions these industries have made to foreign exchange (Irjayanti & Azis, 2015). However, research on the development of this category of industries is still considered to be very low and dispersed (Chaston & Sadler-Smith, 2012). The current article specifically tries to fill the gap in entrepreneurial performance of creative industries based on the Resource Based View.
(RBV) theory (Penrose, 1959). The theory posits that firm performance is the function of the allocation of resources of the firm. According to this theory, entrepreneurship performance is the function of the firms’ capability and resources of SMEs in the creative industries.

The current research posits social capital to be a form of resources that can provide competitive advantages in a company. In investigating the Social Capital (SC) of small-medium enterprises (SMEs), Stam and Elfring (2008) found that it has a strong correlation with EO and firm performance. Prusak and Cohen (2001) and Lin, Cook, and Burt (2001) explained that social capital is a social relation that is accessible by the central actor to exploit social connections and strengthen the relationships with other counterparts to achieve mutual goals (Acquaah, 2007; Aidis, Estrin, & Mickiwiez, 2008; Cao, Simsek, & Jansen, 2015). The stronger the reciprocal trusts and bonds between these members of the networks, the greater the reduction in the transaction costs and increase in competitive advantage (Batjargal, 2003; Florin, Lubatkin, & Schulze, 2003). Thus, a low level of social capital means that the central actors have only limited contact and interactions with external firms which will cause negative impacts on entrepreneurial orientation (Lumpkin & Dess, 1996).

Differently from the previous research, we argue that in the case of SMEs, the individual social capital model Fornoni, Arribas, and Vila (2012) will provide an interesting result. Studies have shown that social capital at the individual level tends to be more suitable for SME contexts (Stam, Arzlanian, & Elfring, 2014) because of the different nature and business settings between SMEs and larger enterprises. Previous research has found other differences; for example, SC has often been conceptualised as one-dimensional, but Fornoni et al. (2012) have argued that individual social capital is multidimensional characterised by three dimensions. The three dimensions are structural, relating to the positions occupied by the actor in the network; the value of relationships owned by the actors (relational dimension) and the value of resources provided by the network (resources dimension) (Batjargal, 2003). These dimensions cited hypothetically are able to provide resources important for increasing firm capability.

Capability refers to the ability to achieve a particular function of a person (Gries & Naudé, 2010). It is not surprising that entrepreneurship skills need to be developed since it expands the choice of exploring one’s positive potential production. Entrepreneurship capability is a strategy that can be observed from the decision-making orientation taken by the company to identify and exploit business opportunities (Kumalaningrum, 2012). However, in recent discussions on entrepreneurship, entrepreneurial capabilities can also refer to methods, practices, and decision-making styles of managers to take on entrepreneurial actions (Renko, Carsrud, & Brännback, 2009). Entrepreneurial Orientation (EO) can be viewed as strategic postures and
the concept reflects how businesses utilise their resources, which are important for anticipating changes in a business environment, specifically for SMEs who have limited resources (Chen, Tzeng, Ou, & Chang, 2007).

The literature suggests that the companies embracing strong EO are able to gain higher performance levels in the industry relative to their competitors (Covin & Slevin, 1989). However, there is much ongoing debate explaining the relationship between the variables in these constructs. In this case, Chaston and Sadler-Smith (2012) explained that in the context of different industrial settings such as the creative industries, which are still growing, the combinations of EO are marked by differences. Furthermore, the researchers have been called to carry out more research to uncover the combinations of EO in businesses in the creative industries which have their own challenges because of their different life cycles compared with other industries. Similarly, there have been calls to research a gap in the literature presented by different compositions of EO in different industrial clusters (Covin & Lumpkin, 2011). In order to focus on those challenges, the current research aims to fill the gap on the study of the EO model to increase firm performance, particularly in creative industries based on its resources (Covin & Miller, 2014).

EO is the most researched construct in entrepreneurship studies operating in three dimensions: proclivity to the market and product innovation, willingness to take risks, and proactively anticipating competition (Miller, 2011). Two dimensions were later added to measure firm willingness in competitive aggressive activities and autonomy or willingness of the firm to support employees to pursue businesses at their own will (Lumpkin & Dess, 1996). Companies with a strong entrepreneurial capability have the ability to change the environment of uncertainty into a benefit for the company. Lumpkin and Dess (2001) showed that the EO helps describe the characteristics of a company that adapts to the business environment and creates new opportunities.

The entrepreneurial oriented company would always be able to produce, discover, evaluate and exploit business opportunities to outperform their competitors (Miller, 1983). However, until now, there has been limited research on the creative industries to explain a company’s capability to create, define, find and exploit opportunities (Zahra, Sapienza, & Davidson, 2006). The current situational business uncertainties and global competitions have lead companies to learn from experience and develop strategic decisions to strengthen their organisational processes, with the help of their network, in a variety of uncertainties related to situational intensity (Autio, George, & Alexy, 2011). Research on the organisational EO suggests that in different industrial settings, the EO will have different combinations and thus impact differently on company performance (Covin & Slevin, 1990). By these descriptions, it hypothetically infers that all five dimensions...
of EO will influence the firm’s performance, including those of creative industries.

In a growing sector with much room to expand, creative industries are predicted to have characteristics of EO that are different from those of mature industries operating under severe competition (Chaston & Sadler-Smith, 2012). Previous research found consistent and significant relationships between the entrepreneurial capacity of the company (Entrepreneurial Orientation) and company’s performance (Miller, 2011). Thus, the characteristics of entrepreneurial orientation such as Innovativeness, Proactiveness, risk-taking, competitive aggressive, and autonomy have positive impacts on SME performance. Other researchers have pointed out that the level of social capital of entrepreneurs have a strong influence on the company’s performance moderated by EO (Ahuja, 2000; Mehra, Dixon, Brass, & Robertson, 2006).

Although a few research have attempted to explain the contributions of various individual variable toward entrepreneurial performance, these studies still have research gaps. As mentioned earlier, the objective of the current research is to test the relationships among social capital, entrepreneurial orientation and entrepreneurial performance. The primary purpose of this research is to understand the contributions of social capital and entrepreneurial orientation on entrepreneurial performance for the creative industries, specifically in the fields of design, fashion and craft.

**MATERIALS AND METHODS**

The unit of analysis used in this study are the individuals or the employees in creative industries in Central Java, Indonesia. Data were collected through survey questionnaires distributed in April 2015 by visiting the entrepreneurs in the sites of the businesses. Using a cluster sampling technique in the data collection process, the study grouping (clustering) was based on the type of business. There were three types of businesses that were covered; fashion, design, and craft. These businesses are frequently cited as the most prominent creative economy at the location of populations (Chang, 2009). Once the three groups were identified, we then selected the respondents randomly for each group that conformed with the research objective. We gave each respondent a month to complete the questionnaires. At the end of the month, only 60 questionnaires were valid for further analysis, indicating a 20% response rate. However, the low response rate was considered acceptable in a research on entrepreneurs (Chandler & Lyon, 2001).

The instrument used to measure social capital in the study was developed by Fornoni, Arribas, and Vila (2011, p. 497), which focused on “an entrepreneur’s formal or informal links with other agents and the resources that she or he is able to access through these links”. While the measurement of EO and firm performance in this research was adapted from the standard developed by Covin and Slevin (1989) and Covin and Wales (2012), the measurement
of entrepreneurial orientation is reflected through the dimensions of Innovativeness, Proactiveness, risk-taking autonomy, and aggressiveness in competitive postures. The questions focused on the ability of business to identify business opportunities, the ability of business to innovate products, the ability of business to give a positive reaction when there is an attack from competitors, and the ability of business to show courage in taking risks. These items in the analyses are described in Table 1 below:

Table 1

<table>
<thead>
<tr>
<th>Variables</th>
<th>Code</th>
<th>Items</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrepreneurial</td>
<td></td>
<td>Orientation</td>
<td></td>
</tr>
<tr>
<td>Orientation AUT4</td>
<td></td>
<td>Employee involved in identifying and selecting business</td>
<td>1.000</td>
</tr>
<tr>
<td>Orientation CA1</td>
<td></td>
<td>Aggressive in competition</td>
<td>1.000</td>
</tr>
<tr>
<td>Orientation INNOV2</td>
<td></td>
<td>Number of new products or services that have been</td>
<td>0.957</td>
</tr>
<tr>
<td>Orientation INNOV3</td>
<td></td>
<td>The nature of changes and accretion of products</td>
<td>0.953</td>
</tr>
<tr>
<td>Orientation PRO1</td>
<td></td>
<td>Involved proactively in competition</td>
<td>0.673</td>
</tr>
<tr>
<td>Orientation PRO3</td>
<td></td>
<td>Involvement in business competition</td>
<td>0.958</td>
</tr>
<tr>
<td>Orientation RT1</td>
<td></td>
<td>The tendency of undertaking risky projects</td>
<td>0.930</td>
</tr>
<tr>
<td>Orientation RT2</td>
<td></td>
<td>Confidence to take risks</td>
<td>0.958</td>
</tr>
<tr>
<td>Social Capital</td>
<td></td>
<td>RL1 Shared with main contact relevant and confidential</td>
<td>0.661</td>
</tr>
<tr>
<td>Social Capital RL2</td>
<td></td>
<td>information</td>
<td></td>
</tr>
<tr>
<td>Social Capital RS2</td>
<td></td>
<td>Often call colleagues to discuss business issues</td>
<td>0.777</td>
</tr>
<tr>
<td>Social Capital RS3</td>
<td></td>
<td>Open new market using help from all contacts</td>
<td>0.705</td>
</tr>
<tr>
<td>Social Capital S2</td>
<td></td>
<td>Access to important information using help from all</td>
<td>0.615</td>
</tr>
<tr>
<td>Social Capital S4</td>
<td></td>
<td>contacts</td>
<td></td>
</tr>
<tr>
<td>Social Capital S6</td>
<td></td>
<td>Having many contacts to discuss business</td>
<td>0.624</td>
</tr>
<tr>
<td>Social Capital S7</td>
<td></td>
<td>Having many colleagues to provide access to potential</td>
<td>0.659</td>
</tr>
<tr>
<td>Social Capital SK1</td>
<td></td>
<td>markets</td>
<td></td>
</tr>
<tr>
<td>Performance SK2</td>
<td></td>
<td>Net profits compared to competitors over the last three</td>
<td>0.881</td>
</tr>
<tr>
<td>Social Capital SK3</td>
<td></td>
<td>years</td>
<td></td>
</tr>
<tr>
<td>Social Capital SK4</td>
<td></td>
<td>Sales growth compared to competitors over the last three</td>
<td>0.868</td>
</tr>
<tr>
<td>Social Capital S3</td>
<td></td>
<td>years</td>
<td></td>
</tr>
<tr>
<td>Social Capital SK4</td>
<td></td>
<td>Firm performance compared to competitors over the last</td>
<td>0.860</td>
</tr>
<tr>
<td>Social Capital SK4</td>
<td></td>
<td>three years</td>
<td></td>
</tr>
</tbody>
</table>

Confirmatory Factor Analysis (CFA) was used to test the validity of the instruments. Validation is processed in two stages: convergent validation and discriminant
validation. In order to determine whether the item in the question has a high validity, we used methods developed by Fornell and Larcker (1981), which were by observing the loading factor value and the value of Average Variance Extracted (AVE). Meanwhile, in testing reliability, we used Cronbach’s Alpha and the composite reliability value. Structural Equation Model (SEM) and estimated Least Squares were used to test the hypothesis of the relationship between social capital and entrepreneurial orientation, and entrepreneurial orientation and performance of the company. The Least Squares estimation method was selected due to the minimum data obtained (Gefen, Straub, & Boudreau, 2005). The Smart Partial Least Squares (PLS) computer programme was used to help in estimating the Structural Equations Model.

RESULTS

Validity and Reliability

The instruments analysed for the applicability of the research included content validity (content validity) and construct validity. The validity tests of scale were used to evaluate the items in Table 1 so as to represent adequately the concept being measured. In order to examine whether the contents of the instruments used in this study are invalid, tests were conducted by experts in the field of entrepreneurship, methodology, and language experts at the forum Focused Group Discussion (FGD). A linguistic expert was also involved in assessing the validity of the instruments in this study since most were cited in the English literature which was then translated into Indonesian (Kreiser, Marino, Dickson, & Weaver, 2010).

A Likert-like scale ranging from 1 to 7 was used, with 1 referring to the item not describing concepts that are measured, and 7 referring to the concept being measured. The results showed that not all items qualify or were able to measure the concept. This research used only items whose criteria were able to describe the concepts being measured.

After all of the instruments had passed the test of content validity, the instrument was piloted among fifteen respondents. The result was that in terms of language, the instrument had to be well understood by the respondents and the items used had to be able to describe the concept being measured. Using the number of respondents for applying the Confirmatory Factor Analysis (CFA) produced a loading factor of above 0.5 ($\lambda = 0.5$) on all the items in the questions. This means that all the items of the questions were valid and able to measure the variables or concepts used in this study.

The test showed how well the results of the instrument are capable of measuring and defining a construct tested through convergent validity (convergent validity) and discriminant validity (discriminant). Once tested, the instrument was then used to conduct the survey. The test results as described in Table 2 from the analyses produced by the convergent validity of the loading was significantly above 0.5 and for all the question items. In addition to this observation by the statistics, the average variance extracted (AVE) gained 0.50 points...
on all the variables. Following Fornell and Larcker (1981), the instrument is valid when all the items weigh >0.50 if the average variance extracted is >0.50. Based on this measure, all the items used in our study are no doubt statistically valid.

Table 2

Validity and reliability test results

<table>
<thead>
<tr>
<th></th>
<th>AVE</th>
<th>Communality</th>
<th>AVE Square</th>
<th>Composite Reliability</th>
<th>Cronbach Alpha</th>
<th>R-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy</td>
<td>1.00</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>0.87</td>
</tr>
<tr>
<td>Competitive Aggressive</td>
<td>1.00</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>0.127</td>
</tr>
<tr>
<td>Innovativeness</td>
<td>0.912</td>
<td>0.912</td>
<td>0.955</td>
<td>0.954</td>
<td>0.904</td>
<td>0.111</td>
</tr>
<tr>
<td>Performance</td>
<td>0.723</td>
<td>0.723</td>
<td>0.850</td>
<td>0.913</td>
<td>0.872</td>
<td>0.191</td>
</tr>
<tr>
<td>Proactiveness</td>
<td>0.685</td>
<td>0.685</td>
<td>0.828</td>
<td>0.809</td>
<td>0.604</td>
<td>0.155</td>
</tr>
<tr>
<td>Risk Taking</td>
<td>0.892</td>
<td>0.892</td>
<td>0.944</td>
<td>0.943</td>
<td>0.881</td>
<td>0.091</td>
</tr>
<tr>
<td>Social Capital</td>
<td>0.599</td>
<td>0.599</td>
<td>0.706</td>
<td>0.887</td>
<td>0.861</td>
<td></td>
</tr>
</tbody>
</table>

In order to test the discriminant validity of related items of different constructs that are highly correlated, observation through the cross loading of statistical constructs is required. From the test that produced the correlation of the latent constructs, we were able to predict the indicators in the column which showed that they are better than the other indicators in the column. Furthermore, Table 3 provides the test results to determine the reliability of this study to calculate the Composite Reliability and Cronbach’s alpha of the constructs used, indicating Cronbach’s alpha > 0.600 and composite reliability > 0.700, and showing that measurement results in this study are consistent or reliable, although measuring twice or more of the same symptoms.

Table 3

Latent variable correlations

<table>
<thead>
<tr>
<th></th>
<th>AU</th>
<th>CA</th>
<th>INNO</th>
<th>PER</th>
<th>PRO</th>
<th>RT</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive Aggressive</td>
<td>0.290</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovativeness</td>
<td>0.011</td>
<td>0.212</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>0.298</td>
<td>0.239</td>
<td>0.258</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proactiveness</td>
<td>0.110</td>
<td>-0.452</td>
<td>-0.035</td>
<td>0.099</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk Taking</td>
<td>-0.075</td>
<td>-0.448</td>
<td>-0.072</td>
<td>0.009</td>
<td>0.545</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Social Capital</td>
<td>0.295</td>
<td>0.356</td>
<td>0.333</td>
<td>0.284</td>
<td>-0.393</td>
<td>-0.302</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Inner Model Evaluation

The benefits of the structural model in this study were evaluated by looking at the value of R-Squares for the predictive power of the endogenous latent variable in the structural model. Testing of all the hypotheses was
conducted by examining the path of the coefficients and structural stability of the estimates using t-statistics obtained through the bootstrapping procedure. The test results showed that the variable, Autonomy, can be explained by the variable, Social Capital at 8.7%. All the variations in the Competitive Aggressive variables can be explained by the Social Capital variable of 12.7%. Furthermore, Innovativeness variable can be explained by Social Capital at 11.1% and Proactiveness variation can be explained by Social Capital at 15.5%, while Risk Taking can be explained by Social Capital at 9.1%. Meanwhile, 19.1% of the variation in performance variables can be predicted by the Autonomy, Competitive Aggressive, Innovativeness, Proactiveness, and Risk Taking.

The structural model of the constructs to explain performance can be seen from the comparative dimensions of subjective scores (measured using indicators SK1, SK2, SK3 and SK4) influenced by the construct of social capital and entrepreneurial orientation. The construct Social Capital, consists of three dimensions, namely Relations, Resources, and Structure. ‘Relations’ was measured using indicators RL1 and RL2; ‘resource’ was measured using indicators RS2 and R3; and ‘structure’ was measured using indicators S2, S4, S6 and S8.

While the construct of entrepreneurial intention has five dimensions (Innovativeness, Proactiveness, Risk Taking, Aggressiveness and Competitive Autonomy), the variables have different number of items. Innovativeness consists of two indicators: INNOV2 and INNOV3; Proactiveness consists of two indicators, PRO1 and PRO3; Risk Taking is composed of two indicators: RT1 and RT2; Aggressive Competitiveness consists of one indicator, CA1, and Autonomy consists of a single indicator, AUT4. A summary of the hypotheses testing results is provided in Table 4 below:

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Relationship</th>
<th>Score</th>
<th>t-value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A</td>
<td>Social capital → Innovativeness</td>
<td>.333</td>
<td>7.141&gt;2.58</td>
<td>Supported</td>
</tr>
<tr>
<td>1 B</td>
<td>Social capital → Proactiveness</td>
<td>-.393</td>
<td>9.309&gt;2.58</td>
<td>Not Supported</td>
</tr>
<tr>
<td>1 C</td>
<td>Social capital → Risk taking</td>
<td>-.302</td>
<td>7.572&gt;2.58</td>
<td>Not Supported</td>
</tr>
<tr>
<td>1 D</td>
<td>Social capital → Competitive</td>
<td>.356</td>
<td>7.708&gt;2.58</td>
<td>Supported</td>
</tr>
<tr>
<td>1 E</td>
<td>Social capital → Autonomy</td>
<td>.295</td>
<td>4.933&gt;2.58</td>
<td>Supported</td>
</tr>
<tr>
<td>2 A</td>
<td>Innovativeness → Performance</td>
<td>.218</td>
<td>933&gt;2.58</td>
<td>Supported</td>
</tr>
<tr>
<td>2 B</td>
<td>Proactiveness → Performance</td>
<td>.151</td>
<td>0.151&gt;1.96</td>
<td>Supported</td>
</tr>
<tr>
<td>2 C</td>
<td>Risk Taking → Performance</td>
<td>.06</td>
<td>40.990&gt;1.65</td>
<td>Not Supported</td>
</tr>
<tr>
<td>2 D</td>
<td>Competitive → Performance</td>
<td>.225</td>
<td>2.788&gt;2.58</td>
<td>Supported</td>
</tr>
<tr>
<td>2 E</td>
<td>Autonomy → Performance</td>
<td>.218</td>
<td>3.538&gt;2.58</td>
<td>Supported</td>
</tr>
</tbody>
</table>
DISCUSSION

This study analyses the impact of Entrepreneurial Orientation and Social Capital on performance. Three interesting findings emerged from the study, with two findings in accordance with the literature described previously, and one unexpected finding. First, it was found that, in accordance with the earlier literature, SC had a positive and significant contribution against the Competitive Aggressiveness, Innovativeness and autonomy dimensions. The results were consistent with the findings documented by Cao et al. (2015) and Stam et al. (2014). Our research findings also support the proposition that Social Capital at the individual level proved to have a positive influence on the performance of companies (Fornoni et al., 2011) and company capability or EO. Thus, it can be said that both these constructs have an influence on the development of companies in the creative industries. Second, the four dimensions of EO significantly influence entrepreneurial performance, which is in line with the findings of Chaston and Sadler-Smith (2012). Our findings support the previous research that the differences of EO configurations are based on industrial competitiveness (Covin, Green, & Slevin, 2006).

The results of this study also generated unexpected results. In this case, it was found that the Social Capital contributed insignificantly toward Proactiveness and risk-taking. This could mean that social capital in this current setting was not critical to supporting businesses. This could be because current clusters or networks were not able to provide resources needed by the entrepreneurs. This could also mean that high levels of social capital result in entrepreneurs in being reluctant to proactively anticipate in market dynamics (Stam & Elfring, 2008). These facts are contrary to the general findings of the contributions of social capital to enhance EO (Cao et al., 2015). Another explanation is that these two dimensions, risk taking and Proactiveness are prone to cultural differences (Kreiser et al., 2010). This may be because SMEs receive support from the government such as special loans (Tambunan, 2011). In this sense, it appears that social capital is able to provide resources other than financial support, thus leaving risk taking solely to the discretion of entrepreneurs. Because of the availability of such financial support, entrepreneurs easily secure access funding from new financial agencies outside their networks (Honig, 1998).

Another valuable result is the insignificant EO risk-taking dimension contribution toward entrepreneurial performance. This finding specifically suggests that the courage to take risks among the entrepreneurs in the creative industry is still rather low because of the status of the entrepreneurs participating in this study. Carland III, Carland Jr, Carland, and Pearce (1995) stated that there are differences between entrepreneurs and managers in their preferences of risk. Runyan, Droge, and Swinney (2008) concluded that SME owners have similar characteristics to
The current research aims to shed light on the SC and EO models on the entrepreneurial performance in creative industries, as described in the Figure 1. The research shows that social capital and networks of the entrepreneurs have not fully supported business performance. The role of the government to support business creative clusters should be developed further. For example, the government should develop discussions with the creative clusters to provide resource and expertise. The current research also points out that creative industries should develop their Proactiveness and risk taking further to strengthen organisational capability.

The current research is not without limitations. The authors have suggested that replications be undertaken to include more cultures to test the differences across industries (Kreiser, Marino, & Weaver, 2002). Furthermore, the study did not compare the social capital and entrepreneurship orientation of male and female entrepreneurs. It also did not compare the creative industries with other industries. These would prove to be interesting research themes in the future. In our research, we specially focus on small businesses but later research should also include medium enterprises.
REFERENCES


Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research*, 382-388.


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ABSTRACT

This paper aims to explore the use of directive speech acts in a local language in a university environment in Central Sulawesi. Pragmatics a multidisciplinary science methodology is adopted here since it focuses on things outside of the language itself. The study of pragmatics is growing and scholar of linguistics are increasingly interested in the context of language in society and its use. One dimension discussed within the field of pragmatics and linguistics is directive speech acts. In academic discourse language is used as an identifier in more ways than only a tool to communicate. The aim then is to identify the type of directive local language and function involved in the context of the conversation. The findings of this study can be used in pragmatics of teaching materials at universities. A pragmatic development in teaching materials based on multicultural differences taking into account concepts such as integration, ethnic and cultural differences, race, age, gender, roles, and religions are considered essential to suit the needs of teachers and students. Multicultural aspect is expected to one alternative in pragmatics based local value and socio-cultural.

Keywords: Directive speech acts, local language, multicultural, teaching materials, pragmatics

INTRODUCTION

Developing a global language requires a distinctive character so that speakers can grow and develop in a way that strengthens each culture and relates to the daily activities of social life. In other words, pragmatics comprises the social context of messages and parameters of variation that are often
excluded from consideration. In academic discourse or intellectual contexts, directive speech acts can be used to describe a multiplicity of social domains, the latter referring to specific characteristics of social groups, in an effort to identify equivalent features across “cultures” or “societies” (Rahardi, 2006; Riley & Johnson, 2007). Pragmatics includes how to use speech acts in social interaction and when the speaker and the hearer produce and receive utterances; it also includes about speaker and hearer that who is speaking to whom, where, when, and why everything that connects language to users, identities and meanings. A society may be distinguished by its language. Similarly, Halliday (as cited in House, 2013, p. 2) stated that in any interaction, speakers use many linguistic means to express intersubjectivity. It may develop an appropriate that will be the communicative involved in participating in academic discourse.

Central Sulawesi is a multicultural society diverse in terms of ethnicities, cultures, and religions. The diversity in culture shows up in language use. Cultural nuances can be captured in the local language used in daily interaction. This point was reinforced by Abu Bakar, Osman, Bachock, and Ibrahim (2014, p. 613) who claimed that a linguistic phenomenon known as “language shift” occurs when a mother tongue is gradually displaced by other languages in the daily lives of a particular group of people. Among the contributing factors leading to this linguistic phenomenon are demographic declinations, interlingua distance, dialect diversity, writing systems, and mass media. The change is usually preceded by linguistic variation, and many researchers within this field focus on describing and explaining such variation and change (Nilsson, 2015, p. 6). Sometimes, many acts processing from the speaker and hearer linguistic competence is using dialect and linguistic situation in the perspective acts.

The local languages in Central Sulawesi include Kaili, Buginese, Buginese Malay, and Malay Manado. Kaili is a dialect used by the tribe, Kaili, the majority ethnic group in Central Sulawesi. Kaili tribes settled along the west and east coasts of the Palu Valley and some other districts located in Central Sulawesi (Gazali, 2016, p. 190). The Malay Manado language is the lingua franca of North Sulawesi and is regarded as a regional dialect of the Malay language. Malay Manado is used alongside regional languages, Indonesian and foreign languages. These languages have been found in several areas including Central Sulawesi as a result of population mobility and acculturation. Buginese language is one of the local languages used by the Buginese from South Sulawesi. The Buginese language became the second most widely spoken local language in Central Sulawesi as a result of the migration, intermarriage, and commercial activities of the Bugis people (Noordyun, 1991, p. 137).

In pragmatic studies, every utterance in communication is seen as an act. Participants in communication comprise individuals who speak and the listeners involved in
the conversation (Cummings, 2007; Grice, 1975). In the learning process, both in the classroom and outside the classroom, and in every school and college level, teachers should have the skills and social competence to encourage interaction in the classroom. Conceptualising, and in turn, encouraging interaction across cultural groups is problematic for several reasons (Banks, 2010, p. 20). According to Bellack (cited in Suwignyo 2010, p. 148) the language or speech used by teachers in the classroom is peculiar to the context which he calls the “awakened ‘cyclical’” marked by teacher structuring, reacting, reinforcement, correction or remediation with the response given by learners in learning interactions. Everything is integrated dynamically throughout the learning, to keep the educational goals intact. This goal aligns itself with the principle of reinforcing capabilities as outlined in the statute No. 14 Year 2005 about Teachers and Lecturers Article 4(5), which states that the teacher be able to have the ability to communicate easily with students. In academic discourse, communicating with ease occurs in a lecture is defined as “conversational interaction” in which lecturers and students become the speakers and listeners who participate in an exchange of specific actions to achieve certain goals.

The distinction between illocutionary force and propositional content, as was suggested earlier by the different contexts. Illocutionary acts are performed by the utterance of expression, and this fact motivates the introduction of yet another speech act, that is, the *utterance act*: an utterance act consists simply of the utterance of an expression (Searle & Vandervaken, 1985, p. 9). The same type of utterance act can occur in the performance of different illocutionary acts. For example, while “I’m hungry” can be classified as two different types of token utterance acts, two different illocutionary acts may also be performed, since the reference and hence, the proposition is different in the two cases and this result suggests that pragmatic processes can start very early when appropriate contextual information is provided (Xiang, Grove, & Giannakidou, 2016, p. 85).

An utterance from the speaker is a directive speech act marked by content with respect to a certain conversational background. If this conversational background contains at least one possible world such the occurrence of this utterance is necessary and sufficient for the hearer to make a decision to reinforce the truth to do or not (Kissine, 2013, p. 105). In addition, directive speech acts must lead to the truth of their propositional content and this must be the only necessary condition for speakers to act, that their propositional content is made true by the hearer does not suffice for directive speech acts to be obeyed (Searle & Vandervaken, 1985). To be really compliant, the directive speech act must goad the hearer to act on receiving an utterance by the speaker. In Bach and Harnish’s account (1979, p. 47), this kind of utterance is set apart from other directive speech acts, which they describe as an expression of speaker
intention, such that his or her utterance or the attitude it expresses is taken as reason for the hearer to act.

Searle (2005, p.13) classified the basic categories of illocutionary acts. He says that the illocutionary point of directive utterances consists in the fact that they are attempts (of varying degrees and with increased precision) by the speaker to get the hearer to do something in accordance with the meaning embedded in the utterance of the speaker. Verbs denoting members of this class are ask, order, command, request, beg, plead, pray, entreat, as well as invite, permit, and advise. In oral academic discourse, speech acts between teacher and students can represent a variety of directive acts with certain functions. Therefore, the conversations between teachers and students can be seen as a form of face-to-face communication with specific social goals. In lingual expression, classroom exchange with linguistically diverse students is useful to illustrate directive acts especially to show interaction between ethnic groups and cultures (Banks, 2010, p. 33). In this study conducted at the Tadulako University and Alkhairaat University, the aim was to show that while the local languages, Kaili, Bugis, and Malay Manado are unique on their own merits, they can usefully to show how directive acts take place across regional languages in the form of speech acts. Based on this assumption, the authors undertook research on how “respect” was shown in a multicultural society. The study primarily adopts a socio-pragmatics approach in understanding directive speech acts between lecturers and students in a university academic environment.

Soames (as cited in Hedger, 2013, p. 209) argues that in some cases, the semantic content of a sentence does not result in a complete proposition without requiring pragmatic contributions to clarify meaning. Sociopragmatics is an area of study which tries to understand speech behaviour of a particular language community, based on social background as an influencer of language behaviour, not only as a unit of language but also process of social interaction (Maschler & Scriffrin, 2015, p. 190; Wardhaugh, 2010, p. 118). Therefore, the sociopragmatic approach is useful for analysing the social relationships of the speaker and hearer so as to interpret the implicit meanings in the form, function and strategy of directive speech acts by teacher and students. Directive displays of heterogeneous typology include initiating moves that reflect different types of social organisation (Goodwin & Cekaite, 2013, p. 124). Thus, everyday directives constitute monitors on how to process conversations, that is, to give, to take, and to use multimodal formations of actions in directives. As described by Turner (Darmojuono, 2011, p. 20), in a multilingual society, language reflects the identity of a speaker based on the values espoused in the socio-cultural codes and symbols of that society of speakers.

METHODS

This study, which uses the sociopragmatics approach, is mainly qualitative. In qualitative research, the research data retrieval process
occurs naturally where the conditions and the situation are not manipulated. Ericson (2010, p. 45) maintains that direct connections between the daily lives of students outside the classroom and the contents of instruction, social studies, and literature can make the stated curriculum come alive. This is a true for every school classroom situation. Each new set of students represents a unique sampling from the universe of local cultural diversity around the school area. The subjects in this study include students who had learned about pragmatics and were skilled and knowledgeable in communication, with differences in culture background, ethnicity, gender, and local languages spoken. Communication through interaction such as in conversations between teachers and students were observed and analysed based on the research problem. Arikunto (2010, p. 21) stated that in the data collecting process right up to data verification, qualitative research does not use numbers but describes the data by interpreting results. Sugiono (2010, p. 15) emphasises that naturalistic study conducted on natural conditions, not manipulated by the researcher or the researcher’s presence, does not affect the research object. Sociolinguistics reveals identical form-function correlations in speech construction use. Pichler and Hesson (2016, p. 3) suggested that discourse-pragmatics variation patterns may be consistent across situational contexts and, possibly, varieties. Sociolinguistics is as socially variable language practice “use” is challenging as it is a socially unrealistic aspect of mainstream linguistics (Fairclough 2013, p. 6). In such a context, cross-cultural pragmatics studies can play a pivotal role in illuminating the cultural differences between speakers from a wide range of linguistic and cultural backgrounds (Shicshavan & Sharifian, 2016, p. 75).

Although many other approaches to data collection have been developed, the method of data collection used in this study includes interviews that are specially designed to simulate as closely as possible a relaxed conversational style. The data consist of counts of the occurrence of the sociolinguistic variable, noting the constraining linguistic and social environments (Horvath, 2013, p. 9). In this study, the research subjects are lecturers and students of the Indonesian Language Studies Programme at the Tadulako University and Alkhairaat University Palu in Central Sulawesi. The data were retrieved from the verbal utterances of teachers and students in formal and non-formal academic discourse in the classroom setting. The data analysis technique used is the interactive model by Miles and Huberman (pp. 15-20), which includes the following: (1) data collection, (2) data reduction, (3) data display, and (4) conclusion or verification.

RESULTS AND DISCUSSION

Directive speech acts are intended to produce their effects through an action by the listener. In many cases in authentic conversations and real communication, there exist restricted all many types of language functions and choice one types to using...
in communicate (Kohandani, Farzaneh, & Kazeni, 2014, pp. 10-13). Searle and Austin (as cited in Waring & Hruska, 2012, p. 290) stated that directives could be used to describe certain forms in the speech acts of others. The coding of directives in the context and situation can describe power and social status that makes the speaker direct the hearer. One aspect of speech acts is that the listener produces the effect of a directive or action. Directives also serve as commands as they request the hearer to perform an action. Research about directives such as by Mauri and Sansò (2012) revealed that directives are used in contexts as a marker for future situations.

**Form Directive Request in Kaili Language**

1. *Kaili* Language

   **Mhs1**: begini, deskriptif itu melaporkan fakta, secara faktual, apa adanya. Seperti itu tadi menggambarkan apa adanya. (1)

   **Mhs2**: iyo... iyo... (2)

   **Mhs1**: oke teman-teman begini mangkali saya minta dari ibu guru dulu. Ibu Yul dulu lea (3)

   **In English**

   **Student 1**: *Maybe* I should ask the teacher first. Mrs. Yuli, *right?* (3)

   **Context**: Discussion in classroom when Student 1 asks the lecturer to make clear some statements for Student 2.

   In data (2) and (3) above, the directives, *iyo* and *mangkali* used in the local language, Kaili, when translated into the English language are *okay, probably*, respectively, and which has the meaning *yes and perhaps*. The words in the sentences given the context have their own power in communicating as a speaker that can make the hearer do something. Interlanguage pragmatics, which contributes to the comparability of multiple interactions, includes expected norms of interaction such as turn-taking, constant social relations/roles, and asymmetrical power relationships (Harlig & Hartford, 2005, p. 9). *Iyo* in the Kaili language not only shows the word *yes*, but signals to fellow students to put an end to the explanation by the speaker, so that other students can also answer the same questions. Collin (Beck, 2008, p. 163) stated that direct speech stands out from the other modes of speech representation because it requires a greater degree of interpretation and thus participation from the listener. Directive forms with the word, *mangkali*, in the Kaili language (in English version is *probably*) suggests respect. Rahardi (2006) stated that the relationship between speaker and listener determines how successful the meaning of a sentence has been conveyed.
In the conversation above, the directive request by the speaker was understood by the hearer, even without the direct statement, “I want you”. The extent to which the meaning of the sentence is conveyed was possible because the hearer was of a different age from the speaker. Moreover, the use of the word, *lea*, which is an honorific marker and a form of politeness in the local language, *Kaili*, also serves to convey the speaker’s intent. Other research on the same theme conducted by Takada (2013) sought to show the development of communicative competence among teachers and students using the instructional settings of instructors and trainees, and experts and novices. In this case, the pragmatic approach that highlights the significance of co-text, context and meaning in speech behaviour is critical in understanding comprehension and production of the meanings people are attempting to convey (Kasper & Blum-Kulka, 1993, p. 3). According to Byram, Grundy, Bryam, and Phipps (2002, p. 1), “context” is as complex a concept as “culture”, the latter being notoriously difficult to define.

**Form Directive Act in Prohibition in Malay Manado**

2. Malay Manado language

Moderator: *ini jam so menunjukkan jam 9*. (1)

Mhs: *boleh sudah itu*. (2)

Moderator: *demikianlah diskusi kita ini*. (3) *Kita akan mendengarkan kesimpulan. Hei!* (4)

Notulis: *(Notulis membacakan hasil diskusi berupa kesimpulan)*

: *ya Ok. Terima kasih*. (5)

Mhs: *season ketiga, boleh?* (6)

Moderator: *So nyanda' pake season ketiga lagi. Jang lagi ditambah*. (7)

Mhs: *So boleh e. So jam 9 dan ini. Ok tapi ditutup dulu baru pulang. Uh*. (8)

In English

Moderator: It is 9 pm now.

Student 1: This discussion is enough.

Moderator: So discussion today is over. Come along and listen to the conclusion. (reporter reads out the conclusions) Ok. Thanks.

Student 1: Now, can the third session start?

Moderator: No. There will not be a third session. We will not add another session. We have done enough. See, it is already 9 pm. Let’s end the discussion so that we can go home.

Context: The moderator disallows his friends to ask more questions, saying that the group discussion will end because we don’t have many times this night.
With respect to type, the data showed that the level of illocutionary force may be the problem and strategic communication in the classroom is useful for some aspects of utterances, especially directive acts. According to Saddhono, Wardani, and Ulya (2015, p. 27), a discourse is considered as a group of utterances of a speech performance that is recognisable such as in a conversation. In the sentences (1), (7) and (8), a directive form of prohibition in the Malay Manado Language is phrase *so, nyanda, jang*, which means the same as “shouldn’t” in the English version.

According to the classified commands by Ramlan (2001), there are different classifications of sentences: (1) direct; (2) invited; (3) invitation; and (4) prohibition. Keraf (1991, p. 158) explained that commands are requests to get someone to do something or not. Among the commands are prohibition orders. The word *so* (enough) is the emphasis indirectly used by the hearer to understand that the current discussion should be halted. The use of indirect strategies is reinforced by pieces of other modalities and markers that *nyanda’* and *jang*, if seen from the structure that has meaning again the discussion should not be extended.

The same point was also expressed by Alwi, Djarjowidjono, Lapoliwa, and Moeliono (2003, p. 336) who stated that the imperative sentences in Indonesia include: (1) imperative transitive, (2) imperative transitive, (3) refined, (4) request, (5) invited, (6) prohibition, and (7) imperative? The restrictions used in Data (2) are included in the imperative form. The function of identified imperatives is their ability to issue directives (Jary & Kissine, 2014, p. 3).

**Function of Directive Commands in Malay Manado**

3. *Malay Manado* Language

**Dosen:** *Kase’* menyala dulu *dang*

Pak Azhari (tombol OHP) (1)

**Mahasiswa:** Menekan tombol on dan mengatur posisi tampilan layar. (2)

**In English**

**Lecturer:** Please, turn on the projector, Azhari! (1)

**Student:** Yes Ma’am. (the student presses the button on and sets the position)

**Context:** The lecturer needs help from the student when the overhead projector in the classroom is not connected.

Data (3) sentence (1) demonstrates an act which is a command directive directly addressed by the lecturer to the students. The direct command in the Malay *Manado* language includes the words *kase’* and *dang*; in English, the word “give” has the same meaning in sentences representative, which is “please turn on the projector, Azhari!” Using the command from the data is also consistent with the findings of Imbang (2014, p. 36) who found that words in the *Manado* language with one
syllable but with several variations have different meanings. Speech acts depend on a variety of interpersonal and individual variables such as degree of confidence, age differences, hierarchy, form of perception and social interaction, personal and social interaction, personal characteristics, and so forth (Stranovskȧ, Munkova, Frȧterova, & Ďuračkovã, 2013). Hence, some forms of rejection in Manado above indicate the characteristics of a person in terms of the use of speech to respect each other whether the spokesperson rejects or accepts.

Sometimes the structure of statement imperatives can be ungrammatically represented although they might be pragmatically accepted (Kissine, 2013). In our daily lives, utterances intended for solidarity can be achieved through words such as polite forms and language strategy communication. Similarly, Farnia (as cited in Hashempour 2016, p. 946) states that a speech act should be focused on aspects of daily life (like requests, apologies, complaints, expressing gratitude, refusals, and so forth).

**Function of Directive Refusal in Local Malay or Buginese Language**

We also examined form directive speech acts indicating refusal in the Buginese language in the classroom setting.

4. **Buginese**

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<td>Ds:</td>
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<tr>
<td>Mhs:</td>
<td>ya Bu (2)</td>
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<tr>
<td>Ds:</td>
<td>besok saya ada mata kuliah juga ya? (3)</td>
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</table>

Mhs: ya bu. (4)

Ds: *aii, saya bawa materi sampe malam itu je’*. (4)

Mhs: *aii, pragmatik juga ibu*. (5)

Ds: *ya, tapinya saya bawa materi sampe malam itu, pokoknya nanti kita cari, terakhir sudah ini, peerteaching minggu ini, selesai sudah*. (6)

**In English**

Lecturer: Azhari?

Student: Yes, ma’am.

Lecturer: I’ve schedule in this class tomorrow?

Student: Yes, ma’am. The Subject is Pragmatics.

Lecturer: But I cannot leave my job in different place tomorrow morning until evening. So, we will replace them at a different time. I promise to clear our material within this week.

**Context:** When the lecturer reschedules class material because of the job in the different place.

In oral communication, especially in the academic discourse in Central Sulawesi, the authors maintained that it is important to preserve the value of the local language and culture of the majority of ethnic groups. Data (4) sentence (4) and (6) constitute directive acts in the Buginese language. Here, we could see a refusal in the directive act. The
word for refusal in the local language of Buginese is "je’" (well) and "aii" (no). Achmad (2012, p. 2) stated that the use of the words, "pangandereng" or "ampe madeceng," which indicates the lack of ‘boorish behaviour’ shows the manners of the Buginese (in English is politeness). From the data, the change in structure of the sentence can change its meaning. From the data, structure of language can replace something that carries meaning as a refusal. This situation can be achieved because there are different ways of communicating and language is a communication tool. According to Saddhono and Rohmadi (2014, p. 25), language has become entrenched in human life because of its dominant function in communication. House (2013, p. 65), in his research findings, described the multifunctional discourse markers “Yes” and “Okay” in the English language and in Malay Manado; their equivalents are "Ja" and "so" used to express agreement to signal a resumption of speech acts marked by hesitation and pauses if we talk about semantics subject. Mohammadi, Nejadansari, and Youhanee (2015, p. 92) described the qualitative aspect of a sentence and the classification of the pragmatic functions of "je’" and "aii" in Buginese in a local context used by students.

Direct Strategy in Directive Speech Acts in Kaili

5. Kaili

Dosen: bagaimana kalau ibu Sumiatun menambahkan barangkali? Totuamo e.  (1)

Moderator: silahkan!  (2)

Mahasiswa: Komiu mo Bu.  (3)

(Mahasiswa yang bersangkutan menambahkan dan menjelaskan apa yang diinginkan peserta diskusi)

Peserta: ya, mantap (tepuk tangan) mantap Ibu.  (6)

Dosen: nadoyo guru kelas 1, sudah berapa tahun Bu? (Tertawa)  (7)

Mahasiswa: calon pengawas (Tertawa)  (8)

Dosen: calon pengawas memang.  (9)

In English

Lecturer: Mrs. Sumiatun, might you deign to add? We recommend that parents go first to explain about the progress using curriculum 2013 in elementary school)

Moderator: Please.

Student2: Just you, miss.

Student1: (Miss Sumiatun explain about the progress using curriculum 2013 in elementary school)

So, because of her explanation, the other students appreciate her. The other students proud of Miss Sumiatun too.
Student 2:  Good job! Great! Give a round of applause.

Lecturer:  *Wow, Wonderful* that I see. How long have you taught in elementary school? (laugh) Maybe you will be able to a supervision.

Student:  Yes, that is right. I’m candidate supervisor.

Context:  When the student directs the other students to answer the teacher’s question with an explanation about the curriculum.

The directive forms marked by the words, *totuamo* (parent) and *komiu* (you) and *nadoyo* (meaning 'good job') in Kaili signal the strong relationship between the teacher and students as encapsulated in honorific terms and the mitigation form of a request. In Kaili, the use of the word, *hello*, constitutes a honorific, and in a social relationship, honorifics can be used as a linguistic strategy (Kridalaksana, as cited in Agus, 2014, pp. 3-4). In its application, the use of greetings also indicates the social status of the speaker and hearer. In addition to the function of a linguistic marker, a greeting may be used as a parameter in directive speech acts to indicate kinship relations between speaker and hearer such as in the case of a conversation in the classroom. This was confirmed in the findings by Lohse, Granefenhain, Behne, and Racoczy (2014, p. 2), who asserted that the successful use of a command is determined by the context in which it is understood by both the speaker and hearer.

6.  *Malay Manado:*

| Mhs1: | begini, saya mau bertanya. (1) |
| Mhs2: | eh…belum *dank* bu, torang masih bacurita. (2) |
| Mhs1: | belum selesai Oo, saya kira *sudami* bertanya *kita Bu. Belum pale’* (tertawa) (3) |
| Moderator: | ini yah, berupa tabel, dituangkan dalam bentuk kalimat berdasarkan tabel. (4) dalam bentuk kalimat? (5) |
| Mhs2 : | ya. secara fakta yang ada dalam tabel. Dalam kalimat. Kalau deskriptif. (6) |

In English

Student 1:  I want to ask (1)

Student 2:  Wait, I have not finished. *I am still in the midst of explaining what I mean.* (2)

Student 1:  I think you’ve done about the question. But, in fact, it is not done. It is so long ago.

Moderator:  In this form of table, the results are written in the form of a sentence based on the table. Can you write in the form of a sentence?
Student 2: Yes. In fact based on the table. But modified in the form of a sentence; it should be a description.

Context: When a student wants to ask the other students to explain the question.

In the society, people are aware of how to speak with appropriate speech acts. In this case, the polite and refined way of asking a question would be contained in a speech act which would not be articulated clearly and openly, but only implicitly. Lakoff (1990, p. 34) explained that politeness is reflective of a system of interpersonal relationships that are designed to facilitate interaction with potential to minimise conflicts and confrontation. In this case, actual speech implicature tends to be more polite, more refined and more delicate. In the case of language as “interaction” and not only as “action”, that is, statements that goad the other person to act, linguistic strategies also encode positive directive speech acts (Reiter & Placencia, 2005, p. 15).

CONCLUSION

Tarigan (as cited in Saddhono & Fatma, 2016, p. 38) mentioned the sociopragmatic approach as critical for the study of the “local” conditions in which language is used as it reveals how the principles of cooperation and modesty operate. According to Leech (1993, pp. 10-11), sociopragmatics is two-pronged: the pragmatic side of language, and the pragmalinguistics side of language. In the Indonesian language, pragmatics is useful in examining the intent contained in a discourse or speech whose meaning cannot be explained by the theory of semantics which supports co-texts and context. In this study, the field socio-pragmatic approach is useful in understanding directive speech acts in a select few regional languages of Indonesia. The Pragmatics approach is also useful for determining the meaning embedded in the context since it highlights extralinguistic and intralinguistic nuances in an utterance (Rahardi, 2005, p. 93).

Speech commands are essentially directives marked by the power differentials between the speaker and hearer. To suppress the illocutionary power of the speaker, several markers of politeness could be used instead in an utterance. Research has indicated that directive speech acts expressed by imperatives usually have formal structures. In fact, the meanings conveyed in formal imperatives can also be expressed by another linguistic construction depending on the context of speech.

This is consistent with the view, among others, proposed by Rahardi (2005, p. 3) that the meaning of an utterance is not only expressed in the form of the language, but also disclosed in other forms of sentence construction. Therefore, the meaning of an utterance in directives is not always in line with the form of construction but is determined by the context. Based on the research and findings of the study outlined in this paper, function directive speech acts found in the local languages in focus consist of direct and indirect strategies to convey a meaning. A direct strategy to make a request
or effect, an action in the local language of Kaili is accompanied by the politeness marker komiu (You in English) and totuamo (parents in English) and indirect strategies to imply politeness which include the use of the words, ‘we’, and any particle, ‘mi (too in English) and ‘pale’ (well in English). Moreover, it is important to note that sociocultural nuances add meaning to an utterance. In this case, all social nuances must be considered in analysing the speech intention to understand the relevance of the utterance.

This is confirmed by the findings of Lauzon and Berger (2015, p. 16) who analysed conversations focused on how identity, role, social categories, norms, and gender show up in practice communication. The study of sociolinguistics is important since it captures the social aspects of language communication in a classroom between teachers and students, and students with students. The positive side of this phenomenon can be an effective way to deliver lesson to students because both teachers and students understand the language. As a multidisciplinary science study, pragmatics focuses on studying the aspects outside of language itself. Pragmatics is a growing field of study which examines the nature of language and how linguistic boundaries are changing and expanding. The study of pragmatics allows for the understanding of linguistic contexts in society and how language is used. In this case, language is not merely seen as a tool for communication but it also signals the sociocultural aspect related to language use.

REFERENCES


Showing “Respect” in Multicultural of Directive Speech Acts in a Local Language Academic Environment


Mathematical Reflective Thinking Processes of Senior High School Students

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ABSTRACT

Reflective thinking is an important aspect that should be developed by students because they often face problems which are not immediately able to be solved, while students are required to be able to resolve them. Students need to have the awareness to think, predict, and seek simple formulas, and then prove the truth. This research aims to describe the processes of reflective thinking of tenth-grade students in solving mathematical problems. This research is qualitative in nature. Subjects are students in the tenth-grade of MAN (Madrasah Aliyah Negeri) Ngawi in the second semester of the 2015/2016 academic year. Data were collected using task-based interviews and are analysed using Miles and Huberman’s technique (1994) consisting of three activities; data reduction, data presentation, and conclusion. Results showed that students with high and average initial mathematical ability were already able to apply reflective thinking processes in solving mathematical problems. The results of this research indicated that students with low initial capability in Mathematics did not use reflective thinking processes for problem solving. Therefore, teachers needed to provide scaffolding to them so that they could apply reflective thinking in solving mathematical problems.

Keywords: Initial mathematical ability, problem solving, reflective thinking process

INTRODUCTION

Mathematics represents a human life activity, i.e. the problem-solving activity. Problem solving is a process of thinking (Krulik & Rudnick, 1988, p. 3). In solving problems, students are faced with an unusual situation and required to apply the
knowledge, skills, and understanding which have been acquired to find and analyse a solution. The problems presented are aimed to make students think systematically of possible ways and results obtained, organise a range of knowledge and experiences, as well as save and recall a wide range of knowledge and skills to facilitate the process of problem solving (NCTM, 2015). Problems have actually been solved if the students understand what they are doing – that is, to understand the problem-solving process and understand why the obtained solution is appropriate (McIntosh, 2000). When a student observes, asks questions, and understands the meaning of this problem - that is when the student has a good opportunity to think reflectively. Reflection involves the critique of assumptions about content or the process of problem solving (YuekMing & Manaf, 2014). Thus, reflection helps students to develop higher-order thinking skills by prompting them to: (a) relate new knowledge to their prior understanding, (b) think in both abstract and concrete terms, (c) apply specific strategies to novel tasks, and (d) understand their own thinking and learning strategies (Hmelo & Ferrari, 1997). Gagatsis and Patronis (1990) refer to it as the initial process of reflective mathematical thinking. Dewey (1933) suggests that reflective thinking is an active, persistent, and careful consideration of a belief or supposed form of knowledge, of the grounds that support that knowledge, and the further conclusion to which that knowledge leads.

The process of reflective mathematical thinking begins to develop at the age of 7 years old. At that age, a child is able to manipulate a variety of concrete ideas and recount what has been done (in his imagination) (Skemp, 1982). This is reinforced by Gagatsis and Patronis’ research (1990) which found that after the age of 7–8 years old, the process of reflective thinking is relatively stable, especially in the determination of problem-solving strategies (geometry model). Furthermore, Gagatsis and Patronis recommended conducting advanced research related to the process of reflective thinking among students in more mature age; this is because the reflective thinking is an important aspect that should be developed by students in learning (Ayazgok & Aslan, 2004; Odiba & Baba, 2013). Reflective thinking can be used as a means of encouraging the process of thinking during problem solving because it gives students the opportunity to predict the correct answers promptly so as to explore the problem by identifying the mathematical concepts involved, using a variety of strategies, building ideas, drawing conclusions, determining the validity of the argument, re-examining solutions, and developing alternative strategies (Kurniawati, Kusumah, Sumarmo, & Sabandar, 2014). To be able to pass any of these activities, of course, it requires the involvement of mental activity.

The interactions that occur when students respond to the external environment, followed by intervening mental activity, are called reflective thinking processes.
Mathematical Reflective Thinking Processes

(Skemp, 1982). The intervening mental activity becomes the conscious object of self-introspective (introspective awareness) that generates responses (effectors). This is confirmed by the results of Kosslyn’s research (2005) which showed that the process of reflective thinking occurs when information stored in the long-term memory (LTM) does not allow a person to respond automatically to an object or event. The stored information should be included in the working memory (WM) and then a new response or solution is produced. Furthermore, mental imagery plays an important role in the process of reflective thinking. An understanding of mental imagery provides information related to the cognitive developmental disorders such as the failure of a student to apply reflective thinking in the right condition even when he/she cannot do any processing information effectively. Dewey (1933) stated that the knowledge and experience previously gained by students would affect the process of reflective thinking, while Hamdi (2012) reported that mathematical abilities essentially affect students’ reflective thinking processes. The variation degree of the answers which has accuracy scope and requires the development of existing formulas will facilitate students to find solutions. This is in line with Moon (1999) who stated that the process of reflective thinking among students is different and evolving with age. Galton (Ibrahim, 2011) emphasised that among a group of students selected randomly, there would always be those with high, medium, and low abilities.

On the other hand, the process of mathematical problem solving is related to the stages of problem solving being carried out (Usodo, 2012). Although students master the steps to resolve the problem, they may sometimes find difficulties in solving the problem. In relation to the process of reflective thinking in problem solving, the reflective thinking process through which students are in the problem-solving process can be tracked down from the stages of problem solving. Based on relevant theories and research results, the researcher collected data from two students so that they have different initial mathematical abilities to reveal the process of reflective thinking used in problem solving. Results of this analysis on the data with diverse students’ ability, there is a need for further research which aims to describe the process of reflective mathematical thinking among students of Madrasah Aliyah who possess high, medium, and low initial mathematical abilities in solving the problem based on Krulik and Rudnick’s (1988) steps.

METHODS

The present study is a qualitative research which aims to analyse the mathematical reflective thinking processes of senior high school students which fulfil credibility, reliability and reveal their characteristics. Data collection was conducted by means of task-based interviews. The research was conducted in MAN (Madrasah Aliyah Negeri) Ngawi, in the second semester of the academic year 2015/2016. The range
of students’ age was between fifteen and seventeen years old. The subjects were students in the tenth grade of MAN Ngawi who had completed trigonometry subject. Selection of the research subject was done via purposive sampling technique. The main instruments were the researchers themselves as interviewers assisted by forms of testing, solutions and interview guidelines. Validity of the data was done by triangulating time and increasing endurance. The data in the research were the reflective thinking processes of students who have high, medium, and low initial mathematical abilities in problem solving. The sources of the data were the work of the subjects, interviews with the subjects, and field notes, while the data collection techniques were task-based interviews. Miles and Huberman’s data analysis techniques were applied in the research.

The research involved twelve tenth-graders of MAN Ngawi under the following research procedures: (a) formulating the early hypothetic theory based on a literature review and supported by the early empiric data; (b) validating the draft for the mathematical reflective thinking processes to the experts to reveal the content validity and the theoretical construct to be developed; (c) revising the draft for the mathematical reflective thinking processes by proposing a new theory; (d) collecting data to reveal the existence of mathematical reflective thinking processes; (e) performing analysis using fixed comparison to reveal the dependability of mathematical reflective thinking processes, and (f) writing out the mathematical reflective thinking processes.

RESULTS AND DISCUSSION

The processes of mathematical reflective thinking ability of MAN students having high initial mathematical ability

During the reading and thinking step, students with high initial mathematical ability in solving mathematical problems believed that what they read and thought was right by reading the questions repeatedly, giving meaning to every sentence in solving problems, and representing problems. In the exploring and planning step, they selected and considered a variety of information to plan the problem solution by: (a) analysing the concept or the information on the subject matter and the problem situation; (b) generating and checking the truth of the information that will be used; and (c) using their intuition and asking themselves (self-questioning) to believe whether such information could be used to plan a resolution. The students believed that the original plan for problem solving was drawn up right by: (a) organising the problem; (b) deciding firmly on various prepared initial plans; and (c) using their intuition and asking themselves to believe that the plan drawn up is correct. Here are the results of the representation of the subject on the task of solving the problem. A circle is drawn touching the sides of an equilateral triangle. Inside the circle, there is a square whose four vertexes lie on the circle (Figure 1). How is the ratio of the square’s width and the equilateral triangle’s?
Solso, Maclin, and Maclin (2008, p. 297) call the visual representation of knowledge a parable or mental imagery. Kaldrimidou (as cited in Gagatsis & Patronis, 1990) noted that mental imagery is a mental object to do the process of reflective thinking. In addition, the mental imagery will help students to solve problems, reorganise the range of knowledge and reconstruct the concept of the problem. Clark and Paivio (Solso et al., 2008, p. 311) stated that the LTM has two means to represent knowledge, namely, the verbal system and imaging system. The verbal system incorporates knowledge expressed through language and imaging system, or image system, as well as stores visual and spatial information. Both systems are interrelated; a verbal code can be converted into an imaginary code or image code, and vice versa. Unlike the two-code theory, the unitary theory states that all information is represented in the LTM in the form of verbal codes (propositions).

In determining strategy, students considered the problem-solving strategy which was determined based on data and information. The data and information were obtained by (a) developing an initial plan for the completion of the work in the representation results in a trial-error and guess-test; (b) determining the pattern of problem solving; (c) checking each process; and (d) using their intuition and asking themselves to believe that the chosen problem-solving strategy was correct. Feldman (2012, p. 314) stated that finding a solution can be done by using a trial-error strategy. The completion of complex problems often involves the use of heuristics, short cognitive which can produce a solution. The most often used heuristics in problem solving is means-end analysis. A means-end analysis of every step leads students closer to a resolution. While this approach is often effective if the problem requires indirect measures which temporarily increase the discrepancy between a current state and the solution, the means-end analysis becomes unproductive.

In determining completion, students understood every step of the work based on problem-solving strategies which were selected by (a) ensuring the applied formula (area of plane, area of a triangle if it is known that two angles are adjoining a corner, and a comparison of trigonometry to specific angles based on firm and accurate considerations); (b) doing repeatedly
using the selected pattern; (c) checking and observing each step of the work and calculations by working backwards; (d) being aware of the errors (in the formula, computing, and writing) and improving them; and (e) using their intuition and asking themselves to believe the steps of the work according to the chosen method. Some errors made by the subjects are shown in Figure 2 below:

In reflecting and generalising, students considered the appropriateness of the obtained results for the existing problems by (a) reflecting on each process used to obtain a solution; (b) testing the correctness of the conclusion drawn by verifying information; and (c) using their intuition and asking themselves to believe that the obtained solution had answered the problems.

One interesting thing shown by the subjects having high initial mathematical ability in any problem-solving steps is that they always asked themselves questions (self-questioning). This result of the research confirms the research carried out by Teekman (2000). Teekman noted that asking ourselves questions is important in supporting the development of reflective thinking processes. Furthermore, asking ourselves questions is used to create and understand the meaning of a mental object. Next, some benefits to asking ourselves questions are: (a) helping students to clarify and categorise situations and events, and contributing to logical thinking skills; (b) helping to structure the thinking process and reducing the possibility of overlooking the important aspects of an event; (c) helping students to make sense of a situation and planning what to do next; and (d) helping students to clarify existing schemes or rules which they use to respond within a broader context.

Another thing done by the students having high initial mathematical ability is using their intuition to convince them that what they have done is right. Intuition is described by Fischbein (1999) as a cognition which subjectively retains truth in it, may be accepted by itself, and is direct, holistic, leading, and estimating. One of the intuition characteristics stated by Fischbein (1999) is coerciveness, i.e. an intuition which naturally leads towards a believed thing. This indicates that students tend to reject an alternative interpretation which would
contradict their intuition. This is in line with Hogarth’s research (2001) which states that intuition will be present and used when one deals with the dilemma of problem solving or decision making. The process underlying the intuition used in problem solving is matching the pattern which can be sharpened through continuous training and practice. In line with this, Fischbein (1999) remarks that intuition can be used as a mediating cognitive employed as a bridge of a person’s understanding, so it can help and facilitate in linking the imaged object with a desired alternative solution.

The reflective thinking processes of MAN students having average initial mathematical ability

During the step of reading and thinking, students with average initial mathematical ability believed that what they read and thought is right by reading the questions repeatedly and representing the problem. In the exploring and planning step, students selected and considered a variety of information for their problem-solving plans by analysing the concept or the information on the subject matter and problem situations. Students believed that the initial plan was proper by organising the problems and deciding on the prepared initial plan.

In choosing a strategy, the students considered problem solving plans/strategies which were determined based on the data and information obtained with (a) the development of an initial completion plan formed by working on the results of representation through trial and error; and (b) the decisions of solving problems with a pattern which was properly selected but with question stimuli.

In determining completion, the students understood that every step of the work, which was based on the chosen problem-solving strategy, was correct by (a) ensuring the formula used in relation to the plane area, the area of a triangle if it is known that two angles are adjoining a corner, and a proper trigonometry comparison of special angles, but that the questions should be assisted by stimuli; (b) doing repeatedly using the selected pattern and checking every step of work and calculations performed; and (c) being aware of the errors (in the completion strategy, formula, computing, and writing) and fixing them with the question stimuli. An interesting phenomenon is that students worked in two ways which resulted in different answers. In relation to this phenomenon, Feldman (2012, p. 315) explained that this occurs because of the sudden awareness (insight). Several approaches to creating possible solutions focus less on the step-by-step heuristics as compared to the sudden emergence of understanding that may be experienced by a person when they are trying to solve a problem. The phenomenon is caused by an inaccurate evaluation of the solution, which is hereinafter known as confirmation bias. Confirmation bias is a tendency to look for and be in favour of information that supports one’s initial hypothesis and avoid the opposing information that supports the alternative hypothesis or solution. This occurs because the confirmation bias
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rethinks a problem that seems to have been resolved, and students tend to stick with the first solution. In the reflecting and generalising step, students consider the appropriateness of the results obtained for the existing problems by correctly checking and ensuring basic problems and obtained solutions.

The reflective thinking processes of MAN students having low initial mathematical ability

The students with low mathematical ability did not use their reflective thinking processes in problem solving, as mentioned by Krulik and Rudnick (1988). However, it was noted that the students in this category often said "I forget" and were aware of the mistake but did not know how to fix it. They forgot to refer to the portion of the knowledge or their ability was lost in their memory. The forgetfulness symptom easily occurs in cognitive knowledge when students do not successfully construct their own knowledge or associate knowledge or concepts they have learned with the knowledge or concepts which they have had (2004, pp. 446–452). Furthermore, one of the causes of forgetting is that students do not get the right key to unlock their memory, so the difficulty arises in the phase of recalling itself. The forgetfulness symptom is due to a lack of attention to the concentration phase and to imperfect material management (fixation) before it is put into the LTM. Most of the materials which should be processed are touched briefly and then left out; most of the materials are processed in the short-term memory (STM) imperfectly and then put into the LTM in a state of half-understanding. As a result, there is no good organisation in the LTM. Meanwhile, psychologists have claimed four things which cause forgetfulness; they are the failure to retrieve, reconstruction errors, interference, and decay (Ormrod, 2008).

The interview results showed that the subject was aware of the error, but he/she was unable to correct it. An example of the error made by the student when he/she described it (Figure 3).

![Figure 3. Errors made by students having low initial mathematical ability](image-url)
Based on the chart, Skemp (1982, pp. 54-55) described the phenomenon of when students realise their error because during the mental activity (intervening mental activities) awareness for introspection (introspective awareness) occurs. However, students are not able to find a solution to the introspection.

**CONCLUSION**

Based on the results of the research and discussion, the conclusion is as follows. The processes of reflective thinking of MAN students having high initial mathematical ability in problem solving based on Krulik and Rudnick’s (1988) steps are: (a) the students believe what they read and think is right by reading the questions repeatedly, giving meaning to each sentence, and representing the problem; (b) students select and consider a variety of information to make the initial plan of problem solving by analysing the concept or the information on the subject matter and the problem situation, and generating and checking the appropriateness of the information that will be used. The students believe that the initial plan of the problem solving is correct by organising the problem, and deciding firmly on various initial prepared plans; (c) students consider the problem-solving strategy, which is determined based on the data and information obtained by developing an initial plan for the completion of the work in the representation results in a trial-error and guess-test, determining the pattern of problem solving, and checking each process; (d) students understand every step of the work based on problem-solving strategies which are selected by ensuring the applied formula, doing repeatedly using the selected pattern, checking and observing each step of work and the calculations by working backwards, being aware of the errors and improving them; and (e) in reflecting and generalising, students consider the appropriateness of the obtained results for the existing problems by reflecting on each process to obtain a solution, and testing the correctness of the conclusion drawn by verifying the information. In every step of problem solving, they always use their intuition and ask themselves to make sure that what has been done is right.
The reflective thinking processes of MAN students with average initial mathematical ability in solving problems based on Krulik and Rudnick’s (1988) steps but not completely the high initial mathematical ability. Students with low mathematical ability do not use their reflective thinking processes in problem solving, as mentioned by Krulik and Rudnick. Therefore, teachers need to provide specific scaffolding for these students so that they are able to think reflectively and solve mathematical problems well.

ACKNOWLEDGEMENTS
We would like to express our thanks to the students and the mathematics teacher of class X in the second semester of the 2015/2016 academic year, and the principle of MAN Ngawi, for providing us with rich information which serves as invaluable data for this research.

REFERENCES


Polymer Engineering Education in Indonesia

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ABSTRACT

The polymer industry, which plays an important role in Indonesian manufacturing, requires a more-skilled workforce to sustain its competitiveness. Despite its importance today and the potential for future economic growth, there is no adequate information for polymer education in Indonesia. This present article provides an overview of the education in the field of polymer engineering related to the current profile of the industry. Literature research on plastics-industry-related statistics has been developed in order to give an indication of what polymer education will need to meet the future challenges in the Indonesian plastics industry. It then discusses the current practices of polymer-related curricula implemented not only at university but at vocational and training institutions. A gap analysis was performed to identify the mismatch between the current education practices and demands of the labour market. It is expected that this paper will provide an opportunity to consider expanding current courses to include programmes relevant to the polymer industry.

Keywords: Curriculum, plastics industry, polymer education, vocational education

INTRODUCTION

As a synthetic polymer, plastic materials are used in a variety of applications in nearly every aspect of human lives, from food and beverages to spaceship components. The plastics industry is one of the most dynamic and vibrant growth sectors within the global manufacturing sector. The statistics report that, with an average of 109 kilograms of plastics being consumed by each person in a year in the USA, global plastics production was around 311 million metric tons in 2014 (PlasticsEurope, 2015). Indonesia also offers plenty of potentials to the plastics industry as personal income continue to rise in its consumption-led economy. The domestic industry is able to supply
around 3.6 million tons of plastic a year out of 4.3 million tons of total demand. Most of the domestic industry’s products are used as inputs to components of other manufacturing sectors as they supply several products to the packaging, building and construction, agriculture, automotive, and pharmaceutical industries.

The ability of the industry to adopt new approaches to manufacturing, successfully implement emerging technologies and develop the capability of its workforce will determine its ability to remain competitive in the global economy. The development and maintenance of a highly skilled workforce is crucial for boosting innovation and maintaining global competitiveness. The International Labour Organisation (Organization, 2012) emphasises the importance of skills development for enhancing employability in Indonesia. It is reported that several countries, including Indonesia, are facing difficulty in responding to the skills needs of their workforce in the manufacturing sector due to increasing globalisation and new technology. This highlights the importance of investing in education and training. In order to meet the human resources requirement in the plastics industry, the skills of the workforce should be developed either by a higher education institute, or a vocational- and skills-training institute. Polymer science and engineering is an instructional pathway that prepares people for employment, or continued education in plastics and polymer materials manufacturing. This field includes multiple disciplines in Chemistry, Physics and Engineering, which have emerged to meet the growth of commercial polymer industry (Pannell, 2007).

The extent of polymer education in some countries has been presented in previous studies (Amornsakchai & North, 2015; Chan & Ho, 2015; Edmonds, McKee, & Plimmer, 2015; Fellows, 2015; Nakano, 2015; Salamone, Deonin, Young, & Pearcez, 1973; Santos, Dias, & Canevarolo, 2015; Stein, 1997; Theato, 2015; Thu, Khoi, & Tung, 2015), which mostly focused on higher education degrees. In light of the recent economic developments in the Indonesian plastics industry, it is important to identify current educational and training elements that are relevant to the skills required in the plastics industry. The learning outcomes of those education and training institutes should be assessed in conjunction with the Indonesian Qualifications Framework (IQF) for manufacturing plastic products, which is established in IQF number 2014-90 (Iskandar, 2014a). This paper will review the Indonesian education system with respect to the education for polymer engineering, not only in higher education but also in vocational schools and colleges. It will be developed through literature research on the statistics for Indonesian plastics industries and the curricula offered by the main universities, polytechnics, academics and the directorate of vocational secondary schools.

**METHODS**

This work provides an overview of the education in the field of polymer
engineering that is related to the current profile of the industry in Indonesia. The first part of the article focuses on the current trends in the Indonesian plastics industry. The contribution of this industry to the economy is indicated from the statistics data for some economic indicators. The profile of employment in the plastics and rubber industry is also presented. The second part of this article deals with the situation of polymer engineering education in Indonesia by reviewing the polymer-related curricula offered in higher education and vocational training institutions. To quantify the breadth of polymer education traditions in Indonesia, it uses a similar approach to the one suggested by Fellows (2015), which covers a number of research projects in the field of polymers. It is an indication of the extent to which polymer research is embedded in polymer education in academia. Lastly, the analysis is focused on identifying the gap between the demands of the polymer-related industry and the workforce supplied by the education and training institutes.

RESULTS AND DISCUSSION

Current Trends in the Indonesian Plastics Industry

The plastics industry is a diverse manufacturing sector that plays an important role in Indonesian manufacturing. According to the statistics data from the Indonesian Central Bureau of Statistics (Statistic, 2013), the industry consists of 1,729 plastics and rubber companies among 23,941 manufacturers in Indonesia. In 2013, the Indonesian plastics industry generated a value of 88,844 billion rupiahs for the economy, which is a share of around 6% of the total manufacturing industry. A total export value for plastic products of US$ 2.77 billion was reported in 2014. Even though this accounts for less than 2.5% of the total exports of manufactured goods, the statistics show growth in the Indonesian plastics industry. For the local market, the plastics market grew by 22.47% in 2011 in spite of the global economic slowdown and continue growing by 7.75% to 3.48 million MET in 2012 (Federation, 2015).

The Indonesian plastic industries produce a diverse range of output, from the raw materials to commercial products such as packaging and automobile components. The industry supplies 60% of the total packaging demand, which accounted for US$5.3 billion in 2013, mostly to the food and beverages industry. The superior flexibility and durability offered by plastic packaging are the key advantages over other packaging materials. In the construction industry, plastic materials are used to provide efficient insulation, flexible pipes and durable surfaces. Moulded plastics are increasingly being used for automobile components and consumer goods (kitchenware, household articles, etc.).

The current profile of the workforce in Indonesia gives an indication of what polymer education will need to meet future challenges in the plastics industry. In 2013, the industries employed over 360,000 people nationally, which gradually increased from around 329,000 in 2009, as can be seen
in Figure 1 (Statistics, 2014). This represents more than 8% of Indonesia’s manufacturing workforce; a larger proportion than in the USA (5.5%) (Rogalski, 2006). This closely follows a recent general trend towards increasing employment being observed in the total manufacturing employment in Indonesia.

![Figure 1](image)

*Figure 1. The number of employed persons in the plastics and rubber industry as a percentage of total manufacturing (Statistics, 2014)*

Education and skills training is one of the supportive factors used to gain high productivity and competitiveness. Attainment of education is a structural issue, and it takes a considerable time to transform the educational profile of a nation. It can be seen from Figure 2 that majority of the workforce in the Indonesian manufacturing sector (48.6%) has only attained a low level of education (primary education and below) (Statistics, 2014). This reflects the fact that the manufacturing industry employs more low-skilled workers compared to the service sector. It might be one of the reasons for the low labour productivity in Indonesian manufacturing since innovative production technology that provides a competitive advantage requires a more-educated workforce.
In 2014, a total of 816,505 vacancies were reported with the placement of 625,187 positions. However, more than 1,295,000 job seekers were also reported in that year. This highlights the simultaneous existence of both a shortage of required workers and a labour surplus in Indonesia. The Ministry of Manpower’s Employment Service Centres indicates that unemployment in Indonesia is in part caused by the skills mismatch that is observed between registered job seekers and registered job vacancies (Organisation, 2015) as a mere fraction of the vacancies were filled up due to an insufficient supply of manpower and skilled personnel. In general, only 37% of workers are indicated to be well-matched between their occupation and educational attainment, with more than 55% being considered underqualified, especially in the manufacturing-related area.

**Polymer Education at Undergraduate Level and in Vocational Schools**

The educational system in Indonesia is set out in its Act on National Education System Law No. 20/2003 (D. o. I. H. Education, 2003), which is divided into several stages. According to this law, basic education is general education with duration of nine years, including six years in primary school and three years in lower secondary school. Secondary education, which covers the broad fields of general and vocational education, aims to increase the ability of students, such that they become contributing members of society, through developing a mutual relationship with their social, cultural and natural surroundings. Higher education in Indonesia offers not only theoretical degrees but also vocational degrees, provided by different types of institution such as academies, polytechnics, institutes and universities.

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*Figure 2. Workforce by education in the Indonesian manufacturing industry in comparison with the agriculture and service sectors (Statistics, 2014)*

Low education: primary school graduates and below; medium education: secondary school graduates; high education: academy and university graduates
The extent to which polymer research is embedded in polymer education in academia is quantified from a number of research projects in the field of polymers. Compared to other Southeast Asian countries, Indonesia has a considerably lower research profile in polymers (Figure 3), which accounts for around 2,200 documents (Scopus, 2016). This number is far lower than China and the USA, which currently produce more than 370,000 and 480,000 publications, respectively.

![Figure 3. Number of published research documents (research articles, conference papers, review articles and book chapters) reported in Scopus database that include the keyword “polymer” (Scopus, 2016)](image)

Unlike the USA and Malaysia (Chan & Ho, 2015; Stein, 1997), universities in Indonesia do not offer undergraduate degrees exclusively in polymer chemistry or polymer/plastics engineering. Courses in the polymer-related subjects are usually incorporated into chemistry, chemical engineering, materials engineering and mechanical engineering. The syllabi of some universities that offer courses that include the word “polymer” were considered in this analysis. Out of 1,668 engineering undergraduate degree programmes offered by Indonesian public and private institutions, only 7.5% of the programmes are in chemical-related subjects. This number also includes degree programmes in Chemistry under the faculties of Science. Materials engineering degrees are offered by only three institutions, and account for less than 0.2% of the total number of engineering degree programmes, compared to mechanical engineering degrees, which account for 12% of the total (I. A. B. o. H. Education, 2016).

Like literature research was performed to determine some different polymer-related courses identified in the syllabi. Tables 1 and 2 list some of the different polymer-related courses identified in the syllabi analysed.
There are four institutions listed that offer free access to their syllabi (Anwar, 2011; ITS, 2014, 2015; Rochmadi, 2010; UGM, 2011), which are Gadjah Mada University (UGM), Indonesian Education University (UPI), Indonesian Islamic University (UII) and Sepuluh Nopember Institute of Technology (ITS). This shows that the courses on polymers are usually offered as elective courses within the chemical-related undergraduate programme, which carry two to three credit hours. The elective courses are taught in the third or fourth year of a four-year bachelor degree programme. The courses provide students with an overview of the methods for polymer synthesis and its characterisation. On the other hand, the polymer-related courses offered in materials engineering are mostly in the core curriculum as compulsory courses. The courses, which are equal to three credit hours, are mainly related to polymer properties and polymer processing.

Table 1
Polymer syllabi for chemistry and chemical engineering courses in selected universities

<table>
<thead>
<tr>
<th>University Name</th>
<th>UGM</th>
<th>UPI</th>
<th>UII</th>
<th>ITS</th>
<th>ITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Name</td>
<td>Chemistry (Science)</td>
<td>Chemistry (Science)</td>
<td>Chemical Engineering</td>
<td>Chemistry (Science)</td>
<td>Chemical Engineering</td>
</tr>
<tr>
<td>Course Name</td>
<td>Polymer Chemistry</td>
<td>Polymer Chemistry</td>
<td>Polymer Technology</td>
<td>Polymer Technology</td>
<td>Polymer Technology</td>
</tr>
<tr>
<td>Compulsory/Elective</td>
<td>Elective</td>
<td>Compulsory</td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Credit Content</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Content</td>
<td>Molecular weight, polymerization, copolymerization</td>
<td>Polymerisation, molecular weight, copolymerization, processing</td>
<td>Polymerisation, molecular weight, chemical and physical properties</td>
<td>Characteristics, synthesis, molecular weight, physical properties and structure</td>
<td>Characteristics, polymerisation, copolymerisation, processing</td>
</tr>
</tbody>
</table>
Some institutions are equipped with standard apparatus for qualitative and quantitative analytical chemistry, as well as equipment for material characterization analysis such as differential scanning calorimetric, thermal gravimetric analysis, atomic absorption spectrometry, differential thermal analysis and thermo-mechanical analysis to support research and teaching in the relevant areas of polymer science and engineering (UI, 2016). The practical works performed in this area usually cover material characterisation and mechanical testing, which are carried on for four to five laboratory work hours.

The Indonesian government, through its Ministry of National Education, is investing more in improving the vocational education and training (VET) system in order to close the skills gaps in line with the demands of the labour market. The ministry has made VET expansion a priority, and set a goal to shift the ratio of students enrolled in general senior secondary education to those in a vocational senior education school to 40:60 by 2015 (UNESCO-UNEVOC, 2013). The government believes that vocational education is obviously required to respond to the needs of the current global market.

Among 18 skills courses offered by the vocational senior education schools in technology and engineering fields, there is no course exclusively on a polymer-related subject (School, 2008). There is only a study programme for industrial chemistry, which aims to provide the knowledge and skills students need to be capable of working in the general chemical industry. Politeknik ATK Yogyakarta (2016) is the only higher education institute offering vocational education in plastics processing. However,

Table 2
*Polymer syllabi for materials-engineering-related courses in selected universities*

<table>
<thead>
<tr>
<th>University Name</th>
<th>ITS</th>
<th>UI</th>
<th>ITB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Name</td>
<td>ITS</td>
<td>UI</td>
<td>ITB</td>
</tr>
<tr>
<td>Polymeric Materials and Composites</td>
<td>Metallurgy and Materials Engineering</td>
<td>Metallurgy Technology</td>
<td>Materials Engineering</td>
</tr>
<tr>
<td>Compulsory/ Elective Credit</td>
<td>Compulsory</td>
<td>Elective</td>
<td>Compulsory</td>
</tr>
<tr>
<td>Chemical bounding, structure, types of polymers, synthesis, processing, physical properties</td>
<td>Morphology, rheology, mechanical &amp; thermal properties, blending and copolymerisation, processing</td>
<td>Polymerization, molecular weight, morphology, structure and properties, effect of temperature</td>
<td>Types of polymers, additives, natural polymers, polymers with special properties</td>
</tr>
</tbody>
</table>
a vocational institution is reported to offer a course in the design of plastic casting moulds (ATMI, 2016).

The law on the National Education System of 2003 recognises the existence of non-formal education to replace, complement and/or supplement formal education to support lifelong education (UNESCO-UNEVOC, 2013). Several institutions offer short-term, non-formal, vocational training which focuses on preparing workers and trainees to enter the job market with specifically upgraded skills. Currently, the centre for Indonesia’s polymer research, Sentra Polimer, offers training programmes in plastics technology, polymer composites, polymer testing and plastics processing. The participants for this training are mostly practitioners currently working in the polymer industry.

**Gap Analysis**

To support the smooth running of the manufacturing plants in polymer processing, it is necessary to have highly trained personnel with manufacturing skills (Tillery, 1993). The industries dealing with rubber and plastics require skilled, trained manpower such as chemists, physicists and engineers in polymer-related science to maintain its competitiveness. Those industries also require support in designing and synthesising new materials, as well as characterising, testing and evaluating these materials to find new uses for them (Chan & Ho, 2015).

Since 1968, the Society of Plastic Engineers has stated the necessity of educational programmes to train skilled technical and engineering personnel for the plastics industry. Polymer education has been widely taught around the world, which can be in a specific degree programme, or part of a science or engineering degree programme. As one of the Association of Southeast Asian Nations’ (ASEAN’s) top exporters of plastic products, Malaysia offers several bachelor’s degree courses specialising in polymer engineering, and covering polymer rubber and latex processing (Chan & Ho, 2015), as do the USA and the UK (Stein, 1997). Besides the degree courses, some short courses providing comprehensive coverage of the main aspects of plastics technology are also available (ILPMRG, 2015; PRIM, 2015; SHRDC, 2015). Meanwhile, with more than 4,000 plastics manufacturers, instruction in polymer science and technology has been widely spread across all levels in the Thailand educational system, from technical vocation schools to a doctoral degree programme (Amornsakchai & North, 2015). Short courses in polymer processing that are provided by a Thai institution have also been found in the literature (PPC, 2017). In Vietnam, a university is found in the literature providing a bachelor’s degree course in polymeric materials technology (Hotcoursesabroad, 2017), and several others have incorporated polymer-related subjects as part of a Science or Engineering programme (Thu et al., 2015).

Even though they do not offer undergraduate degrees exclusively in polymers, some countries such as Brazil
(Santos et al., 2015) and Australia (Fellows, 2015) have a strong emphasis on preparing skilled manpower for the plastics industry through various vocational training courses. These range from mould production and polymer processing to polymer composites technology. Designed to deliver workplace-specific skills and knowledge, the VET in Australia is presented in tiered levels based on the qualifications required. For example, the Certificate II in polymer processing is intended for operators who directly control production equipment, while the Certificate IV in polymer technology is intended for senior operators who are capable of working in situations that require autonomy and judgment (Australian Government: Department of Education, 2017). Higher learning institutes at university level in Indonesia offer courses in Chemistry, Chemical Engineering and Materials Engineering that are relevant to the plastics industry. However, by looking at the examples of the benchmark countries, it is hoped that there will be more vocational schools and training institutions in Indonesia that are relevant to the plastics industry. Those institutions will not only be for educating freshmen but also for retraining the staff and technical employees who are currently working in the industry. It is required that working professionals need to be aligned with skills training and certification from intensive, short courses (Malaysia, 2013).

Indonesian plastics manufacturing is expected to rapidly grow since plastics has become the material of choice in various types of applications. With the requisite use of advanced manufacturing technology in plastics processing, the industry requires more skilled labours capable of using the new generation of equipment. As revealed from the facts presented in Figure 2 for manufacturing industries, a skills mismatch may also exist in the plastics industry. To strengthen competitiveness and productivity, it is necessary to reduce the mismatch between supply and demand in the labour market by developing a responsive education and training system with a tight collaboration among the government, industry players, learning institutions and research centres. As reported by the Indonesian Packaging Association, food packaging accounts for more than 60% of plastic consumption sales in Indonesia, with around 892 manufacturers producing both rigid and flexible packaging. The National Occupational Skills Standards (NOSS) for the plastics packaging industry developed by the Indonesian Ministry of Labour (Iskandar, 2014b) has formulated the knowledge and skills required to perform a specified job in this sector. Such training courses that offer comprehensive coverage of the main aspects of plastic packaging processing technology would be considered to be beneficial by the industry.

According to NOSS (Iskandar, 2014b), a total of 27 competency units have been identified comprising of three main areas, namely operations management, process engineering and technical maintenance. The operations management consists of functions related to inventory management.
and material requirements planning. The process engineering covers the scope of the work required when dealing with the different process of plastics manufacturing such as injection moulding, blow moulding, extrusion, thermo forming and vacuum forming. Finally, the technical maintenance area deals with maintaining the quality of the plastics manufactured. For a vocational schools curriculum, Potter (1971) suggests the following learning outcomes should be accomplished:

- Developing the fundamental skills associated with the production of plastic commodities.
- Understanding and exercising safe methods of performing work.
- Demonstrating knowledge of the importance of accuracy and the use of standards in production.
- Understanding the use and care of equipment and materials through demonstration and practice.

CONCLUSION

It is crucial for the Indonesian plastics industry to strengthen its competitiveness through the continued acquisition of the appropriate technologies, as well as enhancing marketing capabilities and skills training. The development of responsive education and training is one of the keys to addressing the issue of workforce skills enhancement. Currently, several higher learning institutes offer courses in chemical and process engineering, mechanical and manufacturing engineering, materials engineering, and other subjects relevant to the industry. However, it is hoped that there will be more training and education centres under the skills and the vocational umbrella that expand their courses to include programmes relevant to the plastics industry. The number of skilled personnel in this industry can be encouraged to meet the growing requirements of the industrial sector. It is expected that technically competent polymer scientists and technologists would form the main core support for the sustainability of the polymer industry in Indonesia.

Further research should include identifying and verifying a list of job duties and tasks for the industrial polymer technicians to use in developing a polymer education and training programme that fully meets the needs of the Indonesian plastics industry.

REFERENCES


Iskandar, M. (2014b). *Penetapan standar kompetensi kerja nasional indonesia kategori industri pengolahan golongan pokok industri karet, barang dari karet dan plastik kelompok usaha industri barang dari plastik untuk pengemasan* [Indonesian national competency standards industry category rubber processing industry, rubber and plastic goods industry business group of plastic goods for packaging], Jakarta.


Polymer Engineering Education in Indonesia


Development and Initial Validation of Emotional Support and Achievement Motivation Scales as a Part of Redi-Space Assessment

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ABSTRACT
It is well-known that self-regulation is one of the most prominent factors that influences success in learning. Prior research suggested not only a new method in the measurement but also an intervention to develop it. The main aim of this research introduced online questionnaire and validated it. This questionnaire is part of REDI-Space, a self-regulation website. Self-regulation cannot be seen as a single variable but it correlates with other variables such as emotional support and achievement motivation. Thus, in the development of Indonesian Self-Regulation Scales for Adolescence (ISRSA), researcher determines five variables as its contents. This study focused on the validation of two scales (namely, Emotional Support and Achievement Motivation Scale self-report questionnaire) given to students at one university in their first and second year of studies. Scales consisting of 20-item and 24-item were developed for Emotional Support and Achievement Motivation, respectively. Confirmatory Factor Analysis and test-retest reliability were demonstrated to analyse the data. From a group of numbered participants (N=216), there were strong internal consistency, discriminant validity and construct validity. Further research involving other universities can enrich the data to reach a better generalisation.

Keywords: Achievement motivation, college students, emotional support, REDI-Space, self-regulation

INTRODUCTION
Adolescents often face challenging situations, such as academic tasks, which not only require cognitive and metacognitive skill, but also demand other supports to maintain their effort coping with difficult situations like finding the appropriate peers...
and career (Ormrod, 2010; Santrock, 2011; Woolfolk, 2010). Support can be obtained from peers or teachers (Torsheim et al., 2012). Teacher support is considered as a critical and central role in maintaining students’ motivation to learn (Becker & Luthar, 2002; Pianta, Hamre, & Stuhlman, 2003; Stipek, 2004). Therefore, students-teacher relationships should be considered in attaining learning goals (Wentzel, 2009). However, research that focused on adolescents in college was still limited and chose other periods due to academic growth (Mercer, Nellis, Martinez, & Kirk, 2011) or transition (De Wit, Karioja, Rye, & Shain, 2011).

Emotional support derives from significant others in students’ life such as teachers. Teachers’ support can be defined as positive climate, teacher’s sensitivity and also warmth which are students’ crucial needs, particularly in academic effort (Schnell, Ringeisen, Raufelder, & Rohrmann, 2015). Experts have said that emotional support is focused on positive climate and lecture sensitivity, because warmth is part of sensitivity (La Paro, Pianta, & Stuhlman, 2004; Santrock, 2011). Based on the above conceptual and empirical work, emotional support by teacher can be conceptualised as involving the (a) positive climate that can be evaluated by students due to lecturer effort, and (b) lecturer sensitivity that is characterised by lecturer’s empathy and warmth in appraising students’ effort when they cope with challenging situations.

Gaining good performance in an academic setting is the general goal for students learning in a formal institution (Ormrod, 2010; Santrock, 2011; Woolfolk, 2010). This phenomenon is called achievement motivation (Dalton, 2010). In the beginning, achievement motivation was referred to as mastery and performance goal (Ames, 1992; Elliot & Dweck, 1988; Maehr & Midgley, 1991; Nicholls, 1984). Then, performance goal was separated into performance approach and performance avoidance (Elliot & Church, 1997; Elliot et al., 1999; Elliot & McGregor, 2001; Sideridis, 2005; Skaalvik, 1997). They performed achievement goals in terms of competence. Thus, the outcome can either be a desirable possibility (i.e., success) or an undesirable possibility (i.e., failure) (Elliot, McGregor, & Gable, 1999). Therefore, for a student who is expecting success will apply an approach orientation, whereas a student who expects failure will adopt an avoidance orientation (Barzegar, 2012). In this study, the researcher adopts mastery goal, performance approach goal, and performance avoidance goal.

The role of cultural background cannot be neglected when it comes to academic performance. It influences students’ and teacher’s perception of the positive behaviour according to cultural context (Ormrod, 2010; Santrock, 2011; Woolfolk, 2010). Discussing the influence of culture, Indonesia can be defined as a collectivist country. Furthermore, we cannot deny the role of information technology in the measurement. Therefore, it is important to build a questionnaire which includes information technology and is suitable.
in this specific setting so as to create a systematic conclusion about the population.

MATERIALS AND METHODS

Participants and Procedures

At first, researchers announced this research through poster and informal meetings with lecturers. We asked volunteers to take part in our discussions on deciding the constructs or variables that determine successful learning from both students’ and lecturers’ perspectives. After we had gotten some names, we gave the students and lecturers informed consent that revealed their contribution to this research. In each group, they were asked the following questions: What are students’ characteristics that determine success in learning? What are the main competencies or abilities that support students’ learning behaviour? What supports do students need? The first group consisted of five lecturers and the second group had ten students.

Interestingly, although discussions of each were held in the different places, both of the teacher and students proposed similar constructs. Based on the team’s discussion, we decided four variables: self-regulated learning, achievement motivation, help-seeking behaviour, and emotional support from parents and lecturers. After we had obtained these variables, we reviewed the relevant literature so as to create blue print for each variable. Every week, the researchers met and approved the final items.

In this study, we reported the validation of Achievement Motivation and Emotional Support Scales.

The participants who fulfilled these questionnaires were recruited in the subjects they attended. The participants are the students from the first- and second-year of college. The team explained the aim of this study to the programme’s director and lecturers. After obtaining the permission, we went to the selected classes and asked the students for their email address using convenience sampling. It meant only the students who attended the classes gave their email address. Several students were absent, and we decided not to involve them because peers did not know their email address.

A total of 230 students agreed and gave their email addresses to participate in this study. However, 14 students were excluded because their responses to all the scales were similar and had the same pattern, i.e. their responses were merely copy of the previous answers. It indicated that they did not fully understand the sentences.

A final sample of 216 students was analysed. After the researchers had collected all the students’ email addresses, they sent a website link containing the five scales. This website is called REDI-Space.

The participants were divided into first-year (54.2%, n=117) and second-year (45.8%, n=99) from three majors: Psychology (68.1%, n=147); Economics (24.5%, n=53); and Others (7.4%, n=16). Others referred to the students who were from other faculties other than Psychology and Economics. More than seventy-five percent (n=163) of the participants are female. Gender was normally distributed, with the skewness of -1.192 (SE = .05) and
kurtosis -.585 (SE = .01). Moreover, subject and grade showed a skewness of 1.341 (SE = .05), kurtosis .671 (SE = .01) and skewness of .168 (SE = .05), kurtosis 1.990 (SE = .01), respectively, indicating that data distribution was normal.

Measures

Emotional Support Scale. The initial Emotional Support Scale was composed of 20 items; a self-report measure was developed to assess students’ perception of lecturer’s support into two dimensions, positive climate and lecture sensitivity. However, considering the results of team discussions, it was found that ten items were unclear and ambiguous. Therefore, it was the final result in ten items.

Positive climate consists of four items and lecture sensitivity contains six items. The participants were asked to indicate the lecturer’s support during learning interaction in the classes they had attended, with responses ranging from 1 (not at all suit for me) to 6 (really suit for me). Sample items of the positive climate dimension are such as “Lecturer treats all of the students equally” and “Lecturer expects students to respect each other.” There were six items in the lecturer’s sensitivity dimension such as “Lecturer considers students’ ability in delivering knowledge” and “My lecturer is a warm person.” The minimum score for positive climate and lecturer’s sensitivity was 4 and 6, respectively. The maximum score for positive climate and lecturer’s sensitivity was 24 and 36, respectively.

Achievement Motivation Scale. The Achievement Motivation Scale consists of 12 items. The Achievement Motivation Scale asks the participants to indicate their motivation when fulfilling academic tasks. Similar to the previous scale, the students’ responses ranged from 1 (not at all fit for me) to 6 (really fit for me). This scale consists of three subcales, namely mastery goal (5 items), performance approach (4 items), and performance avoidance (3 items). The minimum and maximum scores for mastery goal are 5 and 30, respectively. The minimum and maximum scores for performance approach are 4 and 24 and for the last subscale are 3 and 18, respectively. Sample items for each subscale: “The subject that I learn is interesting” (mastery goal); “I insist on achieving a better grade compared to others in class” (performance approach); “I am concerned with the possibility of getting worse grades compared to my friends”.

RESULTS AND DISCUSSION

REDI-Space

As mentioned earlier, this study used a website as a tool to collect data. It is called REDI-Space. After discussions to determine constructs, the researchers agreed that the website consisted not only online questionnaires but also some light materials such as reading material and monitoring tool to evaluate the effectiveness of learning strategies by students. It was decided that REDI-Space should contain online questionnaires, room discussions, reading
Emotional Support and Achievement Motivation Scales

materials, learning journals, and messages. This website can be accessed by students and lecturers. Regarding address descriptive statistics, there is information on gender, grade, and subject about those who accessed this website. There are four scales prepared, namely Self-Regulation, Emotional Support, Achievement Motivation, and Help-Seeking Behaviour. In this study, the participants were given Emotional Support Scale and Achievement Motivation Scale. REDI-Space can be accessed through www.redi-space.net. Figure 1 shows the homepage of REDI-Space.

Instrument Development and Initial Validation of Emotional Support Scale

Factor Analysis. Exploratory Factor Analysis (EFA) was conducted to examine construct validity using the principal component analysis method of extraction. According to Hair, Black, Babin, and Anderson (2010), varimax rotation is the best method to catch orthogonal rotation. Then, varimax was examined for correlation among factors with eigenvalues, prior to rotation, greater than or equal to one. An item was included as loading significantly on a factor if its factor value was greater than or equal to ± .50. First of all, Bartlett’s Test of Sphericity with \( x^2 (45) = 549.047, p < .05 \) and Kaiser-Meyer Olkin (KMO) = .833, \( p < .05 \) showed that the factor analysis can be continued. In addition, Table shows the anti-image correlation between items described that all the items had value above .50.
From the final factor analysis in Table 2, it could be stated that all the items had a significant loading although the item PC1 had been removed to another factor. Afterwards, the researcher named these factors the positive climate consisting of three items, while lecture’s sensitivity contained seven items. The result of varimax rotation showed each factor had a value of more than .08. To sum up, two factors could be accepted as emotional support subscales. Upon extraction, the two factors accounted for 50.38% of the total variance measured variable (see Table 3 for the eigenvalues and percentage of variance).

Table 1
Anti-image correlation Emotional Support items

<table>
<thead>
<tr>
<th></th>
<th>PC1</th>
<th>PC2</th>
<th>PC3</th>
<th>PC4</th>
<th>LS1</th>
<th>LS2</th>
<th>LS3</th>
<th>LS4</th>
<th>LS5</th>
<th>LS6</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC1</td>
<td>.907a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC2</td>
<td>-.207</td>
<td>.834a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC3</td>
<td>-.068</td>
<td>-.169</td>
<td>.751a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC4</td>
<td>-.032</td>
<td>-.313</td>
<td>-.290</td>
<td>.783a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS1</td>
<td>-.154</td>
<td>.048</td>
<td>-.061</td>
<td>-.105</td>
<td>.822a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS2</td>
<td>-.106</td>
<td>-.009</td>
<td>.075</td>
<td>.044</td>
<td>-.423</td>
<td>.806a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS3</td>
<td>-.055</td>
<td>-.048</td>
<td>.002</td>
<td>-.038</td>
<td>-.086</td>
<td>-.145</td>
<td>.883a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS4</td>
<td>-.017</td>
<td>-.051</td>
<td>-.188</td>
<td>.142</td>
<td>-.204</td>
<td>-.016</td>
<td>-.174</td>
<td>.816a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS5</td>
<td>-.045</td>
<td>-.097</td>
<td>.038</td>
<td>-.079</td>
<td>-.063</td>
<td>-.196</td>
<td>.069</td>
<td>-.067</td>
<td>.858a</td>
<td></td>
</tr>
<tr>
<td>LS6</td>
<td>-.093</td>
<td>-.111</td>
<td>.092</td>
<td>-.161</td>
<td>-.094</td>
<td>-.065</td>
<td>-.087</td>
<td>-.071</td>
<td>-.291</td>
<td>.867a</td>
</tr>
</tbody>
</table>

Table 2
Factor loading for ten Emotional Support items in the Final Factor Analysis

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>PC1</td>
<td>.508</td>
</tr>
<tr>
<td>PC2</td>
<td>.260</td>
</tr>
<tr>
<td>PC3</td>
<td>.027</td>
</tr>
<tr>
<td>PC4</td>
<td>.180</td>
</tr>
<tr>
<td>LS1</td>
<td>.776</td>
</tr>
<tr>
<td>LS2</td>
<td>.801</td>
</tr>
<tr>
<td>LS3</td>
<td>.562</td>
</tr>
<tr>
<td>LS4</td>
<td>.550</td>
</tr>
<tr>
<td>LS5</td>
<td>.601</td>
</tr>
<tr>
<td>LS6</td>
<td>.605</td>
</tr>
</tbody>
</table>

Note: PC= positive climate, LS= lecture sensitivity

Table 3
Eigenvalues and Percentage of Variance Accounted for by the Two Factors in the Final Factor Analysis (N = 216)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Initial eigenvalues</th>
<th>Extraction sums of squared loading</th>
<th>Rotation sums of squared loading</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% Variance</td>
<td>Total</td>
</tr>
<tr>
<td>1</td>
<td>3.729</td>
<td>37.287</td>
<td>3.729</td>
</tr>
<tr>
<td>2</td>
<td>1.309</td>
<td>13.092</td>
<td>1.309</td>
</tr>
</tbody>
</table>
Reliability. From the Alpha Cronbach shown in Table 4, each subscale had a sufficient internal consistency and in total, Emotional Support Scale depicted adequate internal consistency with Cronbach’s $\alpha > .80$. In general, ten items had item-total correlations above $r = .30$ ranged from $r = .338$ to $r = .618$.

Table 4
Descriptive Statistic for Emotional Support Scale

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Mean</th>
<th>Variance</th>
<th>SD</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive climate</td>
<td>19.41</td>
<td>4.429</td>
<td>2.105</td>
<td>.677</td>
</tr>
<tr>
<td>Lecture sensitivity</td>
<td>27.57</td>
<td>11.176</td>
<td>3.343</td>
<td>.757</td>
</tr>
<tr>
<td>Total</td>
<td>46.99</td>
<td>22.925</td>
<td>4.788</td>
<td>.805</td>
</tr>
</tbody>
</table>

Instrument Development and Initial Validation of Achievement Motivation Scale

Factor Analysis. Quite similar to the previous scale, Achievement Motivation Scale used EFA by running the principal component analysis method of extraction. The first indicator was the value of Bartlett’s Test of Sphericity with $x^2 (66) = 630.223$, $p < .05$ and Kaiser-Meyer Olkin (KMO) = .757, $p < .05$ showed that factor analysis fulfilled the requirement. In turn, anti-image correlation amongst the items described that all the items had the value above .50.

Table 5
Anti-image correlation Achievement Motivation items

<table>
<thead>
<tr>
<th></th>
<th>MG1</th>
<th>MG2</th>
<th>MG3</th>
<th>MG4</th>
<th>MG5</th>
<th>PAP1</th>
<th>PAP2</th>
<th>PAP3</th>
<th>PAP4</th>
<th>PAV1</th>
<th>PAV2</th>
<th>PAV3</th>
</tr>
</thead>
<tbody>
<tr>
<td>MG1</td>
<td>.731a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MG2</td>
<td>-.119</td>
<td>.749a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MG3</td>
<td>-.239</td>
<td>.044</td>
<td>.814a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MG4</td>
<td>-.150</td>
<td>-.133</td>
<td>-.131</td>
<td>.807a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MG5</td>
<td>-.152</td>
<td>-.141</td>
<td>-.114</td>
<td>-.038</td>
<td>.728a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAP1</td>
<td>-.204</td>
<td>-.107</td>
<td>.028</td>
<td>-.188</td>
<td>-.028</td>
<td>.806a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAP2</td>
<td>.104</td>
<td>.043</td>
<td>-.161</td>
<td>.084</td>
<td>-.159</td>
<td>-.348</td>
<td>.773a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAP3</td>
<td>-.018</td>
<td>-.014</td>
<td>-.056</td>
<td>-.047</td>
<td>-.016</td>
<td>-.292</td>
<td>-.019</td>
<td>.824a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAP4</td>
<td>.018</td>
<td>.017</td>
<td>-.028</td>
<td>-.063</td>
<td>.144</td>
<td>-.190</td>
<td>-.124</td>
<td>-.313</td>
<td>.841a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAV1</td>
<td>.123</td>
<td>.087</td>
<td>-.024</td>
<td>-.103</td>
<td>.016</td>
<td>.007</td>
<td>-.172</td>
<td>-.250</td>
<td>-.127</td>
<td>.808a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAV2</td>
<td>-.090</td>
<td>.050</td>
<td>-.004</td>
<td>-.142</td>
<td>.094</td>
<td>-.021</td>
<td>.076</td>
<td>.001</td>
<td>.021</td>
<td>-.163</td>
<td>.519a</td>
<td></td>
</tr>
<tr>
<td>PAV3</td>
<td>.112</td>
<td>-.015</td>
<td>.040</td>
<td>.187</td>
<td>.025</td>
<td>.013</td>
<td>-.093</td>
<td>-.111</td>
<td>.027</td>
<td>.061</td>
<td>-.571</td>
<td>.513a</td>
</tr>
</tbody>
</table>

Note: a Measure Sampling Adequacy (MSA)
As for item selection, factor loadings of .40 and higher were considered as significant. In other words, items with loading below .40 on all the factors were excluded from further analysis (Yong & Pearce, 2013). On the basis of this criterion, no items were excluded. The final result after the varimax rotation is shown in Table 6. It can be concluded that three factors precisely describe all the items. All the factors were named mastery goal, performance approach, and performance avoidance orderly. However, the results of component transformation matrix showed that only factor (mastery goal) achieved the value more than .80 although the two other factors were still adequate. It should be considered as the critical point for the next research suggestion.

It can be concluded that three factors considered for 54.76% of the total variance measured variable (see Table 7 for the eigenvalues and percentage of variance).

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>MG1</td>
<td>0.066</td>
<td>0.760</td>
<td>0.002</td>
</tr>
<tr>
<td>MG2</td>
<td>-0.068</td>
<td>0.605</td>
<td>0.003</td>
</tr>
<tr>
<td>MG3</td>
<td>0.294</td>
<td>0.507</td>
<td>-0.052</td>
</tr>
<tr>
<td>MG4</td>
<td>0.353</td>
<td>0.561</td>
<td>0.005</td>
</tr>
<tr>
<td>MG5</td>
<td>-0.002</td>
<td>0.578</td>
<td>-0.168</td>
</tr>
<tr>
<td>PAP1</td>
<td>0.706</td>
<td>0.396</td>
<td>0.027</td>
</tr>
<tr>
<td>PAP2</td>
<td>0.682</td>
<td>0.113</td>
<td>-0.032</td>
</tr>
<tr>
<td>PAP3</td>
<td>0.780</td>
<td>0.149</td>
<td>0.130</td>
</tr>
<tr>
<td>PAP4</td>
<td>0.781</td>
<td>0.029</td>
<td>-0.006</td>
</tr>
<tr>
<td>PAV1</td>
<td>0.699</td>
<td>-0.108</td>
<td>0.135</td>
</tr>
<tr>
<td>PAV2</td>
<td>0.106</td>
<td>0.013</td>
<td>0.890</td>
</tr>
<tr>
<td>PAV3</td>
<td>0.039</td>
<td>-0.166</td>
<td>0.853</td>
</tr>
</tbody>
</table>

Table 7
Eigenvalues and Percentage of Variance Accounted for by the Three Factors in the Final Factor Analysis (N = 216)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Initial eigenvalues</th>
<th>Extraction sums of squared loading</th>
<th>Rotation sums of squared loading</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% Variance</td>
<td>Total</td>
</tr>
<tr>
<td>1</td>
<td>3.376</td>
<td>28.137</td>
<td>3.376</td>
</tr>
<tr>
<td>2</td>
<td>1.955</td>
<td>16.288</td>
<td>1.955</td>
</tr>
</tbody>
</table>

Reliability. By conducting the Alpha Cronbach to examine internal consistency in Table 8, it indicated that the total items had sufficient internal consistency although performance avoidance reached the lowest internal consistency with Cronbach Alpha less than .60 compared to the subscale items. Item-total correlations ranged from $r = .112$.
to \( r = .623 \). There were three items with item-total correlation less than .30. In turn, it indicated that future research needs to consider the number of subjects and various backgrounds.

Table 8
Descriptive Statistic for Achievement Motivation Scale

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Variance</th>
<th>SD</th>
<th>( \alpha )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery approach</td>
<td>25.09</td>
<td>5.476</td>
<td>2.340</td>
<td>.614</td>
</tr>
<tr>
<td>Performance approach</td>
<td>19.06</td>
<td>10.109</td>
<td>3.179</td>
<td>.793</td>
</tr>
<tr>
<td>Performance avoidance</td>
<td>11.20</td>
<td>6.988</td>
<td>2.643</td>
<td>.569</td>
</tr>
<tr>
<td>Total</td>
<td>55.34</td>
<td>31.836</td>
<td>5.642</td>
<td>.718</td>
</tr>
</tbody>
</table>

DISCUSSION

The results of this study offer promising support for REDI-Space application. Unfortunately for Emotional Support Scale, one of the dimensions (positive climate) has internal consistency that is questionable (.677) although it shows an internal consistency reliability that is generally acceptable (.70 or higher). Positive climate, which consists of three items, urgently needs a bigger number of participants to estimate its validity. In a research by Goodenow (1993), Students’ Perception of the Teacher Emotionally Supportive Scale that consisted of three items was applied to 8971 students to show a high internal consistency (.80). For Goodenow, it was not important to divide teacher’s support into several dimensions. Compared to Goodenow, it can be concluded that the number of participants in the present work was rather limited.

Furthermore, Achievement Orientation Scale yields similar results. Although generally its internal consistency can be accepted (.718), both mastery approach and performance avoidance approach showed questionable internal consistencies (.614) and (.569). The study by Roussel, Elliot and Eltman (2011) involving 551 students managed to attain an acceptable internal consistency for each subscale. Mastery approach goals reached (.94), performance approach goals had (.88), and performance avoidance goals had (.86).

The subjects involved did not capture various cultures in proportional number, in which for this variable, culture plays a significant factor (Ormrod, 2010). Therefore, these scales cannot be used in a wide population yet. There need to be many more subjects to confirm the structure in various cultural backgrounds.

Despite the weakness of this result, REDI-Space is the first website in self-regulation field that portrays not only description of academic self-regulation but also other variables that predict influencing self-regulation itself, particularly in Indonesia. In addition, it contains valuable
learning sources and tools to help students and lecturers in monitoring their learning relationship. Therefore, utilising this website can help in achieving academic goals.

CONCLUSION
It can be concluded that both Emotional Support and Achievement Motivation Scales can be categorised as valid and reliable scales. However, due to the questionable internal consistency for several aspects, it seems that the validation should be strengthened by adding bigger and more various subjects for the next research. A group of new participants can be proposed for test-retest reliability and also to increase construct validity across not only through the number of universities but also cultural background. In addition, REDI-Space as the first website self-regulation in Indonesia can be promoted to other universities through the use of bigger number of participants who are willing to get involved.

Thus, it is recommended that in order to establish adequate structure and validation of Indonesian Self-Regulation Scales for Adolescence (ISRSA), researchers would collect data from other areas in Indonesia considering cultural background and subject selections, particularly in the Achievement Motivation Scale that had lower item-total correlations and affected internal consistency. This effort will increase generalisation and bolster this scale as part of ISRSA.

ACKNOWLEDGEMENT
This research work was accomplished with the funding from Indonesian Ministry of Research, Technology, and Higher Education. The authors also acknowledged the research team and all the respondents who had taken part in this. The author would like to thank the person who had named REDI-Space and other professionals who had helped us in constructing this web.

REFERENCES


The Causal Model in Physics Learning with a Causalitic-thinking Approach to Increase the Problem-solving Ability of Pre-service Teachers

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ABSTRACT

The causal model is a specific relational pattern for the cause and effect of a phenomenon in learning with a causalitic-thinking approach (CTA) (causalitic means a combination of causality and analytic). This approach is oriented to increasing the problem-solving ability (PSA) of pre-service teachers and has been implemented in two subjects: work and energy, and thermodynamics. PSA includes the ability to understand (IPSA-1), select (IPSA-2), differentiate (IPSA-3), determine (IPSA-4), apply (IPSA-5), and identify (IPSA-6). This research aimed to investigate causal models in learning Physics, which are possible to develop for increasing PSA. This research was conducted by using a mixed method of an embedded, experimental, two phase design and used a sample of 49 students, with 39 females and 10 males. The differences between pre-test and post-test, and between the PSA gain of the low (Lo) and high (Hi) groups were tested using the Wilcoxon signed-ranks test. Results of the test on the subjects, among all pairs (24 pairs) of \( t_{\text{counted}} \) and \( t_{\text{table}} \), showed that there are differences of 71% (for pre- and post-test) and 33% (for Lo and Hi groups) that indicated \( t_{\text{counted}} < t_{\text{table}} \). However, from the investigation of the physics phenomena used, there are six causal models as a result of the first year of this series of research. The models are simple causal model (SCM), divergent causal model (DCM), convergent causal model (CCM), chain causal model (ChCM), simple composite causal model (SCoCM), and chain composite causal model (ChCoCM). These models are useful as references when constructing phenomena for conducting Physics learning or learning for another discipline using this approach.

Keywords: Causal-model, causalitic-thinking approach, physics-learning, problem-solving ability
INTRODUCTION

Many researchers have investigated learning strategies to improve the quality of physics learning. Examples of these are the use of conflict-cognitive learning (Baser, 2006); the process of meta-conceptual awareness, meta-conceptual monitoring and meta-conceptual evaluation (Yürek, 2007); interactive engagement (Hake, 2007); theorem-in-action (Escudero, Moreira, & Caballero, 2009); and the use of demonstration of three accelerated movements (Dykstra & Sweet, 2009). Other examples are the use of technology-enabled-active-learning (TEAL) studio format (Dori & Belcher, 2004); Powerpoint presentation and experimental demonstration (Obaidat & Malkawi, 2009); causal reasoning (Hung & Jonassen, 2006), Physics lecturing programme (PLP), which was designed to increase the ability to analyse and create (Rasagama, 2011); and the use of causality and analytical-thinking approach to increase students’ problem-solving ability (PSA) (Rokhmat, 2013).

Rokhmat (2013) investigated the impact of a causalitic learning approach on the PSA for seven subjects: kinematics, Newton’s law of motion, work and energy, linear momentum, gravity, rigid body equilibrium, and thermodynamics. He defines ‘causalitic’ as causality and analytic. He finds that the PSA increased significantly. In principle, this approach was oriented to facilitating students to develop their abilities in causalitic thinking.

Gopnik and Schulz (2007), and Meder (2006) gave three basic causal models, which are the divergent, convergent and chain models. Next, Rokhmat (2015) added two other models to them, which are simple and composite. He divided the composite model into simple and chain composites. As a result, there are six models of causal, which are simple, divergent, convergent, chain, simple composite and chain composite causal models; these are abbreviated as SCM, DCM, CCM, ChCM, SCoCM and ChCoCM, respectively.

As described previously, this paper focuses on discussing the six causal models and examples of their use in physics-learning phenomena. The discussion includes the conceptual presentations of the related physics-learning phenomena; and identifying their elements (which are the causes and effects) and which kind of causal model is appropriate. In the first year (of three years) of research, the causalitic-thinking approach was actually implemented in the seven subjects; however, in this paper, we only present its implementation in two subjects, i.e. work and energy, and thermodynamics because, statistically they would have been too many pairs for \( t_{counted} \) and \( t_{table} \) (\( t_{counted} \), \( t_{table} \)). There are 18 pairs per-subject, so for the seven subjects it would have been 128 pairs of \( t_{counted} \) and \( t_{table} \). Finally, with respect to the title above, this paper is oriented to answer two questions: 1) how is PSA increased in the two subjects as a result of the CTA implementation. and 2) how examples of the causal models in physics learning.

Relating to the previous questions, we focus this literature review on three topics; the CTA, PSA and the causal model in Physics learning.
Causalitic-thinking Approach (CTA)

An approach is defined as a way of doing something. This paper regards this from the point of view of a learning process. Based on which is more active in the learning between a student and teacher, the approach is divided into two: student- and teacher-oriented approaches. In the former, the teacher has the role to facilitate the students exploring information by themselves. While, in the latter, a teacher is a source of information that they actively transfer to students.

Causalitic thinking (CT) is an abbreviation of ‘causality and analytic thinking’. Paul (2003) divides thinking into eight elements, i.e. generating objectives, proposing questions, applying information, creating a concept, making a conclusion, making assumptions, generating understanding and realising a point of view. However, Gopnik and Schulz (2007) states a philosophical approach to causation theory, which is that it is difference-making, i.e. every cause will create a different effect. The cause must result in, or at least modify, the possibility for an effect to occur. This principle states that some causes are independent from space and time when resulting in an effect. Another principle is that the same initial conditions result in the same phenomenon series. In addition, two principles, Hill (2011) describes one principle of causality, i.e., that one event (a cause) will produce another event (an effect), and if the events are separated by space, they have to be separated by time.

Marzano and Kendall (2008) agreed that analytical thinking is higher-order thinking, while Amer (2005) revealed that analytical thinking is closed to creative thinking. He proposes that analytical thinking is a tool that is useful for understanding a phenomenon. The basic idea of analytical thinking is make a handful of elements, comparing them, give a rank, and finally select the most valuable and discharge the remainder. With respect to CT, analytical thinking refers to how well students can identify the conditions of causes so they result in the determined effect. Kasser (2006) mentioned that to identify, it needs an explanation, and, when establishing the explanation, it has to be presented in terms of facts, concepts, principles, theories and/or laws of physics.

In CT, a student completes some activities that are in line with the causality and analytic thinking. These are activities that are closed to causality thinking such as understanding phenomenon, determining causes, predicting effect and differentiating the causes that are factors of each effect. However, activities that are closed to analytic thinking include identifying the causes that result in an effect, codifying an explanation to correlate cause and effect, and establishing an argument for why the effects happen. To codify the explanation, it has to be presented in terms of facts, concepts, principles, theories and/or laws of Physics, which is closed to the causes and/or effects. Therefore, analytic thinking means determining and applying facts, concepts,
principles, theories and/or laws of physics, and, finally, they are used for identifying or compiling an explanation of why the effect happens.

The elements of the CT agree with some elements of thinking, especially the elements that are stated by Paul (2003), and Kasser (2006). Congenialities exist between the CT and eight elements from Paul (2003), such as understanding CT in line with generating objectives and generating understanding, determining causes and predicting effects that agree with the generated objective, proposing questions, applying information and creating a concept, and differentiating causes is appropriate to proposing questions and creating concept. Furthermore, there are congenialities between CT and the ideas of identification from Kasser (2006) for at least two elements, i.e. identifying causes and explaining the relation between the cause and effect. Therefore, the elements of CT are in agreement for at least nine among the eleven (81%) elements of thinking described by Paul (2003), and Kasser (2006).

Problem-solving Ability (PSA)

In this paper, the term problem-solving ability (PSA) is deductively derived from several opinions such as Marzano and Kendall (2008), and Marzano and Brown (2009). Marzano and Brown (2009) agreed that it is necessary for students to use their knowledge in problem solving to generate and staunch their opinion. While, Marzano and Kendall (2008) gave recommendation for seven questions to encourage problem solving. The questions include determining what the objectives are, what the obstacles are, the way to handle obstacles, the best solutions, the real event, the congeniality between the result and solution, and/or the way to change thinking.

Marquardt (2004) explained two approaches to problem solving. The analytic approach is the first and is the approach through which he maintains that a phenomenon has only one solution. However, integrative approach is the second and the approach through which he proposes there are many solutions to one phenomenon. This approach is recommended in order to develop a multi-effect phenomenon. It varies as to whether there are one or more elements of cause in the phenomenon. Through this latter phenomenon, a student is facilitated to identify conditions of all causes and determine all of the possible effects.

Based on the two previous paragraphs, PSA is defined as two things. First, the ability to use knowledge to select and/or predict all effects when solving a phenomenon, and second, the ability to identify how causes result in each effect.

In general, PSA is defined as having the ability to solve a problem. With respect to causalitic thinking, PSA includes six indicators, i.e. understanding, selecting, differentiating, determining, applying and identifying (Gopnik & Schulz, 2007; Meder, 2006; Paul, 2003). Understanding is defined as the ability to know what the idea behind a problem is; selecting is the ability to determine which elements (in a problem) are the causes and which are the effects. A cause, statistically, is an independent variable and
an effect is a dependent variable. Next, differentiating is defined as the ability to differentiate which cause (or causes) are factors of the effect. Determining is defined as the ability to establish the concepts, principles, theories and/or laws of physics that are related to each effect. Applying is defined as the ability to apply the concepts, principles, theories and/or laws of physics that explains why each effect occurs. And, finally, identifying is the ability to identify the conditions of the cause (or causes) so that it (they) results in the effect.

There is conformity between CT and PSA; to analyse a phenomenon and categorise the causes and effects needs an understanding of the idea and objective of the phenomenon, as well as the consideration and ability to analyse the differences. The three aforementioned needs (understanding, consideration and ability) are included in analytic thinking. Thus, analytic thinking has a significant role in causality thinking. This fact is in line with the findings of Amer (2005), Cohen (2000), Hamilton (2001), Paul (2003) and Zschunke (2000).

The three indicators of PSA (understanding, selecting and differentiating) and the interpretation of problem solving are summarised in the indicators for analytic thinking from Amer (2005), Cohen (2000), Hamilton (2001) and Zschunke (2000). The fourth and fifth indicators (determining and applying) support the ability to identify causes.

From the previous descriptions, it can be concluded that the ability for causality and analytic thinking supports PSA. Causality thinking directly supports the ability to select and/or predict effects in a phenomenon. However, analytic thinking supports the ability to identify how causes have the possibility of resulting in the determined effect. Thus, causality and analytic thinking supports PSA.

Causal Models in Physics Learning

**Causal-thinking model:** the three ideas with respect to the causal model of thinking from Gopnik and Schulz (2007), and Meder (2006) can be developed into six models. The models include three basic models (the divergent, convergent and chain models) and three other models from the development of the basic models (simple, simple composite, and chain composite models) (Figures 1 and 2).

Figure 1 shows four basic causal models; the circles represent the variables of events, while the arrows express the direction of cause-effect. The models are:

(a) the SCM, where one cause \( X \) influences one effect \( Y \); (b) the DCM, where one cause \( X \) influences two or more effects \( Y_1, Y_2 \), and so on; (c) the CCM, where two or more causes \( X_1, X_2 \), and so on influence one effect, \( Y \); (d) the ChCM, where one initial cause \( X \) influences one in-between effect \( Y \), which influences one final effect \( Z \). In addition, Figure 2 shows the combination of the four models (SCM, DCM, CCM and ChCM) into two further models: (a) the SCoCM and (b) the ChCoCM. In the SCoCM, two or more causes \( X_1, X_2 \), and so on influence two or
more effects $Y_1$, $Y_2$ and so on, and in the ChCoCM, two or more initial causes $X_1$, $X_2$ and so on influence two or more in-between effects $Y_1$, $Y_2$ and so on, which influence two or more final effects $Z_1$, $Z_2$ and so on.

Figure 1. One Simple Causal Model (SCM) (Rokhmat, 2013; 2015; Rokhmat, Marzuki, Hikmawati, & Verawati, 2017) and three Basic Causal Models (Gopnik & Schulz, 2007; Meder, 2006)

Figure 2. Composite Causal Models (CoCM) (Gopnik & Schulz, 2007; Rokhmat, 2015; Rokhmat, Marzuki, Hikmawati, & Verawati, 2017) (a) Simple (SCoCM) and (b) Chain (ChCoCM)

METHODS

This research (for the first of the three years) used a mixed methods of embedded, experimental design with a two-phase approach. This method uses a qualitative method as the main approach with a quantitative method embedded in it. The process for this research included four main activities; first, analysing the subject matter; second, designing the instruments; third, validating the instruments (expert and empiric); and forth, analysing and interpreting the instruments (Creswell & Clark, 2007) (Figure 3).
Figure 3 is for the first year’s (of three years) research design for one group pre-test–post-test (Suharsaputra, 2012) as a modification of Creswell and Clark (2007). In this design, the quantitative data are embedded in the qualitative data. The qualitative data were observed in analysing the subject, developing the instruments, validating the instruments, as well as in analysing and interpreting the results of this research. However, the quantitative data were collected during pre-test and post-test. The tests were conducted in the process of empirical instrument validation. A qualitative approach was needed to analyse the data including from filling in the attitude scale, observation and interviews. These data are related to the causal models and their characteristics. Furthermore, a quantitative approach was needed to analyse the results (increase) in PSA. Finally, information about the superiority and restrictiveness of the causal models, and about the PSA increase were useful to make recommendations to develop better instruments and for its implementation.

The subjects of this research were the students of the Physics Educational Programme at one university in Mataram in the 2015/2016 semester year. The sample included 49 students (ten among them males). In the empirical validation, we agglomerated the students into ten groups based on the results of the initial test; nine groups possessed five members, while the other one possessed four members. In the analysis, the subjects were agglomerated into three (approximately homogeneous) groups. Students with ranks 1 to 9 became group one, ranks 10 to 40 became group two, and, finally, ranks 41 to 49 become group three. We informed the first agglomeration but we did not announce the second one. Next, we named the first and the third groups, respectively, as the high (Hi) and low (Lo) groups. The aim of using these two groups was to analyse the increase in PSA while qualitatively validating the instruments. We gathered information on all students. Non-parametric statistic (test of location for two dependent groups), the Wilcoxon signed-ranks test (Minium, King, & Bear, 1993) was used to analyse the PSA increase and its N-gain difference between the Lo and Hi groups.
RESULTS

Increase of Problem-solving Ability (PSA)

The increase of PSA was obtained from calculating post-test minus pre-test. Its significance was determined using the values of $t_{counted}$ (value of $t$ calculated from Wilcoxon signed rank test) and $t_{table}$ (value of $t$ from the table with a significance level 5%). We rejected the null hypothesis if the $t_{counted}$ equals or is less than $t_{table}$ (Minium et al., 1993).

Table 1

Problem-solving ability (PSA) (%) from Pre-test (Pe) & Post-test (Po) for the Low (Lo) group

<table>
<thead>
<tr>
<th>Subject</th>
<th>IPSA-1 Pe</th>
<th>IPSA-1 Po</th>
<th>IPSA-2 Pe</th>
<th>IPSA-2 Po</th>
<th>IPSA-3 Pe</th>
<th>IPSA-3 Po</th>
<th>IPSA-4 Pe</th>
<th>IPSA-4 Po</th>
<th>IPSA-5 Pe</th>
<th>IPSA-5 Po</th>
<th>IPSA-6 Pe</th>
<th>IPSA-6 Po</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work and energy</td>
<td>11</td>
<td>28</td>
<td>6</td>
<td>28</td>
<td>0</td>
<td>17</td>
<td>11</td>
<td>33</td>
<td>0</td>
<td>17</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Thermodynamics</td>
<td>22</td>
<td>96</td>
<td>33</td>
<td>63</td>
<td>0</td>
<td>30</td>
<td>11</td>
<td>74</td>
<td>0</td>
<td>30</td>
<td>0</td>
<td>26</td>
</tr>
</tbody>
</table>

Tables 1 and 2 show the percentage of PSA from the pre-test and post-test, respectively, for the Lo and Hi groups for the subjects of work and energy, and thermodynamics; visually, all indicators of the PSA (IPSA-1 to IPSA-6) increased. Table 3 indicates that all of the normal gains (Lo and Hi groups, and for the subjects) are positive.

Table 2

Problem-solving ability (PSA) (%) from Pre-test (Pe) & Post-Test (Po) of High (Hi) group

<table>
<thead>
<tr>
<th>Subject</th>
<th>IPSA-1 Pe</th>
<th>IPSA-1 Po</th>
<th>IPSA-2 Pe</th>
<th>IPSA-2 Po</th>
<th>IPSA-3 Pe</th>
<th>IPSA-3 Po</th>
<th>IPSA-4 Pe</th>
<th>IPSA-4 Po</th>
<th>IPSA-5 Pe</th>
<th>IPSA-5 Po</th>
<th>IPSA-6 Pe</th>
<th>IPSA-6 Po</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work and energy</td>
<td>39</td>
<td>100</td>
<td>11</td>
<td>56</td>
<td>0</td>
<td>56</td>
<td>33</td>
<td>100</td>
<td>0</td>
<td>67</td>
<td>0</td>
<td>43</td>
</tr>
<tr>
<td>Thermodynamics</td>
<td>30</td>
<td>89</td>
<td>26</td>
<td>63</td>
<td>4</td>
<td>33</td>
<td>26</td>
<td>82</td>
<td>7</td>
<td>41</td>
<td>4</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 3

Normal gain of PSA for Low (Lo) group and High (Hi) group

<table>
<thead>
<tr>
<th>Subject</th>
<th>IPSA-1 Lo</th>
<th>IPSA-1 Hi</th>
<th>IPSA-2 Lo</th>
<th>IPSA-2 Hi</th>
<th>IPSA-3 Lo</th>
<th>IPSA-3 Hi</th>
<th>IPSA-4 Lo</th>
<th>IPSA-4 Hi</th>
<th>IPSA-5 Lo</th>
<th>IPSA-5 Hi</th>
<th>IPSA-6 Lo</th>
<th>IPSA-6 Hi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work and energy</td>
<td>.19</td>
<td>1</td>
<td>.24</td>
<td>.50</td>
<td>.17</td>
<td>.56</td>
<td>.25</td>
<td>.17</td>
<td>.67</td>
<td>.19</td>
<td>.43</td>
<td></td>
</tr>
<tr>
<td>Thermodynamics</td>
<td>.95</td>
<td>.84</td>
<td>.45</td>
<td>.50</td>
<td>.30</td>
<td>.31</td>
<td>.71</td>
<td>.75</td>
<td>.30</td>
<td>.36</td>
<td>.26</td>
<td>.27</td>
</tr>
</tbody>
</table>
The Causal Model in Physics Learning with a CTA

Table 4
List of t\textsubscript{counted} (t\textsubscript{c}), number of effective data pairs (n) and t\textsubscript{table} (t\textsubscript{t}) resulting from the Wilcoxon signed rank test of each PSA indicator for work and energy

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Indicators of Problem Solving Ability (IPSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IPSA-1</td>
</tr>
<tr>
<td>(t\textsubscript{c})</td>
<td>(n)</td>
</tr>
<tr>
<td>Low group</td>
<td>0</td>
</tr>
<tr>
<td>High group</td>
<td>0</td>
</tr>
<tr>
<td>N-gain diff.</td>
<td>0</td>
</tr>
</tbody>
</table>

Next, Tables 4 and 5 reveal the list of \(t\textsubscript{counted}\) (\(t\textsubscript{c}\)), the number of effective pairs (\(n\)) and \(t\textsubscript{table}\) (\(t\textsubscript{t}\)) for the PSA increase and its gain difference for each subject. Pairs of \(t\textsubscript{counted}\) and \(t\textsubscript{table}\) (\(t\textsubscript{count}, t\textsubscript{table}\)) for IPSA-1 to IPSA-6 for the Lo group are (0, -), (0, -), (0, -), (0, -), (0, -), (0, -) for work and energy, and (0, -), (0, -), (0, 2), (0, 3), (0, 2), (0, 0) for thermodynamics. While, for the Hi group, the pairs are (0, 5), (0, 2), (0, 2), (0, 3), (0, 3), (0, 2) for work and energy, and (0, 3), (0, 3), (0, 0), (0, 5), (0, 0), (0, -) at thermodynamics. Finally, the pairs of \(t\textsubscript{counted}\) and \(t\textsubscript{table}\) (\(t\textsubscript{count}, t\textsubscript{table}\)) for the PSA gain differences are (0, 5), (4, 5), (3, 2), (0, 3), (3, 5), (4, 5, 5) at work and energy, and (3, -), (9, 5), (12, 2), (12, 5), (12, 3), (9, 0) for thermodynamics. The value of \(t\textsubscript{table}\) is related to the number of effective data pairs (for six, seven, eight and nine pairs, the \(t\textsubscript{table}\) respectively are 0, 2, 3 and 5). It is clear that, there are 17 pairs (for the pre-and post-test difference) and nine pairs (for the N-gain difference) of \(t\textsubscript{counted}\) and \(t\textsubscript{table}\), with \(t\textsubscript{counted} < t\textsubscript{table}\) for all groups and subjects, and so the null hypothesis was rejected.

Table 5
List of t\textsubscript{counted} (t\textsubscript{c}), number of effective data pairs (n) and t\textsubscript{table} (t\textsubscript{t}) resulting from the Wilcoxon signed rank test of each PSA indicator for thermodynamics

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Indicators of Problem Solving Ability (IPSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IPSA-1</td>
</tr>
<tr>
<td>(t\textsubscript{c})</td>
<td>(n)</td>
</tr>
<tr>
<td>Low group</td>
<td>0</td>
</tr>
<tr>
<td>High group</td>
<td>0</td>
</tr>
<tr>
<td>N-gain diff.</td>
<td>0</td>
</tr>
</tbody>
</table>

Examples of the Causal Models in Physics Learning

Examples of causal models revealed the causes and effects in Physics that have the same relation as for one of the six models. The number of causes and effects for each physics phenomenon is basically indefinite. However, we could restrict them with a specific question, such as we can ask what
will be a free body’s experience with respect to its movement when a constant force acts to it. For this phenomenon, a constant force acts on a free body as the cause, while movement with constant acceleration is its effect.

The previous example is the pair of one cause and one effect, so is an SCM. For the DCM, we restrict it to ask for all possible happenings, both constant or change with respect to velocity, speed and acceleration of an object that is moving circling uniformly around a point, \(P\). This phenomenon has one cause (the object moves uniformly in a circle around a point \(P\)) and three effects (its velocity changes uniformly, its speed is constant and its acceleration changes uniformly). For example, if the CCM, we can confine this to only ask for all possible directions of each velocity change when a ball moving, circling uniformly around point \(P\) with a constant speed \(v\) and where its velocity at four different positions (1, 2, 3 and 4) is always on a tangent to its orbit at that point. This phenomenon has five causes (moving uniformly in a circle around point \(P\), and four vector velocities at points 1, 2, 3, and 4) and one effect (each velocity change is always towards point \(P\)).

Next, for the physics phenomenon in the ChCM, we can ask for all possible interaction forces (in series) between the block and the table when we put a block, which has weight \(W\), on the table. In this example, there is one cause (the weight of block \(W\), one in-between effect (the block presses the surface of the table downward with force \(F_{\text{downward}}\)) and one final effect (the surface of table holds back the block with normal force upward, \(N\)). In the SCoCM, for example, we may restrict this to asking for all possibilities where vehicles \(P\) and \(Q\) are in a side-by-side position when vehicle \(P\) is at rest athwart line \(L\) then moves to the right with constant acceleration \(a\) and, after few minutes, another vehicle \(Q\), which is moving, also to the right, with constant velocity \(v\) crosses line \(L\), and the trajectory of \(P\) and \(Q\) is side-by-side, straight and quite long. This physics phenomenon has three causes (vehicle \(P\) at rest athwart line \(L\) moves to the right with constant acceleration \(a\), vehicle \(Q\) also moves to the right with constant velocity \(v\) across line \(L\), and \(P\) crosses line \(L\) a few minutes before \(Q\)) and also three effects (\(P\) and \(Q\) will never be in a side-by-side position, will be in a side-by-side position one time, and will be in a side-by-side position two times).

Finally, in the ChCoCM, we can confine this to asking for all possible happenings that a block will experience with respect to the type of friction force, the shifting of its normal force, and whether the block remains at rest or moves (translational or rotational) when a homogeneous block \(M\), with weight \(W\), width \(a\) and height \(2a\), is at rest on a table and a force \(F\) (its force line at a height of \(h\)) pulls it to the right, and it is known that the surfaces of both block and table are coarse (with static and kinetic coefficients of \(\mu_s\) and \(\mu_k\), respectively, and \(\mu_s > \mu_k\)). In this example, there are eight causes, three in-between effects and three final effects. The eight causes are (1) weight of block \(M\) of \(W\); (2) the size of the block, width \(a\) and
height $2a$; (3) horizontal force $F$ to the right; (4) the work line of $F$ at height $h$ above the surface of the table; (5) the static coefficient $\mu_s$; (6) the kinetic coefficient $\mu_k$; (7) value $\mu_s$ is greater than $\mu_k$; and (8) the surface of the table holds the block with normal force upward, $N$, through the vertical symmetry line of the block. Next, the three in-between effects are (1) the block experiences a static friction force $f_s$ (to the left), (2) the block experiences a kinetic friction force $f_k$ (to the left), and (3) the normal force $N$ shifts (to the right) so it ends up on the right side of the vertical symmetry line of the block. Finally, the three final effects are (1) the block $M$ remains at rest, (2) the block $M$ shifts to the right, and (3) the block $M$ rolls in a clockwise direction.

It should be noted that the number of causes for a phenomenon is basically not absolute. For example, we may assume that causes 5, 6, and 7 are only one cause, i.e. the static and kinetic coefficients are $\mu_s$ and $\mu_k$, with $\mu_s$ being greater than $\mu_k$.

DISCUSSION

Modus of the Causal Model in Physics

What we commonly find in physics problems are CCMs (with multi-cause and mono-effect) due to there being only one answer to the problem. To increase creative thinking ability, problems with more than one correct answer (multi-effects) need to be developed. This agrees with causal models DCM, SCoCM and ChCoCM, but, among them, the SCoCM is the easiest to develop. In the SCoCM, we may arrange one or more of its causes as a variable and it is suggested to restrict them so that number of its effects is adjusted to the level of difficulty to make it possible for a learner to answer the problem. In addition to the number of effects, we can also direct the depth of its arguments by controlling on which concept, principle, theory and/or law they are based.

Relation of this Research to Some Previous Research

The three aforementioned models (DCM, SCoCM and ChCoCM) lineally encourage creative thinking which indicates that fluency, flexibility and/or originality will result from an open-ended task (Meyer & Lederman, 2015). However, Anwar, Aness, Khizatir and Muhammad (2012) stated that in addition to the three effects, the models also encourage elaboration. Fluency shows how many answers a learner has predicted, flexibility is related to how high a level of difficulty has been designed, originality is indicated from the additional answers written by a learner and, finally, elaboration is shown from how learners build their ideas. In addition, the models also have a similarity to the strategy used by Escudero et al. (2009). They facilitated undergraduate students investigating all possible knowledge (concepts and theories) about the phenomena (solid and hollow body, ball and cylinder, rolling on inclined coarse surface) through writing as many answers as possible about the knowledge they have gained.

While, Baser (2006) through conflict cognitive instruction (CCI) facilitated students to discuss contradictory facts
(resulting from experiments) in relation to their previous conceptions. This instruction is in line with learning through CTA. Both foster the development of critical thinking, which needs analytical and causality thinking. Another conformity is that this CT develops a meta-concept, which also Yürük (2007) found in his research.

**Effectiveness of the Causal Model in Physics Learning with a Causalitic-Thinking Approach (CTA).**

The effectiveness of the causal model in physics learning with a CTA is indicated by an increase in PSA. Among the 24 pairs of \( t_{\text{counted}} \) and \( t_{\text{table}} \) for each IPSA in the Lo and Hi groups, and for two subjects, 17 pairs (71%) indicate \( t_{\text{counted}} < t_{\text{table}} \), which means that the PSA of students increased significantly. Furthermore, among 12 pairs of \( t_{\text{counted}} \) and \( t_{\text{table}} \) for the N-gain difference between Lo and Hi groups, four pairs indicate \( t_{\text{counted}} < t_{\text{table}} \), which means that the PSA increase for the Lo and Hi students was only 33%.

This fact means that using a causal model in the learning with CTA was effective in increasing the PSA of students, and the increases were not different between the Lo and Hi groups (it gives the same advantage for the Lo and Hi students). However, its final attainment was high, being only 8% in the Lo group and 33% in the Hi group. This means that the instrument still needs perfecting.

The positive impact of using the causal model in learning with CTA on the PSA agrees with the relation between the CTA and PSA, which was summarised from the statements of some experts. The experts include Amer (2005), Cohen (2000), Hamilton (2001), Paul and Elder (2003), and Zschunke (2000).

**Restrictiveness of the Causal Model with CTA in Physics Learning.**

There are some restrictions on the implementation of learning by using causal model with CTA. One of which is that it needs quite a long time to implement, so the lecturer had less time to discuss students’ work, and it was difficult for students to solve the phenomenon. In addition, regarding the preparation of instruments and their implementation strategy, in general, each phenomenon needs a long description and we did not prepare a hand-out that is suitable for this type of learning. The restrictions did not foster the development of the CTA of students. This is caused by the fact that the process to select and/or deductively predict all possible effects needs initial knowledge.

**To reduce the Restrictions of the Causal Model with CTA in learning.**

It is advisable to include some stages for perfecting the instruments. Those are preparing a hand-out, using a shorter description of the phenomenon and, for 100 minutes of learning, it may need only one phenomenon to be studied. In addition, based on the final attainment of PSA (on average, this is moderate), it is advisable to design a causal model with the CTA in scaffolding form, i.e. with assistance to facilitate the
The Causal Model in Physics Learning with a CTA

students solving the phenomenon. Examples of the assistance are such as, for the causal model that has more than one cause and/or effect, we inform the students about some of them. In addition, we could also give an example of the explanation of the conditions for each cause so that they would result in the determined effect.

CONCLUSION
A causal model for Physics learning with CTA has been developed, which is significantly effective in increasing the PSA of students for the subsubjects of work and energy, and thermodynamics. The models are simple, divergent, convergent and chain causal, plus the composites of these four models, i.e. simple and chain composite causal models.

The PSA consists of six abilities, i.e. the ability to understand a problem; select causes and effects; differentiate which causes are the variables of the determined effect; determine the concepts, principles, theories and/or laws of physics; apply the concepts, principles, theories and/or laws of physics to identify the causes; and finally, identify how the conditions of all causes result in the determined effect. In addition, to increase the effectiveness of its instrument, it needs some actions for perfecting the instruments, which includes perfecting the design and strategy for implementation.

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REFERENCES


The Causal Model in Physics Learning with a CTA


The Beliefs towards Science Teaching Orientation of Pre-service Teachers in Primary Teacher Education Programme

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ABSTRACT
The present research seeks to describe the beliefs of pre-service trainee teachers in Primary Teacher Education Programme with regard to science teaching orientation. Respondents consisted of 100 sixth (introductory-level), and 120 eight semester (advanced-level) students in a Primary Teacher Education Programme. They came from different high school backgrounds such as science, non-science, and vocational education. Beliefs towards science teaching orientation cover aspects such as specific science curriculum, knowledge of student understanding of science, knowledge of instructional strategies, and knowledge of assessment of science literacy. Data were collected with the use of a 23-item questionnaire using a 4-point Likert scale – ranging from agree to disagree. Advanced level and introductory level students had significant effects on beliefs although gender and different high school backgrounds did not differ in terms of beliefs about science teaching orientation. Therefore, results indicated the belief of pre-service teachers is an important aspect to support science teaching orientation. The pre-service teachers must master the STO component to succeed as science teachers in Primary Education Programme.

Keywords: Beliefs, pre-service, Primary Teacher Education Program, science teaching orientation
INTRODUCTION

The quality of science learning in primary schools is regarded as being effective and efficient if students are exposed to meaningful learning experiences that reflect their real-life situations. National Science Education Standards (National Research Council, 1996) emphasise the use of inquiry in integrated science learning. The quality of teaching needs to be ensured, as does the output of qualified teachers. Teacher education does not always consistently produce qualified teachers, and this leads to a lack of qualified teachers (EACEA, 2012).

Pedagogical Content Knowledge (PCK) makes a big contribution to the development of the quality of teachers and of teacher education (Kind, 2015; Williams & Lockley, 2012; Shulman, 1986). PCK research proposes several theories, which are then developed and adjusted to regional conditions. Friedrichsen, Driel, Van and Abell (2011) stated that the orientation of science teachers is one component of PCK that requires special attention. The teaching orientation enables improvement in the understanding of the quality of teachers. Science teaching varies for each subject matter and is adjusted to students’ progress.

Teachers’ beliefs and Science Teaching Orientation (STO) are important parts of educational research. Beliefs in science learning are developed through scientific inquiry. Prospective primary school teachers have the opportunity to develop their beliefs in science learning (Shim, Young, & Paolucci, 2010; Rahimah, Abu, Ismail, & Mat Rashid, 2014). Teaching experience provides prospective teachers with an understanding of how to teach science (Lay & Khoo, 2012; Yang, Tzu, Higgins, & Tan, 2012). According to research conducted by Diblase and McDonald (2005), a teacher’s background, experience, and confidence in teaching can be applied in the classroom. Orientation from Anderson and Smith (1987) to describe a teacher’s “general patterns of thought and behaviour” is flexible and alterable. Flexible stance changeable by specific circumstance and alterable can be conducted by improving teacher’s knowledge of science content and students’ misconceptions.

Teachers need to understand the differences in students’ individual characteristics, and respond empathetically to their students. For a teacher, teaching skills are required in science learning. Teachers’ basic characteristics, including their beliefs, may affect students’ learning outcomes, especially in science (Ak & Özkarde, 2007; Jong & Hodges, 2013; Mweene, Frackson, & Jonathan, 2011). According to some scholars, the concept of Pedagogical Content Knowledge (PCK) as a knowledge and skill distinguishes one teacher from another (Shulman, 2000; Williams & Lockley, 2012). Teachers have to master the concept of PCK in order to be able to deliver materials/subjects.

Several studies of Shulman’s PCK models have been developed by educational researchers, one of which is Magnusson’s model (Abell, Rogers, Hanuscin, Lee & Gagnon, 2009; Kind, 2015). It is a compilation theory of research and...
curriculum development, covering the aspect of teaching components including teaching orientation, knowledge of assessment of science learning, knowledge of instructional strategies, knowledge of students’ understanding of science, and knowledge of specific science curriculum. These five components of teaching were then developed into nine indicators.

A science teacher is responsible for preparing the learning process and the knowledge of science to help students understand scientific concepts (McComas, Clough, & Almazroa; 1998). Teachers’ and pre-service Teachers’ (PST) belief in science is very helpful in teaching science to the students. Johnson (2006) stated that the teachers’ beliefs, values, and attitude will be improved if they apply the inquiry learning method. Teachers with experience and a deep understanding of science will have more confidence to deliver science materials. Teachers’ beliefs, by definition, are their perspectives with regard to the learning process, which are obtained from their own experience and observation. Value refers to the teachers’ understanding of the benefits or usefulness of the investigation. Belief is defined as a trust or confidence when implementing inquiry in science learning (Diblase & McDonald, 2015).

Lederman, Abd-El-Khalick, Bell, and Schwartz (2002) stated that students should acquire certain belief about science as a feature of scientific knowledge. These include the belief that scientific knowledge is empirical, and that observations and scientific theories are internally consistent explanatory systems which guide research and investigations. Lederman (1999) observed the attitude and belief of pre-service teachers in the learning process. The teachers made use of their creativity and imagination during the learning process. The research proves that the teachers’ beliefs affect the level of students’ understanding. Foley and Mcphee (2008), and Nikula (2015) examined four primary teachers whose belief level increased after doing scientific practicums. They concluded that there is a relationship between hands-on and minds-on learning.

Beliefs have stronger affective and evaluative loading than knowledge. Nespor (1987) used four criteria to separate belief from knowledge. These are existential presumption, alternativity, affective and evaluative loading, and episodic structure. Existential presumptions are personal truth, such as a belief in gods or aliens based on chance or intense experience. Alternativity means the creation of fantasy worlds without direct experience. Kind (2015) argued that the affective and cognitive aspects of beliefs operate independently, but both influence learning. Episodic memory acts as a mental depository of past experiences which can impact on the present. Episodic memories may lead to a teacher replicating teaching received as a child or utilising external experiences, such as working as a research scientist.

In addition to coursework, pre-service teachers often engage in multiple field experiences (e.g., observations, practical, internships, student teaching) that provide
opportunities for the evolution of beliefs about science teaching and learning. While universally seen as valuable, teacher trainers and pre-service teachers often face the dilemma of “bridging the cultures of the school and the university” (Jong & Hodges, 2013).

According to Magnusson, Krajcik and Borko (1999), science teaching orientation (STO) is defined as knowledge and beliefs regarding the purposes of teaching based on children’s stages of development or general methods of viewing, or creating a science teaching concept. STO is the main component of Pedagogical Content Knowledge in guiding how pre-service teachers should teach. Magnusson et al. ’s definition proposes that STOs comprise knowledge and beliefs and determine teachers’ classroom actions. The nature of “knowledge and beliefs” in this context requires consideration. McComas, Clough and Almazroa (1998) noted that science teachers are responsible for providing an “accurate description of the function, processes and limits of science”, arguing that the knowledge of the nature of science (NOS) helps students learn scientific content.

According Shulman (1986), science teaching orientation as a PCK component that specific attention offers a potential contribution to develop high quality science teacher. Magnusson, Krajcik and Borko (1999) postulated that science teaching orientation consists of five domains, comprising of: a) knowledge of a science-specific curriculum, b) knowledge of student understanding of science, c) knowledge of instructional strategies, d) knowledge of assessment of science learning, and e) orientation to teaching science.

Knowledge of science learning objectives is a sub-domain of a science-specific curriculum that teachers need to understand before teaching. Curriculum levels of a topic in a semester are constructed in a concept map. In this way, teachers comprehend the science learning outline and objectives (Friedrichsen, Driel, Van, & Abell, 2011). Knowledge of students’ understanding of science and learning requirements refers to the knowledge of the students’ understanding in studying particular scientific concepts (Lederman, 1999; Waters-Adams, 2006). Teachers’ skills and abilities should meet the students’ needs in learning science. They need to comprehend ways of preventing misconceptions during science learning (Faikhamta, 2013). Areas of students’ difficulty cover a teacher’s ability to understand their difficulties in learning science due to: 1) abstract concepts in areas such as protein synthesis, quantum mechanics, atoms and molecules, and cell respiration, 2) inappropriate method and learning model selection, 3) students having insufficient knowledge of effective ways of thinking in problem resolution, and 4) scientific misconceptions due to prior knowledge. These misconceptions are not easy to cope with because they are coherent and related to daily life (Lederman, Abd-El-Khalick, Bell & Schwartz, 2002). Teachers must understand the skills necessary
to solve the problems using scientific methods, report and present practical results since scientific knowledge is obtained from reading, listening, observation, and practicum. In addition, they need to identify prior scientific knowledge and apply daily science experiences (Friedrichsen, Driel, Van, & Abell, 2011).

Specific strategies for science (for any topic) are ways to motivate students. Classroom management in problem-solving becomes centre on students applying problem-solving methods. Learning strategies consist of exploration, term induction, and concept application. The knowledge of subjects, pedagogy, and learning context affects a teacher’s confidence (Faikhamta, 2013; Greene, Bolick, Jackson, Caprino, & Mcvea, 2015). The knowledge of scientific assessment dimensions includes conceptual understanding, interdisciplinary themes, nature of science, scientific investigation, and rational thinking. Portfolios or students’ reports from practicum, discussion, and question-and-answer sessions about a scientific theme serve as a form of organising scientific concepts and principles (Adey, 2001; Anderson & Smith, 1987; Magnusson, Krajcik & Borko, 1999). Student portfolios such as journals, lab-work reports, anatomical diagrams, model media or multimedia documents can be used in assessments (Faikhamta, 2013; Jüttner, Boone, Park & Neuhaus, 2013; Koh, Woo & Lim, 2013).

**Research Questions**

This study focused on the following two research questions:

- What beliefs do pre-service primary education teachers have with regard to science teaching orientation?
- How are beliefs toward science teaching orientation influenced by demographic variables?

**METHODS**

**Research Design**

The aim of this research is to prepare the orientation and beliefs of pre-service teachers in Primary Teacher Education Programme to teach Science. The research was conducted using a mixed-methods study (in this research combines qualitative and quantitative methods) (Creswell, 2005; Merriam, 2002). The responses from the pre-service teachers who participated in the study were obtained using the survey method.

**Participants**

The participants were pre-service teachers in the Primary Teacher Education Programme at the Faculty of Teacher Training and Education of Universitas Sebelas Maret. The respondents consisted of 100 sixth semester students as the introductory-level participants and 120 eighth semester students as the advanced-level participants.
The participants aged between 20-24 years old at the time of this study. The eight semester students had completed courses in Natural Science Concepts. The educational background of the participants varied from science, non-science, and vocational education. Data of the participants are presented in Table 1.

Table 1
Participants' Profiles

<table>
<thead>
<tr>
<th>Demography</th>
<th>Category</th>
<th>6th semester Student Introductory-level participants (n=100)</th>
<th>8th semester students Advanced-level participants (n=120)</th>
<th>Participants (N=220)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School Background</td>
<td>Science</td>
<td>30</td>
<td>53</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>Non-science</td>
<td>24</td>
<td>43</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>Vocational education</td>
<td>41</td>
<td>29</td>
<td>70</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>45</td>
<td>30</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>75</td>
<td>70</td>
<td>145</td>
</tr>
</tbody>
</table>

Note: The ratio of female to male trainees on the teacher education programme was approximately 2:1

Instrumentation. The beliefs of pre-service teachers toward science teaching orientation was developed by Magnusson, Krajcik and Borko (1999). Questionnaires and interviews were employed to find data on their beliefs regarding science teaching orientation of the students in the Primary Teacher Education Programme. The 23-item questionnaire focused on determining the respondents’ beliefs towards science teaching orientation (Kind, 2015). The questionnaire instrument used a 4-point Likert scale ranging from Strongly agree, Agree, Disagree, and Strongly disagree. The research subjects (the participants) were asked to complete the questionnaire and that there were no right or wrong answers (see the Appendix). The reliability of instrument with 23-item questionnaires to measure the beliefs towards science teaching orientation specific in Universitas Sebelas Maret education setting was measured by Cronbach’s Alpha coefficients. Results of the reliability test indicated the items achieved an overall Cronbach’s Alpha coefficient of 0.85, indicating that the scale used is highly reliable. In addition, in-depth interviews were conducted to find out the mastery of pre-service teachers in the subject matter and how to teach science toward the students. The interview transcripts served as the primary data source (Friedrichsen & Dana, 2005; Kind, 2015). A total of 40 pre-service teachers were interviewed. The 20-40 minute interviews were conducted in the Primary Teacher Education Programme (Table 2).
Data Analysis

Data analysis was conducted using descriptive qualitative (the qualitative data are sourced from statements) and quantitative (quantitative data are in the form of questionnaires) data. The data were analysed quantitatively using SPSS for Windows. Statistical analyses such as descriptive statistics were used to analyse the data. Content analysis procedures were applied to pre-service teachers’ responses. This technique was applied to determine the influence of the teachers’ beliefs and science teaching orientation of prospective primary teachers.

The data were collected in 2015-2016 from the pre-service teachers who were taking the Science course, i.e. while they were in their sixth and eighth semesters. The questionnaire instrument was distributed to the sixth and eighth semester students with a completion time of about a week. The pattern of responses illustrates alignment belief that advanced-level participants and introductory-level participants.

The pre-service teachers in Primary Teacher Education Programme were
classified into introductory-level participants comprising the sixth semester students, and the advanced-level participants consisting of the eighth semester students. They came from different high school concentrations such as science, non-science, and vocational education consist of male and female students. This study was done to compare the advanced-level participants and introductory-level participants. As shown in Table 3, there is no significant difference between the beliefs of introductory-level participants and advanced-level participants towards science teaching orientation, with $t(0.75) p = 0.87$.

Table 3
The Comparison between the Respondents’ Beliefs in Science Teaching Orientation

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>Mean (SD)</th>
<th>T</th>
<th>df</th>
<th>p-value</th>
<th>sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester levels</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Sixth Semester/Introductory</td>
<td>100</td>
<td>3.3</td>
<td></td>
<td>219</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>The Eighth Semester/Advanced</td>
<td>120</td>
<td>3.4</td>
<td>0.75</td>
<td>219</td>
<td>0.87</td>
<td>NS</td>
</tr>
<tr>
<td>High School Concentrations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>83</td>
<td>3.4</td>
<td></td>
<td>219</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Nonscience</td>
<td>67</td>
<td>2.7</td>
<td>0.67</td>
<td>219</td>
<td>0.5</td>
<td>NS</td>
</tr>
<tr>
<td>Vocational Education</td>
<td>70</td>
<td>3.3</td>
<td></td>
<td>219</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>75</td>
<td>2.9</td>
<td>0.5</td>
<td>219</td>
<td>0.57</td>
<td>NS</td>
</tr>
<tr>
<td>Female</td>
<td>145</td>
<td>3.3</td>
<td></td>
<td>219</td>
<td>NS</td>
<td></td>
</tr>
</tbody>
</table>

Note: comparison with statistic

RESULTS AND DISCUSSION
The research results indicate that the respondents consisting of eighth semester (advanced-level) and sixth semester (introductory-level) students understood the science teaching orientation to comprise of:

- a) knowledge of specific science curriculum,
- b) knowledge of student understanding of science,
- c) knowledge of instructional strategies, and
- d) knowledge of assessment of scientific literacy.
Knowledge of specific science curriculum consists of: a) delivering science learning objectives relevant to daily life, b) outlining scientific concepts with concept maps and process skills as the unity of knowledge, c) teaching scientific concepts by first delivering problems and then conducting experiments, d) implementing science teaching orientation to grow in self-confidence when teaching, teaching science by implementing inquiry-based learning and problem-based learning (PBL), thematically and holistically delivering primary school science materials (Biology, Physics, Chemistry, and Earth & outer space). For Knowledge-specific Science curriculum, about 33% of the introductory level students disagreed and 67% agreed, whereas only 17% of the advanced-level students disagreed and some 83% agreed. For the aspect of knowledge of students’ understanding of science, 23% of the advanced-level students disagreed and another 77% agreed, with 27% of the introductory-level students disagreeing and 73% in agreement. Meanwhile, for the aspect of knowledge of instructional strategies, 43% of the advanced-level students disagreed and some 57% agreed, while 21% of the introductory-level students disagreed and another 79% agreed. For the aspect of knowledge of assessment of science literacy, only 53% of the advanced-level students disagreed with some 47% in agreement, while 52% of the introductory level students disagreed and 48 % agreed (see Table 4). This means the introductory and advanced level students do not understand how the assessments in science learning work.

Table 4
Percentage of Beliefs towards Science Teaching Orientation

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Participants (Introductory)</th>
<th>Participants (Advanced)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Disagree</td>
<td>Agree</td>
</tr>
<tr>
<td>a. Knowledge specific science curriculum</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>b. Knowledge of students’ understanding of science</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>c. Knowledge of instructional strategies</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>d. Knowledge of assessment of science literacy</td>
<td>28</td>
<td>24</td>
</tr>
</tbody>
</table>

*Note: comparison with percentage*
resulted in non-integrated topics. The topic of Photosynthesis, for example, should focus not only on Biology, but also on Physics (since it involves the sun’s energy transfer system) and Chemistry (since it involves chemical reactions). Therefore, the name of the topic should be changed to Energy Conversion in Plants. In this case, lecturers play an important role in guiding their students to apply scientific methods, specifically to formulate hypotheses and make data interpretation supported by expert views. In this study, gender has no effect on the pre-service teachers’ belief in science teaching orientation. There is no relationship between knowledge of assessment and science teaching orientation (Aydin, Demirdogen, Akin, Uzuntiryaki-Kondakci, & Tarkin, 2015).

For example, material is delivering material about plants and animals, in which they applied a matching technique, while in fact, it would be better for them to implement a guided-inquiry learning or contextual teaching and learning (CTL). Some 60% of the respondents asked their students to work in groups and present their findings to the class. Concrete materials were used in the learning process by most of the respondents, but visual media such as pictures were still used by 20% of the respondents. Meanwhile, ICT (Information and Communications Technology) was used by the respondents to create PowerPoint presentations. They seldom displayed videos or animations for science learning; one example of an animation used in the classroom showed deglutition (swallowing) and peristalsis.

About half of the respondents excluded students’ knowledge statements, describing only the content position. They may have assumed that there was no need to check on their students’ understanding. However, this shows that the trainees focused on the transmission of the content knowledge rather than the students’ perspectives. Thus, students’ vignettes may be a limitation; responses are likely to reliably represent thinking about the situations. Evidence collected from experienced teachers (currently under analysis) indicates that shifting to considering students’ thinking in lesson planning and delivery takes time. The advanced-level participants, however, provided more varied answers since they had completed the microteaching course, as well as Field Experience and Practice.

The introductory-level students and advanced-level students differ in their understanding of science as a body of knowledge. One of the reasons for the difference occurs is that the advanced-level students had completed Field Experience and Practice for 1.5 months and experienced microteaching, while the introductory-level students had just finished microteaching course.

Students in the Primary Teacher Education Programme came from different high school streams such as science, non-science, and vocational education. As shown in Table 3, there is no significant difference between their beliefs and science
teaching orientation. However, during the in-depth interview session, the respondents who took science concentration in their high school could provide more detailed information and master the science teaching orientation better compared to those who took non-science and vocational education concentrations in their previous schools.

There is no significant difference in their beliefs toward science teaching orientation from the prospective of teacher’s gender. Both the male and female prospective teachers have the same opportunity in learning and teaching science. This is in line with research results of Chabalengula, Mumba, and Chitiyo (2011) which proves that the attitudes towards biotechnology process were not influenced by gender. Prokop, Leskova, Kubiatko, and Diran (2007) stated that gender is important to consider regarding that sex is varied. The respondents in the present research were mostly female students (70%) and therefore gender was primarily considered. The research results in t (count) of 0.6 which is smaller than t (table) of 0.67, and this indicates no significant difference.

The results of the present research are relevant to those of studies of Kind (2015) and Jimoyiannis (2010), which proved that beliefs and science teaching orientation are linked. In this study, the introductory-level and advanced-level trainees differ in their understanding of science as a body of knowledge. One reason for this difference is that the advanced-level students had completed 1½ months of Field Experience and Practice, and had experienced microteaching, whereas the introductory-level students had just finished the microteaching course.

Students in the Primary Teacher Education Program came from different high school backgrounds such as science, non-science, and vocational education. However, during the in-depth interview sessions, the respondents who took science courses at high school were able to provide more detailed information and master the science teaching orientation better compared to others who took non-science and vocational education courses in their previous schools.

Meanwhile, the empirical data from in-depth interviews with and questionnaires completed by prospective primary teachers indicate that in science learning, syllabus construction was based on what was determined by the government and was carried out without innovation. Local potentials were not included in the syllabus, whereas in fact such local potentials as arts, food, and tourist resorts could be explored in thematic learning. Prospective teachers found difficulties in determining coherent indicators according to the determined basic competencies, as well as in relating science materials to both daily life and local potentials. Learning objectives were sometimes inappropriate, and at times were not achieved in core activities.

The belief has a significant effect on science teaching professions (Kolej, 2016) and the belief about Science is regarded as a
component of subject matter knowledge and excluded from science teaching orientation (Kind, 2015).

With reference learning for students in Primary Teacher Education Programme, basic scientific concepts should be thematically and holistically delivered along with practicums. After the trainees have mastered their lesson contents, they should be taught how to transfer them to their primary school students. The lesson contents and the method of transferring them, therefore, are regarded as inseparable parts. This will benefit the trainees since they will immediately impart what they have learned to their primary school students. In this way, they will gain high self-confidence so that it is possible for them to have better attitude and perceptions when teaching Science.

CONCLUSION

With reference to the needs analysis of science learning for pre-service teachers in Primary Teacher Education Programme, the teaching and learning of Science more strongly influenced their responses than their beliefs about Science. For these pre-service teachers, science teaching orientation is personal, intuitive proposal that is separate from informed and partially-informed beliefs about science. STO is a factor for introductory to advanced participants in learning and teaching Science, but is inconclusive about “beliefs about science” as a component. The implication of this research is STO for pre-service teachers cannot be implemented and understand separately, and overall and sustainably. To be successful teachers in teaching, these teachers must master all components of the STO.

ACKNOWLEDGEMENT

The authors would like to thank the Institute of Research and Community Services at Universitas Sebelas Maret for the financial support.

REFERENCES


APPENDIX

Questionnaire: Science Teaching Orientation

<table>
<thead>
<tr>
<th>Item of science teaching orientation</th>
<th>P. Introductory</th>
<th>P. Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>1. Strongly disagree</td>
<td>Strongly Agree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>1. Communicate the objectives of science learning so that students understand the relevant science processes in everyday life</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Describe the concept of science with concept maps, process skills as a unity of knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Teach the concept of science by conveying problems then experiment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Orientation teaching about science so that more confident in teaching.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Teaching science with inquiry method &amp; PBL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Communicate thematic and holistic science materials in elementary school (Biology, Physics, Chemistry &amp; earth &amp; space)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Knowledge of students’ understanding of science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Understanding the concept of science by reading, listening, and hands on minds on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Construct the concept of science by doing observation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Solve science problems with scientific method</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Misconceptions of science need to be avoided by hands on minds on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Identify students' prior knowledge of science as a basic for beginning an orientation of teaching science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Development of ideas from everyday science experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Difficulty understanding the concept of science (Physics, Chemistry, Biology)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Presenting the results of the experiment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Engage discussion students to express their ideas when answering teacher questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Engage students to work group while solving problems</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Beliefs towards Science Teaching Orientation

APPENDIX (continue)

<table>
<thead>
<tr>
<th>Item of science teaching orientation</th>
<th>P. Introductory</th>
<th>P. Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of instructional strategies</td>
<td>Strongly disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Motivate students to explain the concept of science in their own mind</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Engage students working groups to solve science problems and interact with others</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>The work procedures in experiment to understand in finding the concept of science</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Learning strategy with inquiry and Investigation develops the science process skills</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Knowledge of assessment of science literacy</td>
<td>Strongly disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Assessment of science learning during in class and experiment</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Assessment of science learning with cognitive tests, attitudes and process skills</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Assessment of science with various strategies with presentation and portfolio of tasks</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
Creative Visual Aids Effectively Supporting the Student-Centred Learning (SCL) Approach on Science Learning

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ABSTRACT
This research aimed to find out whether creative visual aids (CVAs) are able to support the effectiveness of using a student-centred learning (SCL) approach for teaching and learning science. This research was performed between 20th July and 7th August 2016 at Araullo High School, Manila, Philippines. The participants were three pre-service student teachers from Philippine Normal University; 168 students from four sections of 7th-grade science at Araullo High School, taught using CVAs; and 88 students from two sections of 7th-grade science at Araullo High School, taught using common visual aids (VAs). Four CVA sections and two VA sections were selected randomly from 31 parallel sections of 7th-grade science. Data consists of qualitative and quantitative data. Scores for the quantitative data for the 1st quarter pre-test and post-test were analysed using a descriptive statistical method. The qualitative data (observation, documentation, field notes and interviews) were verified using triangulation methods. Video recording was also used to make documents. Results of this research showed that CVAs effectively supports SCL for science.

Keywords: Creative visual aids, SCL, pre-service student teacher

INTRODUCTION
Abraham Maslow describes the hierarchy of human needs as a pyramid shape. There are five aspects to Maslow’s hierarchy; (1) physiological, (2) safety, (3) love/belonging, (4) self-esteem and (5) self-actualization. Physiological needs, as the most basic needs, are at the bottom and
self-actualisation is at the top. The need for self-esteem corresponds to achievements in education and learning (Jerome, 2013). Education is a component of human needs. Education is fundamental, as education is one of the systems that supports life. Based on that statement, the quality of education must be developed.

There are many ways that the quality of education could be developed; one of them is the application of different approaches. A system of instruction that places the student at its heart is the student-centred learning (SCL) approach. The approach facilitates students to participating actively and enquiring independently. Students’ abilities can be developed through many activities in SCL such as substituting active learning experiences in learning through lectures; giving assignments to solve open-ended problems, and problems requiring critical or creative thinking; and encouraging students to learn from one another and coaching them in the skills they need to do so effectively. They can be involved in simulations and role plays, and use self-paced and or cooperative (team-based) learning. In other words, they are placed at the centre of the learning process and provided with opportunities to learn independently. Positive attitudes towards the subject being taught can lead, through properly implemented SCL, to increases in motivation to learn, greater retention of knowledge, deeper understanding and more (Collins III & O’Brien, 2011).

Therefore, Posamentier and Krulik (2009) stated that in order for students to have the skills needed for their future lives, learning must be directed to activities that encourage them to learn actively, in terms of the social, physical and psychological aspects. The main and most well-established assignment of a lecturer is guiding students to study in a meaningful way and to learn to solve problems appropriately. In the Philippines, especially in the 21st century where there are more demands such as skill development and many others, SCL is believed to be more effective. To achieve the purpose of SCL in teaching science, which has many abstract concepts, it is necessary for the teacher to use visual aids (VAs) to help students understand the concepts more easily.

VAs are instructional devices such as charts, maps, models, film strips, projectors, radios and televisions, which are used in the classroom to encourage learning and make it easier and more motivating (Shabiralyani, Hasan, Hamad, & Iqbal, 2015). VAs such as charts, diagrams, tables and pictures play a big role in students’ understanding and imagination while learning. VAs will help students to understand the material more easily when learning science, which has mostly abstract concepts. Darma’s (2011) research result proves that VAs can increase the effectiveness of the teaching-and-learning process because students will be more attracted to the process by the presence of VAs.

In SCL, it is necessary to modify a VA in order to increase its function as an instructional device. Therefore, the modified VA will be able to induce positive
emotions in the students, give them a joyful learning experience and facilitate them to participating actively. The research results on colour and shapes show that saturated and warm colours can cause an increase in pleasure and excitement; meanwhile, featuring shapes that are round and baby-like can induce positive emotions (Plass, Heidig, Hayward, Homer, & Um, 2014). Based on this, the VAs that are used commonly in teaching chemistry subjects [Figure I (A)] have been modified by the authors in terms of the colours, shapes and designs. The modified VAs here are called creative visual aids and abbreviated as CVAs. CVAs refers to creative products (Kanematsu & Barry, 2016) that are VAs which have never existed and been used before. A CVA should comply with requirements such as (1) the background colour should be different from the content colour, which can consist of either dark and light, or light and dark colours, respectively; (2) the CVAs should have full-coloured figures, not be monochrome; and (3) the CVAs should have foldable parts that the teacher can use to increase the students’ curiosity and participation. Figures 1 (B1), (B2) and (B3) are examples of the CVAs made and used in this research. In this research, we would determine whether CVAs can more effectively support SCL in science than VAs. We will also reveal the perspective of pre-service student teachers on using CVAs in the process of teaching and learning science, planning and preparations made before implementing the students’ learning process, media that have been prepared, process for the students’ to learn science and assessment that will be done.

Figure 1. (A) An example of a common visual aid (VA); (B1) Creative visual aid (CVA) for describing the neutralization that occurs between an acid and a base; (B2) CVA for describing the differences in characteristics between a solution, colloid and suspension; and (B3) CVA for describing a metal’s properties.
MATERIALS AND METHOD

This research used a mixed-method approach (Figure 2) and was performed between 20\textsuperscript{th} July and 7\textsuperscript{th} August 2016 at Araullo High School, Manila, Philippines. The qualitative and quantitative data were collected simultaneously.

![Figure 2. Mixed-method approach diagram](image)

The participants are three pre-service student teachers and, from Araullo High School, 168 7\textsuperscript{th}-grade science students in the CVAs sections (which consist of 51 students from Garcia Section, 42 students from Pythagoras Section, 37 students from Einstein Section and 38 students from Gates Section), and 88 students in the VAs sections (which consist of 45 students from Guerrero Section and 43 from Humabon Section) (Table 1). The four CVA and two VA sections were selected randomly from the 31 parallel sections of 7th-grade science at Araullo High School (Figure 3).
Pre-test and post-test data were taken from the teaching-and-learning process for the Chemistry class. The contents of the test instruments were validated by two teachers at Araullo High School. The interview and observation protocols were examined by two experts on the teaching-and-learning process. A total of 25 meetings were observed and documented using a video recorder. The observation was carried out for the teaching-and-learning process in both CVAs and VAs classes from the preparation, during the process and until the assessment. Structured interviews, each of which consists of five questions, were conducted as face-to-face interviews with the student teachers to collect their perspectives on the teaching-and-learning process for science, strategies and problem solving methods. Field notes were taken on the teachers’ strategies, preparation and problem solving for the teaching-and-learning process based on student behaviour. Multiple-choice tests, both pretest and posttest, were used to show the effectiveness of the CVAs in supporting the SCL approach for science.
This research used descriptive statistics to analyse the pre-test and post-test data. The pre-test and post-test scores for the 1st quarter (quantitative data) were compared to prove the approach’s effectiveness. The qualitative data (observation, documentation, field notes and interviews) were verified to increase their validity by incorporating several viewpoints and methods, as described by Blaikie (1999); Yeasmin and Rahman (2012).

RESULT AND DISCUSSION

Pre-Service Student Teacher Perspectives on the Teaching-and-Learning Process for Science

Based on the observations and interviews with the three pre-service student teachers, some statements commonly appear.

a. Teaching science has to use a technique that is not only interesting but can also maintain students’ attention.

b. To make students love and learn science is to make them do science.

c. The learning process must always involve the students. They have to be the star of the discussion. It is important that they find out what has to be discovered at their own pace, and the teacher should not spoon-feed the answers to them.

d. Most concepts in science are abstract, especially in Physics, Chemistry and Biology. In this regard, creativity in making and choosing the right VAs would help students and teachers in understanding abstract and microscopic science concepts.

e. If it is hard to teach science without proper representation, then it would also be hard to learn science without it.

Based on the above statements, teaching science needs CVAs, which is what was meant by ‘proper representation’ before. This reinforces the research conducted by Shabiralyani et al. (2015), but Shabiralyani research uses VAs, while CVAs were used in this research. All of the three pre-service student teachers agreed that the use of CVAs in the teaching-and-learning process would increase the motivation of both teachers and students, decrease teachers and students time in preparing lessons, avoid dullness, and increase the direct experience of observing the things.

The Planning and Preparation of the Pre-Service Student Teachers

Planning is one of the hardest parts of teaching science. Most science concepts are abstract. It is a teacher’s responsibility to make the students visualise the concepts that are taught. The teacher must come up with learning activities that are relevant to the concept taught by the teacher. In the planning and preparation part, the pre-service student teachers always prepare (a) a lesson plan, (b) VAs, (c) an assessment and (d) an assignment.

Milkova (2012) stated that a lesson plan is the instructor’s road map of what the students need to learn and how to do it effectively during the class time. It is necessary to identify the learning objectives that the class needs to meet before starting
the lesson, then design appropriate activities for learning and develop strategies to obtain feedback on student learning. Three key components that are addressed and integrated into a successful lesson plan are: (a) student learning objectives, (b) activities for teaching/learning and (c) strategies to check on student understanding. From the interview results, all of the student teachers agree that the planning and preparation for the teaching-and-learning process are important, since planning and preparation play a key role for teachers to conduct a great teaching-and-learning process. The preparation performed by the student teachers corresponds to the application of the cybernetic principles (Table 2), which is the step described by Sani (2015). The student teachers believe that planning and preparation for science learning should be creative, since every student has a different learning capacity. The student teachers find planning to be one of the hardest parts of teaching science. Most science concepts are abstract; therefore, as teachers, they feel responsible for making it easier for the students to understand the concepts by visualizing them with creative media. The teachers must come up with learning activities that are relevant to the concept they want to teach.

Table 2
The correlation between the application of the cybernetic principles and student teachers’ planning and preparation

<table>
<thead>
<tr>
<th>Student Teachers’ Planning and Preparation</th>
<th>The Steps of the Cybernetic Principles (Sani, 2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparing the aspect of the lesson plan that consists of defining learning objectives</td>
<td>Determining the learning objectives</td>
</tr>
<tr>
<td>Preparing the aspect of the lesson plan that consists of references and media</td>
<td>Determining the topics</td>
</tr>
<tr>
<td>Preparing the aspect of the lesson plan that consists of key ideas and their materials</td>
<td>Reviewing the information inside the topics</td>
</tr>
<tr>
<td>Preparing the aspect of the lesson plan that consists of the method and approaches</td>
<td>Determining the proper approaches</td>
</tr>
<tr>
<td>Preparing the aspect of the lesson plan that consists of defining the learners’ activities</td>
<td>Composing the topics systematically</td>
</tr>
<tr>
<td>Completing the teaching-and-learning process by using creative visual aids and involving the students in every step</td>
<td>Presenting the topics and guiding the students systematically</td>
</tr>
</tbody>
</table>

The Science Teaching-and-Learning Process. The strategies used for teaching and learning science are discovery- and SCL-based approaches. In a discovery-based approach, experiments are mostly carried out, and the teacher acts as a facilitator. The students perform the experiment or activity given, and are provided with guide questions to be answered. These guide questions are supplied by using CV As, and the questions can only be answered when the experiment has been carried out. Through
the guide questions, the students are able to discover the concepts behind the activity or experiment they were asked to perform. The concepts are provided by using CV As as the key ideas. In this SCL approach, the teacher keeps asking questions to the students to provoke their thinking skills during the teaching-and-learning process. The teacher needs to learn the art of questioning; the method of questioning is combined with the use of CVAs. This way, the students are also able to find answers at their own pace. Students are treated as individuals in an SCL environment, with ideas and issues that deserve attention and consideration, and are also treated as co-creators in the learning process (Froyd & Simpson, 2000; McCombs & Whisler, 1997). The observation sheet and results are shown in Table 3.

Table 3
Observation sheet and results

<table>
<thead>
<tr>
<th>Observation Items</th>
<th>Data Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do the students actively co-operate in the teaching-and-learning process?</td>
<td>a. Einstein: They are so active and show their interest in the CVAs used by the student teacher. They always raise their hand to try to answer questions. Almost all of them do that.</td>
</tr>
<tr>
<td></td>
<td>b. Pythagoras: They are as active as Einstein students, who like to raise their hand when the teacher asks them questions to try to answer questions first.</td>
</tr>
<tr>
<td></td>
<td>c. Gates: The students in Gates have a big interest in the teaching-and-learning process. They usually answer questions raised by the teacher; they even ask the teacher a question sometimes.</td>
</tr>
<tr>
<td></td>
<td>d. Garcia: The students usually try to answer enthusiastically the questions asked by the teacher. They try to be the first person who answers it.</td>
</tr>
<tr>
<td></td>
<td>e. Guerrero: The students are active, but compared with the experimental classes Guerrero is quieter.</td>
</tr>
<tr>
<td></td>
<td>f. Humabon: The students have the same characteristics as Guerrero; they do not instantly raise their hand as easily as the experimental classes do.</td>
</tr>
<tr>
<td>What is the atmosphere of the class like?</td>
<td>Overall, the experimental classes have more interactive lessons and students show that they are interested in the process of teaching and learning in class. It feels like they are really ‘in’ and enjoy this process because it feels like they are playing a game. The control classes have an active classroom condition, but several students do not pay attention to the lesson. They are busy with themselves.</td>
</tr>
<tr>
<td>How do the students show their interest in the CVA used by the student teacher?</td>
<td>Almost all of the students in the experimental classes want to be involved with the teaching-and-learning process at that time; they try answering the questions asked by teacher, asking a question to the teacher and figuring out the problem given by teacher. It is almost the same with the control classes, but, emotionally, they do not completely pay attention as well as the experimental classes do.</td>
</tr>
<tr>
<td>What is the students’ capability to understand the lesson?</td>
<td>Students in the experimental classes are generally more active than the students in the control classes. By comparing the result at the end of the lesson, in the question-and-answer session, the students in the experimental class usually answer the questions correctly and are more active in asking a question. But the students in the control classes are more reluctant to answer and ask fewer questions.</td>
</tr>
</tbody>
</table>
In using the VAs, students exhibit different levels of enthusiasm. They were more excited about using the CVAs than the common VAs. The common VAs used previously only visually represent the subject matter in the form of paper charts, as illustrated in Figure I (A). In this case, for a VA, students are not involved in its use and do not facilitate the concept’s construction because the VA it is ready-made. The three student teachers as observers were all in agreement that using a CVA is more enjoyable than using a VA. In classes with CVAs the students participate actively and enquire independently. CVAs equipped with colours and shapes can induce positive emotions. Moreno’s (2006) cognitive affective theory of learning with media (CATLM) is relevant to this, based on the fact that the theory of the cognitive engagement of learners is affected by motivational factors that mediate learning. Meaningful learning will occur when the student makes a conscious effort in cognitive processes such as selecting, organising and integrating the new information with their existing knowledge. Those things are also facilitated in learning using CVAs. Therefore, in this research, it is possible that the gain scores (the score difference between pretest and posttest) obtained from the learning using CVAs are higher than those from using VAs (Table 1).

Table 1
Result for gain scores for the 1st quarter at ST 2

<table>
<thead>
<tr>
<th>Section</th>
<th>Total Student</th>
<th>Pre-test Score</th>
<th>Post-test Score</th>
<th>Gain Score</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Einstein</td>
<td>37</td>
<td>48.486</td>
<td>62.000</td>
<td>13.514</td>
<td>CVA Sections</td>
</tr>
<tr>
<td>Pythagoras</td>
<td>42</td>
<td>40.047</td>
<td>53.857</td>
<td>13.810</td>
<td></td>
</tr>
<tr>
<td>Gates</td>
<td>38</td>
<td>42.000</td>
<td>55.921</td>
<td>13.921</td>
<td></td>
</tr>
<tr>
<td>Garcia</td>
<td>51</td>
<td>20.019</td>
<td>36.000</td>
<td>15.981</td>
<td></td>
</tr>
<tr>
<td>Total students</td>
<td>168</td>
<td>Average of gain scores</td>
<td>14,306</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guerrero</td>
<td>45</td>
<td>30.000</td>
<td>34.822</td>
<td>4.822</td>
<td>VA Sections</td>
</tr>
<tr>
<td>Humabon</td>
<td>43</td>
<td>29.465</td>
<td>30.628</td>
<td>1.163</td>
<td></td>
</tr>
<tr>
<td>Total students</td>
<td>88</td>
<td>Average of gain scores</td>
<td>2,992</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The gain scores obtained from the assessment for the 1st quarter, handling CVAs and VAs are shown in Table 2. The average of the gain scores obtained in the CVA sections is 14.306 and in the VA section is 2.991. This research result shows that CVAs are more effective for supporting SCL for science than VAs.
Assessment of the Teaching-and-Learning Process that Indicates the SCL Syntax and Characteristics. The assessment was conducted as a pen-and-paper test with multiple choice questions. However, teachers will sometimes administer a practical exam to increase students’ activity. This practical exam can stimulate students to give feedback and to improve their learning ability. This type of assessment is referred to as a formative assessment. Using a formative assessment, the development of capacities and attitudes used in lifelong learning can be promoted (Nicol & Macfarlane-Dick, 2006). Therefore, students’ involvement that shows SCL syntax is a key to effective instruction.

The term ‘syntax’ is from the Ancient Greek ‘syntaxis’, a verbal noun that means “arrangement” or “setting out together” (Van Valin & Lapolla, 1997). Student-centred-learning syntax is a syntax that shows the arrangement of the teaching-and-learning process flows. Firstly, the teacher will introduce only the main topic of today’s lesson. Then, for the rest of the lesson, the teacher can only be the facilitator for the process. All of the learning-system components are given in a way that is more centred on the student. For example, the environment should support the students’ movement, critical thinking, emotions and creativity. ‘Environment’ here refers to the learning method, learning mode, media, assignment and also the assessment. Both the assignment and the assessment should clearly ask for student participation, which can be the tool for the teacher to determine the students’ level of attention, cognitive ability, affective ability and skills, during the entire teaching-and-learning process, up to and including the evaluation process. The assessment and assignment can be of a paper-and-pen test design, or a skill-based assessment and assignment.

The validity of the data is proven using the triangulation method shown in Figure IV, which confirms that the quantitative data (gained scores) have a positive result; this can tell us that the use of CVAs has increased the students’ understanding of science. The qualitative data (observation, documentation, field notes and interviewed) raise the same point that using VAs can increase students’ curiosity, level of attention and imagination for many of the concepts taught by the teacher so that they can understand the subject more easily.
CONCLUSION

Based on the data analysis using a descriptive statistics method and the triangulation method, creative visual aids (CVAs) are able to effectively support the student-centred-learning (SCL) approach in teaching and learning science. Especially in the teaching of chemistry-related subjects at Araullo High School, Manila, Philippines in 2016, the gain scores, field observations and student teachers’ interview results have revealed that CVAs are more effective in supporting the SCL approach for teaching and learning science than common visual aids (VAs).

The results of the study by Shabiralyani et al. (2015) demonstrated that the VAs could stimulate students’ cognition and thinking ability. In this research, the use of CVAs has strengthened control and encouraged body movement. The teaching-and-learning process can be made more effective by using CVAs. In this case, the students and teachers have done something that has caused them to gain knowledge through using their intellects.
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REFERENCES


English Teachers Doing Collaborative Action Research (CAR): A Case Study of Indonesian EFL teachers

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ABSTRACT

Although CAR has been regarded beneficial for English teachers, very few research explores such issue language teaching education context. The aim of this study is to investigate four EFL senior teachers’ perspective involving in CAR projects with the researcher for one semester in an Indonesian school. It investigates how the teachers’ engagement in CAR impacts on their pedagogical practice, and their perception of the support from the school and the researcher. This multiple qualitative case study explores the teachers’ perspectives through in-depth interview, observation, and documents. Data were analysed using inductive approach. Using cross-case analysis, themes within and across the case were compared and grouped to get the findings of the study. The results of the study show that teachers’ involvement in CAR brings meaningful impact on their teaching practice and their students. Despite little support gained from the school, teachers value the external support positively from the collaborator which motivates them to participate in CAR projects. This study contributes to the insight of promoting teachers engaging in action research through a collaborative mode. It also suggests that CAR can be an impetus tool professional development for teachers which impact on their pedagogy and personal growth.

Keywords: Collaborative action research, pedagogical practice, professional development, support

INTRODUCTION

The literature of educational change has put teachers at the heart of its process (e.g., Fullan, 2007; Wedell, 2009). Wedell and Malderez (2013) argue that teachers need to change to response “what is happening in their classrooms all the time” (p. 198). They
are required to develop or change to respond with the changing of new government policy, new teaching paradigm, and deal with their day-to-day practices (Richards & Farrell, 2005). Hence, it is central for them to develop continuously during their teaching career (Craft, 2000). Concerning this,Clarke and Hollingsworth (2002, p. 948) suggest the foci of teacher development should be accorded with the perspective of “change as growth or learning”. They highlight learning is the core feature of teacher change.

Action Research (AR) is considered as a viable tool for teachers’ professional development (Burns, 2009) and a means of being reflective teachers (Wallace, 1998). Yet, Burns (2015) contends that AR provides a more productive avenue of professional development (PD) for teachers if it is conducted in a collaborative fashion than in isolation.

In Indonesian context, AR has been initiated as a tool for teacher change. The government acknowledges that in order to grow professionally, teachers need to participate in continuous professional development programmes. For this sake, AR has been promoted as a potential form of PD that may develop teachers. AR in Indonesia has been institutionalised as part of teachers’ work and embedded as the central element for teachers’ promotion since 2009 (Ahmad & Setyaningsih, 2012; Sari, 2014; Sukidjo; 2014). However, after some years of implementation, the output of promoting to engage in AR does not seem to yield satisfactory results. Research suggests that there are still huge percentages of teachers who do not practice AR (Ahmad & Setyaningsih, 2012; Badrun, 2011; Sari, 2014; Sukidjo; 2014).

Although it is unclear from the above studies what constitute teachers not partaking in AR, it is likely that such an issue is connected with the degree and amount of support given to teachers by these elements in each region such as local educational leaders, institutional leaders, teacher educators, and colleagues (Wedell, 2009). In this case, those aspects are particularly evident to have affected teachers’ successful engagement in AR. The degree of Indonesian teachers’ success in implementing educational change via AR seems to be influenced by the scale of support from local education office, university teacher educators, school administrators, and colleagues (Burns & Rochsantiningsih, 2006). For teacher educators or university researchers in particular, the viable support can be done through collaboration between teachers in school and them, known as collaborative action research (CAR) (Burns, 1999).

The present study is intended to explore the teachers’ perception of engaging in CAR with the outsider collaborator (the researcher himself) in a junior secondary school in Palu City, Central Sulawesi. The focal point of this study is to investigate the impact of CAR toward their pedagogical practice, as well as how they perceive the support provision both from school and the external collaborator (the writer himself).
What is CAR?

Most definitions of CAR in literature involve a partnership between teachers in school and university researcher conducting research for the sake of improving teachers’ practice and school improvement (e.g., Burns, 2009; Calhoun, 2009; Hendriks, 2009). For instance, Hendriks (*ibid*) defines CAR as “a system of action research in which multiple researchers from school and university setting work together to study educational problems” (p. 9). Meanwhile, Sagor (1992) and Pine (2009) tend to focus their attention on collaboration among teachers in school, and teachers with other practitioners who have similar interest. The main characteristic of CAR lies on the collectivity or collegial inquiry among members of the research project. In CAR, teachers work together to improve their practice via systematic inquiry and promote collective learning community. By engaging in collaborative AR, teachers gain more meaningful experiences and benefits than when they work individually as in ordinary AR (Burns, 2015).

There has been an agreement among PD experts stating that a collaborative model of PD is more effective than traditional ones such one-shot workshop (e.g., Burbank & Kauchak, 2003; Burns, 2015; Michell, Reilly, Logue, 2009; Postholm, 2012). In this case, Johnston (2005) argues that collaborative PD provides more opportunities for teachers to participate actively and equally in PD, get more support, and nurture learning community. Burns (2015) and Johnston (2005) suggest that when engaging in PD, teachers may collaborate with fellow teachers, university-based researchers, students, and other parties such as parents, and supervisor.

CAR, in particular, has been considered as an impetus collaborative PD as it enables teachers to collaborate with parties inside and outside the school. The advocates of AR have encouraged teachers involved in CAR instead of individual AR project as its collaboration tenet may promote teachers’ collegial works and gain more benefits from their projects (e.g., Burns, 1999; Oja & Smulyan, 1989). Unlike individual AR, in CAR teachers and their collaborators participate equally in designing their research agenda for a common purpose (Kemmis, 1993) and potentially could deal with research constraints such as time and limited AR knowledge (Yuan & Lee, 2015). Furthermore, in contrast with other research facilitated by an outsider into schools involving teachers, in CAR, the ownership of research stems on the teachers and their collaborators (Kemmis, *ibid*). Additionally, teachers gain their autonomy to plan, execute, and evaluate their projects in a joint-team with co-researchers (e.g., teachers, university researcher, or other collaborators) (Mello, Durta, & Jorge, 2008; Wang & Zang, 2014). Wang and Zang (2014) reported that 45 English teachers in China who engaged in 18 month-CAR projects with university-researchers become more autonomy in reflecting their practice and being active in reform activities. Most importantly, from this partnership, teachers may learn both from the research projects,
as well as from collaboration (Wigglesworth & Murray, 2007).

**Benefits and challenges in doing CAR**

There has been a growing body of research reporting language teachers gain considerable benefits from the CAR project they engaged in. Wang and Zang (2014) revealed that forty five EFL teachers in China benefitted from collaborating in action research such as: having more attention to students and changing the view of their teaching practice. In addition, due to the collaboration, the teachers gained an increased awareness of working as a team with their colleagues, and enjoyed the benefits of working with university researchers. They also reported that the teachers improved in the area of research skill. Similarly, Yuan and Lee (2015) revealed that fifteen EFL teachers in China benefitted from engaging in the CAR partnership with University research team (two researchers and eight research assistants). They found that the teachers shifted their misconception about research due to the collaboration, and thus, in turn, increased their understanding of research.

The shift in teachers’ awareness towards their practice has also been reported in other studies (such as Atay, 2006; Banegas, Pavese, Velásquez, & Vélez, 2013; Burns, 1999; Edwards & Burns, 2016; Wigglesworth & Murray, 2007). Atay (2006), for instance, found ten EFL pre-service and in-service teachers in Turkey formed a partnership in the CAR projects facilitated by her. She found that the teachers’ awareness of the impetus of collaboration improved, and gained an awareness of CAR as a form of PD for examining their teaching practice for the sake of their students’ learning. Four secondary EFL teachers from Argentina also reported that having engaged in the CAR projects, they had gained growth for their PD which brought impact for their students’ motivation and language development (Banegas et al., 2013). The current study by Edwards and Burns (2016) in the Australian context reported that the ESL teachers valued positively their engagement in action research practice facilitated by the researchers. They found that the teachers felt more confident with their practices, felt more connected to their students, motivated to engage with (reading research recourses) and in (doing) research, and being recognised by colleagues and managers.

With regard to teachers’ hindrance of doing CAR, studies found that the lack of institutional and collegial support is the dominant challenge faced by teachers in addition to lack of time, time-consuming, partnership issue of mutual respect and expectation (Atay, 2006; Banegas et al., 2013; Burns, 2000, Tinker Sachs, 2000; Wang & Zhang, 2014; Yuan & Lee, 2015). Regarding support, Tinker Sachs (2000) viewed that the lack of institutional support and inflexible demands from school for teachers to accomplish the required school syllabus were the main challenges for teachers engaging in research. Yuan and Lee (2015) found the teachers’ main constraints involving in CAR project included heavy workload and complying with rigid school
curriculum. Both Tinker Sachs and Yuan and Lee agreed that the provision of school support was central to promote teachers’ reflective practice via classroom research. The following section then discusses the role of support in facilitating teachers engaging in CAR.

The role of support

There is a widespread argument calling for support for teachers engaging in research in schools (e.g., Borg, 2010; Burns, 2010, Tinker Sachs, 2000). The provision of support is central to overcome the challenges encountered by teachers engaging in research. Support is meant as any form of actions intended to facilitate teachers doing research in their classroom. Without considerable support, it is likely difficult to expect teachers to engage with research successfully (Borg, 2010). Support may emanate from internal parties such as school administrators (managers), and colleagues (Borg, 2006), and from external parties such as mentors and critical friends (ibid), University researchers (Burns & Rochsantiningsih, 2006), and district policy makers (Tinker Sachs, 2000). In Indonesian context, particularly, Burns and Rochsantiningsih (2006) proposed that the role of university teacher educators is indispensable to facilitate EFL teachers do or sustain their practice in classroom action research based on the fact that when engaging in such PD they encounter considerable hindrances.

Borg (2010) suggests that schools should provide teachers time and opportunity to do research, give moral and incentive support, as well as recognition if they are expected to conduct their research projects successfully. Several studies have documented that the support provision both from the school and outside school motivates teachers to continue engaging in AR projects and is identified as the central element in supporting teachers engaging in research (Burnaford, 1996; Gilles, Wilson, & Elias, 2010; Westwell, 2006; Yuan & Lee, 2015). Regarding the external support, study suggests that when teachers gained full support from teacher educators in a research partnership of CAR, they could conduct their projects successfully. Yuan and Lee (2015), for instance, reported teachers successfully confronted with their contextual constraint (e.g., time) when engaging in CAR due to the support of external collaboration.

The studies of teachers engaging in classroom action research, particularly in CAR, are very few in Indonesian context even though the notion of teacher research has existed for years as a PD tool in educational reform. This present study, therefore, explores the Indonesian EFL teachers’ perception of the CAR project they are engaged in.

METHODS

This present study uses a multiple-qualitative case study to investigate a particular phenomenon of a group of English teachers in a secondary school setting in Palu City who participated in the CAR projects (Merriam, 2009). The researcher is interested in studying a
particular phenomenon of a group of English teachers in a secondary school setting (a bounded system) in Indonesia who have participated in CAR projects. Following Merriam (2009) and Stake (2006), by using a qualitative case study methodology, he was able to understand and provide an in-depth and rich description of the phenomena of teachers doing CAR projects through the lenses of the participating teachers by exploring their experiences, views, and thoughts of doing CAR for one semester at their school in 2016. The following research questions were addressed in the study:

1. What are the Indonesian ELT teachers’ perceptions of their experiences engaging with CAR as a means of PD?
2. How do they perceive the support provision both from the school and external collaborator when engaging in the CAR projects?

The participants of this study consisted of four English teachers - Maria, Eni, Pia, and Ana (all pseudonyms) from a state junior secondary school in Palu City, Central Sulawesi, Indonesia. They have been in teaching services for 14-20 years. Three of them had never involved in any AR project, except for Pia who had experienced doing AR once for the purpose of her M. Ed study completion. The four teachers voluntarily participated in the CAR projects with the writer in semester 2 (February-June, 2016). The teachers were asked to participate in the study by visiting them in their school. Since the researcher had never previously met them, he approached them through a “gate keeper” who arranged a meeting to recruit them in the study. Once they had agreed to participate, he conducted a meeting to discuss about the study (by clarifying points in a participant information sheet, and a consent form). Since they had understood and agreed with those points (such as the right to withdraw from the study, confidentiality, and anonymity), the teachers signed the consent form to mark their willingness to participate in the study.

Regarding the CAR project, Maria and Eni decided to do one project, while the other two (Pia and Ana) did individually in their classes. Each project was considered as an individual case. Thus, there were three cases in this study. All the projects were fully supported by the writer as the collaborator for the AR projects. Out of three CAR projects done, two focused on developing students’ learning motivation via games and fun learning activities; the other one emphasised on encouraging students to speak English using video activities.

Data of this study were collected during the CAR project that took place in school. To gain their perception of engaging in CAR, the writer used semi-structured interview, observation, and documents as tools for collecting data. In-depth interviews were conducted after the project had been completed; observation data were gathered during the meeting with the teachers (Feb-May, 2016) both inside and outside the classroom. Document data were gained from their projects such as materials, teachers’ note, and students’ questionnaire results. To analyse the data, a qualitative inductive
approach (Strauss & Corbin, 1998) was employed. The interview data analysis involved transcribing (translating) and coding the data to find occurred categories (Miles & Huberman, 1994). By employing cross-case analysis (Stakes, 2006), themes within and across the case were then compared and grouped to find the answers to the research questions (findings of the study).

**RESULTS AND DISCUSSION**

**Positive view of CAR as PD**

Teachers in this study agreed that participating in the CAR projects provided meaningful benefits as opposed to attending other PD programmes such as workshops. They noted that doing the CAR projects gave them more knowledge due to its practicality in which they were able to implement what they had learned into a meaningful practice in the classroom which was benefitting their students. For instance, Eni noted that “...in this activity [CAR project] we can practice in the classroom what we have learnt and discussed...while when attending workshop or teacher forum meeting, the instructor just explained the material...” (Eni, Interview, July 2016). Similarly, Pia echoed that “...In the workshop, I gained only ideas...after the workshop we get envelopes [lump sum money]...Yet, CAR is different, I can do it in the classroom...it yields result too...” (Pia, Interview, July 2016).

In addition, the provision of considerable support from outsider collaborator has been seen as a positive aspect of CAR for teachers. They revealed that when engaging in CAR, the collaborator may provide an immediate solution for their project issues in the classroom. Maria commented that, “If thing [CAR as a PD] like this, we can gain a lot of knowledge; if we are not sure with something we can ask to you [the collaborator]; you may give us feedback. Other activities [PD], we did not find such things; we just listened” (Maria, interview, July 2016). Ana also valued the provision of help from the collaborator: “This activity (CAR project) is different from others since you (the collaborator) are helpful... we gain more positive results than attending workshop...” (Ana, interview, July 2016).

In a similar vein, the teachers argued that the collaboration aspect of this PD provided a venue for them to share or solve the issue in the classroom. Pia, for instance, reflected the benefits of having a meeting with the collaborator, “solving problems together, planning the next meeting... with the collaborator, I am able to think something that never across to my mind...” (Pia, interview, July 2016).

The teachers’ views of CAR above are in line with the notion of effective PD, as proposed by PD experts in the area of teacher research. As opposed to the traditional PD such as one-shot workshop, CAR provides more opportunities for teachers to participate actively and equally in PD, get more support, and nurture learning community (Bleicher, 2014; Burbank & Kauchak, 2003; Burns, 2015). In this type of PD, teachers are not passive recipients or consumer of knowledge, but they also “construct meaning and knowledge and
acts upon them (Richardson, 1996, p. 266). Mitchell, Reilly and Logue, (2009) noted that the power of CAR as a PD tool lies in its nature where PD is located in teachers’ working context where they deal with their real problems. In this case, teachers have the opportunities to understand what happened in their classroom, and are able to provide a practical solution to issues occurred in their classroom. Unlike traditional PD in which classroom solution is offered by outsiders who are unfamiliar with their context, through a collegial sharing in CAR, teachers may provide better-informed decisions to any puzzlements they have in their context (Burns, 1999). In addition, Pine (2009) argued that the characteristic of CAR as a PD lies in the collegial sharing among teachers, supportive environment and inquiry community which enables them to improve classroom practice. In this study, the teachers viewed these conditions constituted their positive view of CAR.

Based on the above findings, it implies that CAR, as a practical PD, has a potential PD for EFL teachers to develop professionally via examining and improving their practice.

**Impacts of engaging in CAR for teachers’ pedagogical practice**

The teachers in this study revealed that their participation in CAR brought about meaningful changes to their pedagogical practices. For instances, they noted that their motivation to teach heightened when seeing there was a shifting of behaviour from students in learning English. A teacher claimed: “We are motivated to teach as there are changes on students learning behaviour...they used to be inactive... I found teaching becomes enjoyable” (Eni, interview, July 2016). Another teacher stated a similar point, “When seeing students are pleased with the materials used in the classroom, we become motivated to enter into the classroom” (Pia, interview, July 2016).

The above benefits of participating in CAR may suggest that when students’ learning behaviour has changed as a result of their teacher’s intervention, teachers’ self-efficacy and motivation of their practice also increased. Teacher efficacy is defined as “an individual’s belief about proficiency in performing the actions thought to lead to student learning” (Ross, 1994, p. 381-382). Praver and Oga-Baldwin (2008) argued that the feeling of high efficacy will lead teachers to enhance intrinsic motivation. By contrast, the insufficient self-efficacy possessed by teachers will lead to inhibiting teachers’ motivation to teach (Donymei & Ushioda, 2011). Thus, it can be said teachers’ motivation engaging in CAR is mediated by their beliefs that it will increase their efficacy which ultimately affects their learners’ learning. When this efficacy is heightened, their self-motivation to engage in CAR or other PD will be enhanced and sustained. A study by Henson (2001) suggested that collaborative AR positively impacted on teacher efficacy to help their students in learning, and thus affected teachers’ belief in their efficacy to help their students, and thus strengthened the teachers’ motivation in PD.
Furthermore, experiences of engaging in CAR projects have augmented their awareness, as can be seen from one teacher’s excerpt: “…By engaging in CAR project, I realise now that when teaching low motivated students, their needs should be acknowledged first…I did not do that last time”. (Ana, interview, July 2016). The other teacher became aware that the teaching delivery through lecturing was ineffective to motivate students: “As you see yesterday in “banana” class, the students enjoy such way of teaching [using videos and games]… they don’t like only hearing lectures telling this and that…doing such thing will make students unmotivated” (Maria, interview, July 2016). Reflected from the observation data, it seemed that the weekly reflective meeting conducted during the project gradually shifted the teachers’ sense of awareness towards their practice. During this meeting, the teachers were actively involved in reflection, which ranged from examining their practice [e.g., finding the research topic] to reflecting upon the process of the project; any issues occurred during the implementation in the classroom were modified to achieve the favourable condition planned by the teachers (Field notes, July 2016).

The teachers’ accounts of their growing awareness as impacted by engaging in CAR are aligned with the other studies in language teaching context. Studies suggest teachers change their view of their practice (Atay, 2006), being aware the value of collaboration (Wang & Zang, 2014), and being more reflective (Wigglesworth & Murray, 2007). Osterman and Kottkamp (1993) asserted that when teachers are involved in CAR project, it would lead them to be reflective teachers. As such, they can shift their attitudes and ideas due to the change of self-awareness. York-Barr et al. (2006) argued that reflective teachers are those who demonstrate awareness of themselves, others, and surrounding events. A reflective teacher is defined as the one who “examines, frames and attempt to solve the dilemmas of classroom practice” (Zeichner & Liston, 1996, p. 6). This trajectory of being reflective teachers via engaging in CAR will lead them to grow professionally (Mertler, 2009).

The teachers also noted that the outcome of engaging in CAR projects benefited their students’ learning motivation and achievement. Prior to conducting CAR projects, all the teachers complained that students’ learning motivation was the crux of their pedagogical practice. For instance, employing videos and games in teaching, Maria and Eni found their project boosted students’ motivation to learn English “Our students get motivated in learning… they also got excited with the given activities…they also became active and were attentive in learning activities…” (Maria, interview, July 2016). It seemed that the students’ interest in learning English was increased due to the shifting of teaching delivery by the teachers. Ana found a similar story in which she changed her teaching facing unmotivated students through English “games” in her CAR project. She asserted: “The students are very
motivated and enthusiastic to learn English using “games”...I feel this project helps my students to learn English in a fun way” (Ana, interview 2, July 2016). In a similar vein, Pia suggested that her project using videos was able to reduce students’ reticence to speak English. She said: “In terms of speaking in English, my students are not shy anymore to speak...they used to be silent and shy if ask to speak...” (Pia, interview, July 2016). Furthermore, the writer’s observation in the teachers’ classroom also affirmed that students were enthusiastic in learning English when teachers used fun activities in the classroom. This condition, in turn, made the teachers felt passionate with their class and ignited their motivation to teach students. Moreover, the evidence from the students’ responses from the questionnaires distributed to know their perceptions of the teaching techniques used by Pia and Ana revealed that the students enjoyed them. In particular, the students from Ana and Pia’s class responded that the techniques used motivated them to learn English as they found it interesting, and helping them to learn English (Document data, 2016).

What can be learned from the above results is the reciprocal relationship between teachers’ motive to engage in CAR and the students’ learning outcome. Guskey (2002) argues teachers’ intent for pursuing PD is to be able to enhance student learning outcome. He further contends that teachers believe that by partaking in PD activities, they can expand their skill and knowledge and thus increasing their competence which contributes to the growth and develops their practice. In a similar vein, Scribner’s study (1999) found that intrinsically teachers’ motivation to engage with PD programmes, for instances CAR, is driven by the need to address their classroom challenges. The finding above is also in concert with the assertion of Dörnyei and Ushioda (2011, p. 170) “…If a teacher is motivated to teach, there is a good chance that his or her students will be motivated to learn”. Moreover, regarding to language learning, Dörnyei (2001) contends that the success of a learner to be proficient in a learned language depends on his or her degree of motivation. Hence, it is very central for teachers to facilitate students’ motivation to learn. By engaging in CAR, the effort can be potentially achieved via a deliberate teaching innovation for the sake of students’ learning. One study by Banegas et al. (2013) demonstrated that teachers gained growth due to their involvement in CAR project that would ultimately impact on their students’ language learning achievement.

The provision of support

All the teachers in the present study agreed that they gained limited support from the school party (particularly from school managers). In this case, the school did not provide incentives for teachers, or at least in the form of moral support. A teacher pointed out that “Although the head teacher, or school administrators allow you to do research with us, there is no support in the form of incentives or moral [encouragement] to us” (Maria, interview, July 2016). Neither did they get any support
from the colleagues, as Pia noted, “My colleagues [non-English teachers] never asked me what I did with you during our doing AR project in school...what they know you did research in our school” (Pia, interview 2, July 2016). The writer also observed that the teachers doing research were likely not valued in their school. The school managers and their colleagues (non-English teachers) were not interested to find out what the four teachers were doing by having informal dialogues with them (Field notes, 2016).

Interestingly, however, they revealed that the main motive for engaging in CAR was for the sake of their students regardless of whether or not they gained support from their school. One of the teachers said “...For us, when there is no support [from colleagues], it does not matter; what really matter is my students enjoy learning English” (Maria, interview 2, July 2016). This fact is in line with Guskey (2002) who maintains that teachers’ motivation to take part in PD activities is triggered by the need to become effective teachers and enhance students’ learning outcome.

In terms of support, all of them agreed that school should endorse teachers’ engagement in PD, such as doing classroom action research individually or collaboratively. They further argued that the support provision would motivate them and enable teachers to sustain their practice in teaching innovation via CAR. Eni suggested that “At least school managers acknowledge teachers in school engaging in AR projects.....it would be highly important if teachers are given appreciations and incentives” (Eni, interview, July 2016). Pia echoed a similar matter: “If the school provides fund, I am sure many teachers will participate in personal development such as this CAR” (Pia, interview, July 2016). In conjunction with school support, Borg (2010) suggested that schools should provide teachers time and opportunity to do research, give moral and incentive support as well as recognition if they are expected to conduct their research projects successfully. Additionally, it is suggested by Burnaford (1996) that it is imperative for schools to create a healthy atmosphere for teachers doing research. Providing this condition will enable them to collaborate and share their research with others. He also suggested that schools should provide facilities needed by teachers and acknowledge teachers’ work when engaging in research.

The process of doing CAR for the teachers in this study was not a straightforward way for them. Teaching workload was the main challenge for them. The 24-hour teaching policy per-week made them exhausted to prepare for their research projects well. One of the teachers commented: “I feel exhausted as in one day I have to teach three classes...If it is only two classes, it will be more comfortable to teach...” (Pia, interview, July 2016). Therefore, teachers viewed that the role of collaborator was central for them in reducing the burden and enabling them to successfully doing their projects. “I found the collaboration is very beneficial...we can solve problems and plan teaching scenario
together” Pia noted (interview, July, 2016). The provision of support from collaborator ranged in the form of one to one mentoring, supplying references, being an observer in the classroom, involving in a team teaching, and sharing ideas. They also noted that this collaborative PD motivated them to continue engaging in teaching innovation. A teacher asserted that, “Through collaboration with you, we feel comfortable, and our knowledge increased... for years we slept [no passion in teaching innovation], now we wake up again [feeling motivated]...” (Maria, interview, July 2016).

The teachers’ comments of the central role of collaboration above accord with Pine’s (2009) statement of CAR. He contends that at the heart of CAR is the collegial sharing among teachers, supportive environment and inquiry community which enables them to improve classroom practice. In CAR, teachers are connected with their colleagues and the outsider collaborator, and it potentially diminishes the feeling of isolation (Burns, 2000). In ELT context, there have been attempts to mitigate teachers’ challenges in AR through collaborative action research (CAR) support such as partnership between teachers and university researchers (Burns, 1999; Wang & Zhang, 2014; Yuan & Lee, 2015), in-service teachers and pre-service teachers (Atay, 2006), a PhD student researcher and English teachers (Banegas et al., 2013).

In addition to CAR, other types of PD encouraging teachers to collaborate and support each other are lately promoted in the field of ELT. These activities are deemed to promote reflection among teachers via a collegial learning. Nguyen (2017) introduced peer and group mentoring as a tool of PD to promote teachers’ reflection. Allwright and Hanks (2009) write about exploratory practice as a form of PD that encourages teachers to collaborate with their students and colleagues to understand the puzzlement in their practice. In his review about collaborative professional development, Johnston (2005) suggests a myriad of collaborative PD that language teachers can participate in such as cooperative development, narrative inquiry, dialogue journals, teacher study group, team teaching, and long-distance collaboration. He also recommends language teachers can collaborate with fellow teachers, university-based researchers, students, school stakeholders (managers, supervisor, parents), and language teachers and subject teachers.

In the present study, the role of external support reiterates the importance of collaboration in teachers’ professional development which enables them to develop professionally and brings impact on their teaching practice, particularly their students.

**CAR as a Potential Effective PD for Teachers and the role of support**

The findings of the present study suggests that the teachers’ engagement in collaborative professional development such as CAR impressed and benefitted them. They viewed CAR as a more practical PD as they have the opportunity to follow up what they have learnt and provide immediate solution...
toward their practice – improving students’ English learning achievement. This fact is aligned with the current belief that teachers’ involvement in the collaborative PD is more efficient than that of attending such as a one-shot workshop (e.g., Burbank & Kauchak, 2003; Burns, 2015; Michell et al., 2009; Postholm, 2012).

The teachers in the study also revealed that they gained benefits from participating in the CAR projects. The value of it has reenergised their passion in teaching, enhanced their awareness, and impacted their students’ learning output. This study then adds to the body of knowledge that exploring CAR benefitted EFL teachers, as reported by other studies (e.g., Atay, 2006; Banegas, et al., 2014; Burns, 1999; Wang & Zang, 2014; Yuan & Lee, 2015). In the context of Indonesia, the study may suggest that CAR is a viable PD tool to mitigate the teacher’ challenges involving in CAR. It has been reported the low motivation and lack of research knowledge preclude teachers to engage in classroom action research (Burns & Rochsantiningsih, 2006; Mukrim, 2012, Sukijo, 2014). The appearance of external mentor or facilitator in the CAR partnership with teachers may reduce such issues and provide a great chance for teachers to engage in a collegial learning for growth (Johnston, 2005). Regarding this external support, a recent study by Çelik and Dikilitaş (2015) reported that the ongoing support provided by them (the university-based educators) toward EFL teachers in Turkey during action research projects motivate teachers to sustain their engagement in such PD. In the context where teachers have limited access to PD, such as the teachers in this study, the form of collaboration among teachers and external mentors (such as teacher educator) is likely beneficial to facilitate teachers’ development (Burns, 2015). This collaboration will promote collegial learning in school among teachers that eventually encourage them to solve their classroom issue in a collective mode. Once this partnership has become prevalent among teachers, the existence of external mentor can be then diminished.

This study also found that given the contextual challenges faced by the teachers (such as heavy workload, and lack of support), the role of support both from internal and external school is greatly beneficial. Some researchers (e.g., Burns, 2014; Yuan & Lee, 2015) revealed that institutional support is a central element to ensure teachers sustaining this practice. In this current study, the teachers gained their support only from the external collaborator and were not endorsed by their school. It may be apparent that once the external support is absent, it may be difficult for the teachers to remain engaging in classroom research as the school atmosphere is unhealthy for them, except for those who have high self-motivation. Edwards and Burns (2016) contend that in addition to self-motivation, the role of institutional support is indispensably needed to ensure teachers engaging in classroom research such as CAR. Similarly, Borg and Sanchez (2015) also put the availability of support as one of the essential elements for a condition
teacher research practice. They argue the absence of this aspect seems to inhibit teachers’ engagement in research practice.

This study thus reiterates the above statements about the role of support for teachers’ involvement in the collaborative PD such as CAR. By engaging in CAR, they will potentially become a reflective teacher – a teacher who continuously examines her/his practice, and takes immediate action of issues in her/his classroom for the sake of students’ learning achievement.

CONCLUSION, IMPLICATIONS, AND FUTURE DIRECTION

This study suggests that by participating in CAR projects, English teachers gained benefits affecting their practice, as well as impacted on their students’ learning behaviour and achievement. Despite the fact that teachers did not receive support from their school, the provision of external support (the collaborator) considerably maintained the teachers’ interest in completing their CAR projects. This present study may implicate to both theoretical and practical impact in the area of language teacher professional development. First, it may contribute to the body of knowledge about the insight of the powerful of CAR as a means of professional development, which can be done by language teachers with teachers, university educators, supervisor, head teachers, and also the policy makers. This study also adds to the knowledge that the support both internally (from school) and externally (from external collaborator) are crucial in promoting teachers engaging in research for the sake of self-development and students’ learning achievement. Furthermore, this study adds our understanding of limited teacher research study in the Indonesian context, particularly in the area of supporting teachers doing research. This research will enable us to understand factors constituting to effective PD in the context, where teachers adversely face unconducive learning condition at schools, particularly in the Indonesian context. Last but not least, for practical impact, this study implicates to call the external researcher (teacher educator, master teacher, or supervisor) to help teachers’ difficulties in doing research, particularly from the context, where teachers face considerable challenges engaging in research via collaboration or research partnership.

Given the fact that this current study is limited in scope and population (only four EFL teachers in a site school), more research should be conducted to explore and understand teachers’ insight when engaging in CAR, or other collaborative PD in general. Future studies should also be devoted to investigate the types of support needed both from the schools and outside school parties to facilitate teachers’ motivation to engage in PD, particularly in research engagement. This study is necessary to be conducted to unveil factors motivating teachers to engage in research, specifically in the context of this study, in which teachers still encounter a plethora of challenges in such PD, in order to be able to provide inputs for all stakeholders of teacher
development party in facilitating teachers’ engagement in research.

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REFERENCES


Integrated Creative Learning Model through Suket Puppet (Wayang Suket) for Elementary Students

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ABSTRACT

Wayang suket is one of the nine types of wayang puppet found in the city of Surakarta, Indonesia (Wardani, 2014). Wayang suket can be described as wayang puppets made of grass (suket). These grass puppets are created to represent human beings or animals. Wayang suket, as a cultural product of Indonesia, is appropriate for introduction to students. Teachers, as classroom learning facilitators, can use creatively made wayang suket as a learning model, thus enabling students to better absorb the materials and character traits of the wayang suket stories. This article explains the use of an integrative-creative learning model that can be applied in Indonesian-language and culture education lessons for students in the fourth year of elementary school. This research finds that: (1) creative learning is learning planned by teachers to include a variety of activities that can meet the needs of students with varying capacities. This learning is conditioned by the teacher in a fun and entertaining atmosphere; (2) an integrative creative learning model, based on wayang suket, was implemented through lessons focusing on listening, reading, speaking, and writing. Activities included students making wayang suket and using these puppets for role-playing.

Keywords: Creative integrative, elementary school students, learning models

INTRODUCTION

Building the character of our younger generation is crucial for Indonesians. The noble values of the culture and nation, held for hundreds of years, have been eroded over time. Many cases of crime have involved the younger generation. Frequent
cases of assault, rape, bullying, internet pornography, sadism, and hate speech indicate the fragile state of the younger generation. This can be seen in data from the Indonesian Commission for Child Protection (Hendrian, 2016, p. 1), which indicated that in 2016, the Commission handled 3,581 reports of children’s rights being violated. This included 1,002 cases involving children facing legal issues, 702 cases involving family and childrearing, 414 cases of cybercrime involving children, and 328 cases of children’s right being violated in education. These cases involve cyberbullying, online prostitution, kidnapping, hate speech, rape, tawuran (inter-school fighting), etc.

This condition is concerning. The youth are easily exposed to negative influences, and these can have a negative impact on the children’s character development and behaviour, which becomes increasingly apparent over time. Positive character traits such as honesty, social and environmental awareness, hard work, religiosity, responsibility, and friendship are slowly lost. Chan and Sidhu (2016, p. 555) stated that technology is the cause for the diminution of these positive character traits among the youth. This is reflected in the argument by Lickona (1991, p. 4) that character education has failed because “we live in a media-driven culture which promotes relativism and hedonism and undermines many of the values that are the foundation of good character. Families are more stressed and fragmented [more] than ever and often spend less time in the face-to-face communication necessary for the transmission of values and the formation of children’s character”. A good character, according to the Indonesian Ministry of Education and Culture (IMEC) (2016), covers eighteen points: religiosity, honesty, tolerance, discipline, hard work, creativity, independence, democracy, curiosity, nationalism, love for the homeland, appreciation for achievements, friendliness, peacefulness, love of reading, environmental awareness, social awareness, and responsibility.

Facing these conditions, it is important to implement character education programmes for youths in schools. Character education can be realised through an Indonesian literary and cultural education. Good character traits can be conveyed to students through an innovative, creative, and fun learning model. Through such a learning model, good character can be taught to students. Such a learning model could use wayang puppets, or more specifically, wayang suket. Wayang suket is one of the nineteen types of wayang found in the city of Surakarta, Indonesia (Wardani, 2014). Wayang, in this sense, is selected because it serves as an educational medium. It serves not only as spectacle, but also as a guide for viewers. As explained by Marzanna Poplawska (2004, p. 1), wayang is a vital art form in Java. Its performances are still very popular and often staged for all kinds of celebrations, from family to state events. Wayang provides both good performance (tontonan) and guidance (tuntunan).

For teaching good character, an appropriate learning model is necessary
to ensure that lessons are well received by students. Character traits and values are not provided through advice, but rather taught to students through cognitive, affective, and psychomotor lessons that include writing stories, making *wayang* puppets, and role-playing. This is in accordance with Dalmeri’s (2014) view that character education does not simply teach students right and wrong, but conveys specific character traits through the habituation of good behaviour. As such, students can understand, are capable of sensing, and wish to emulate these good behaviours.

Material for character education can be integrated through an integrative creative learning model, such as one used for fourth-year elementary students that integrates Indonesian literature and language. Through this integrative creative learning model, it is hoped that students can internalise positive character traits more easily than if they receive continuous advice from their teachers. This reflects Lickona’s view that, throughout history, in countries all over the world, education has had two great goals; to help young people become smart and to help them become good (1991, p. 6). This article’s goals are two-fold; (1) to explain the integrative creative learning model as one learning model implemented at Indonesian elementary schools; and (2) to explain the *wayang suket*-based integrative creative learning model and its use in Indonesian language and culture education for students in the fourth year of elementary school.

**METHODS**

This research is a qualitative research that applies an explorative approach. It is intended to answer questions formulated in accordance with this research method (Creswell, 2013, p. 22). The research subject comprised fourth-year elementary school students and their teacher. Data for this research came from: (1) informants (teacher and students); (2) documents (notes from observation and notes from interviews with teacher and students) for analysis; and (3) experiences with year-four classes using *wayang suket* in realising an integrative creative learning model. Data were collected through observations of the learning process, involving teacher and students. The learning process was observed beginning with the *wayang suket* stories being told by the dalang (puppet master), the stories being written, the *wayang* puppets being made, and the role-playing activities. Interviews were conducted with teacher and students regarding the *wayang suket*-based integrative creative learning model used. In-depth document analysis was conducted using observation and interview notes. Data were analysed using the interactive analysis approach of Miles and Hubermann (2014) that consists of: (1) data collection; (2) data reduction; (3) data presentation; and (4) conclusion drawing.

**RESULTS AND DISCUSSION**

The Integrative Creative Model

Studies in Indonesia at the primary and secondary level follow the 2013 curriculum
This curriculum is intended to fully empower students and allow them to realise their greatest potential. This, in turn, is intended to allow students to attain the expected competencies and develop their own attitude, knowledge, and skills. Other qualities that must be developed and realised in the learning process include creativity, collaboration, solidarity, leadership, empathy, tolerance, and life skills, all of which are used to shape their personalities and thus improve the civilisation and dignity of the nation (Hosnan, 2016, p. ix). In order to attain the greatest quality of education, several principles must be realised: (1) learning must be student-oriented; (2) learning should improve students’ creativity; (3) the learning environment should be fun; (4) learning should involve ethical, aesthetic, logical, and kinaesthetic values; and (5) diverse learning experiences should be offered through the implementation of fun learning methods.

Creativity is one quality that the 2013 curriculum intends to develop. Creativity can be defined as the ability to create something new, the ability to implement new ideas in problem solving, and the ability to see new, already existing connections (Munandar, 2012, p. 25). Creativity, according to Moustakis (as cited in Munandar, 2012, p. 19), is the experience of expressing and actualising individual identity in an integrated form, in one’s relations with oneself, with nature, and with others. Creativity, in this understanding, is the development of one’s innate potential. It is learning to use one’s abilities optimally, to come up with new ideas. It is developing an awareness and sensitivity to issues of the environment, of other people, and of humanity.

The Indonesia National Advisory Committee on Creative and Cultural Education defines creativity as imaginative activities and values that produce new results (Craft, 2005). Fildman (as cited in Craft, 2005), identifies it as “the achievement of something remarkable and new, something which transforms and changes a field of endeavour in a significant way. The kind of things that people do that changes the world”. Creativity will lead to a creative product.

Creativity must be stimulated from early childhood, be it in early childhood education or in primary education (Munandar, 2012, p. 12). Why must education be stimulated from early childhood? Munandar (2012, p. 31) identifies several factors for this, which include: (1) to allow them to actualise themselves through creativity; the need for self-actualization, as argued by Abraham Maslow, is the most important of humans’ core needs; (2) creativity and creative thinking, as a way of identifying various possible solutions to problems, has not received sufficient focus in education; schools focus on students’ knowledge, memory, and rational thought; (3) being creative not only benefits the self and others, but also provides individual satisfaction; and (4) creativity makes it possible for humans to improve their quality of life.

The stimulation of creativity is linked to the development of cognitive, affective, and
psychomotor competencies, in accordance with the 2013 curriculum in effect in Indonesia. Increasing students’ creativity and creative thinking skills is closely linked to teachers’ methods. To stimulate creativity, a fun learning atmosphere is required, in which educational methods and media promote students’ enthusiasm for learning. Teachers must function as facilitators and offer students the greatest creative opportunities and allows them to build their confidence for thinking and voicing their opinions. In planning learning activities under the 2013 curriculum, these learning goals can be realised by developing students’ creativity. Teachers, as facilitators, need only focus on the specific elements necessary for promoting the 5Ms in the 2013. These 5Ms consist of mengamati (observing), menanya (asking), mengumpulkan data (collecting data), mengasosasikan (associating), and mengomunikasikan (communicating).

The wayang suket-based integrative creative learning model can develop students’ characters through student-centred learning and in a fun atmosphere. Students often conduct their learning collaboratively in groups, where they learn to voice their thoughts, respect the opinions of others, think critically and creatively, etc. The wayang suket-based integrative creative learning model also allows students to absorb various character traits and values by listening to stories, making wayang puppets, and role-playing. This is appropriate with Mulango’s statement (2013, p. 157) that the goal for student-centred learning is to bring students into the process of their own education.

A Wayang Suket-Based Integrative Creative Model for Elementary School Students

Creativity is an important need, one that must be developed among students because at school, in society, and (later) in the workplace, they will require creativity for knowledge, technology, and art. As such, an integrative creative model is necessary to increase students’ creativity through lessons that integrate Indonesian language, art, and culture. The Indonesian language is taught by integrating listening skills, reading skills, speaking skills, and writing skills. These integrated strategies and interactive learning techniques require students to work in groups, thus helping them become more involved in the learning process (Delija, 2013, p. 13).

A wayang suket-based integrative creative learning model here involves: (1) teaching Year 4 students the Indonesian language by integrating listening skills, reading skills, speaking skills, and writing skills, and thus increasing students’ creativity; (2) making wayang puppets suited to stories written by students in writing skill-building activities; the making of wayang puppets also encourages students to be actively creative; (3) the final step of the wayang suket-based integrative creative learning model is role-playing, in which each student must act as his or her character. The entire learning process applies mind-
mapping, role-playing, discussions, inquiry, demonstrations, assignments, and discovery learning strategies.

The stages of the creative integrative learning model, as applied to Indonesian-language classes, are as follows.

(1) Listening and observing:

Students were asked to appreciate a *wayang suket* performance directly by listening and watching a performance staged by a *dalang* (puppet master). The *wayang suket* story was written by the puppet master in collaboration with the researcher. This story focuses on the characters students are already familiar with and contains the eighteen character traits stipulated by the Ministry of Education. The researcher’s intervention in the story writing included the integration of character traits and values in the story. As such, in viewing the *wayang suket* performance, students were not only entertained, but also learned and absorbed the character traits and values contained within the story. The Indonesian language was chosen to be easily understood by students in the fourth year of elementary school.

(2) Inquiry:

This activity involved students asking their teacher about *wayang suket*, about the story shown in the *wayang suket* performance, about the characters, about the character traits and values in the story, etc. Questions asked by the students included, “What is *wayang suket*?”, “When was *wayang suket* first performed?”, “Why did Arif help his friend?”, “Why must we be nice to others? What happens if we’re nice to them, but they’re mean to us?”, and “What must we do if we see our friends mistreating others?” Questions were asked to the teacher and discussed together. Students’ active participation in asking questions to their teacher and in discussions was prioritised. The teacher served as the facilitator in the learning process.

(3) Data collection:

Based on their listening and viewing of the *wayang* performance, the students were asked to prepare a mind-map using paper, pencil, and colour pencils. During this mind-mapping activity, the students were asked to note keywords, draw, and colour. This mind-mapping activity was linked to the story presented to students.

(3) Association

Students prepared a mind-map by writing the main theme in the middle of the paper, with keywords positioned as branches of the main theme. The students used their imagination in diagramming the theme and keywords as a tree, and then coloured the tree diagram they made. The students used this diagram as a framework for writing a simple, imaginative piece.
(4) Communicating:

Students read their imaginative writing pieces. The integrative-creative learning model was used to integrate Indonesian language, art, and culture in a classroom setting. The learning process followed several stages, beginning with observation and inquiry as in the previous stage. Here, differences could be found in the data collection, association, and communication stages.

(1) Data collection and association (arts and culture):

After reading the stories they had written in groups, students in each group identified four characters that could be used in making wayang puppets. Based on their identification, and working with the teacher (as the facilitator), the students made wayang suket puppets. Wayang suket (meaning ‘grass puppets’) are made from napier grasses that are shaped to resemble human beings. The making of wayang suket puppets does not need any special equipment. It requires only the skill of weaving the grasses into a puppet.

(2) Communication:

Communication was conducted using the Indonesian language. The communication activity involved role-playing using wayang puppets and the stories written by the students. Every student held one puppet and, during role-play, conducted dialogue between the different characters in their stories. These students were supported by other students, who provided music with specific musical instruments. This was intended to increase students’ creativity.

This integrative-creative model of learning promoted students’ creativity by having them write stories, read stories, make puppets, and role-play. Although it included productive activities such as speaking and writing, it did not ignore the importance of students’ receptive abilities. It hones their listening skills and reading skills. Lessons capable of promoting students’ creativity were one aspect character education, as they teach the value of creativity. The learning methods used were likewise able to promote character building among the students. The lessons here used several methods, namely discovery, inquiry, mind mapping, discussion, and role-playing. Through these methods, students absorbed several character traits that include the willingness to voice their opinions, ability to work in groups, discipline (the ability to complete tasks on schedule), democracy (the ability to accept other people/groups’ opinions), responsibility for the tasks assigned to them, and ability to focus and work on assignments, etc. The character traits and values in these lessons are in-line with those voiced by Lickona (1991, p. 18), who writes that students must learn and absorb seven traits; honesty, compassion, courage, kindness, self-control, cooperation, and diligence or hard work. These traits are also reflected by the Indonesian Ministry of Education (2011), which identifies eighteen points:
religiosity, honesty, tolerance, discipline, hard work, creativity, independence, democracy, curiosity, nationalism, love for the homeland, appreciation for achievements, friendliness, peacefulness, love of reading, environmental awareness, social awareness, and responsibility.

The live performance of *wayang suket* used a story in which character building and character education had been included in a non-patronising manner. This performance lasted for two periods. Through this story, the students were able to absorb a number of values related to their interactions as students, children, and members of society. Values such as honesty, mutual respect, tolerance, responsibility, respect for the environment, and tenacity in facing problems are all presented through these *wayang* characters. This is also part of reinforcing the character traits absorbed by students in class. Students’ moral feeling and moral action are explored through discussions and inquiries regarding *wayang*, the characters, and stories performed. The teacher tries to draw students’ opinions regarding alternative actions, actions ill-suited to students’ moral feelings and moral actions. This is in accordance with Lickona’s (1991, p. 10) view that character education contains three core elements: moral knowing, moral feeling, and moral action. Through these lessons, students are not limited solely to moral knowing, but also reach the stages of moral feeling and moral action.

This lesson was contextual, in that students directly observed a *wayang* performance and appreciated this performance by using the four language skills, making *wayang* puppets, and role-playing. In this contextual learning, the students underwent the processes of discovery and inquiry. In these lessons, the students were not the only ones who must be creative; teachers too had to show creativity in planning their lessons so as to ensure that character traits were not simply known, but absorbed and applied in students’ everyday lives. This is indicated by the response of Teacher who stated that, before any lessons, she had always prepared a plan to ensure that her students developed not only their cognitive aspects, but also their affective and psychomotor aspects. As such, aside from the learning methods, learning media, and learning techniques, learning also requires a role model. This supports the finding by Sarimah Mokhtar et al. (as cited in Mohamed, 2016) that teachers improve their teaching techniques, become more aware of their students’ drawbacks, and portray an ideal character for the students to role model.

**CONCLUSION**

Creative learning is a learning that is planned by teachers to include a wide variety of activities that fulfil the needs of students of various competency levels. Such learning is conditioned by teachers to use a fun atmosphere. Such creative learning is integrated with learning the four basic skills of language and culture.

The *wayang suket*-based integrative creative learning model is implemented
by teaching four basic language skills: listening, reading, speaking, and writing. These activities also include students making wayang suket puppets and role-playing using the said puppets. Through such integrative creative activities, the character traits contained in wayang suket can be internalised by students.

REFERENCES


Implementation of Inter-School Collaboration as a Strategy in Enhancing School Principal Competencies

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ABSTRACT
A school principal requires adequate competencies to provide effective leadership to manage teaching and learning processes at school. This study examines the effectiveness of an inter-school collaboration on the principals’ competencies in a rural area. It is believed that the inter-school collaboration has a significant impact not only on educational but also on social aspects. This study draws insights into ways to improve the competencies of the principal in school management using an action research approach. It evaluated the impact of an intervention by implementing a partnership between schools. One level A accredited school and three level B/C accredited schools in Kebumen, Central Java, Indonesia, were selected to participate in the inter-school collaboration. Within the collaboration programme, the level B/C accredited schools actively seek opportunities to improve their teaching and school management under the guidance of their counterparts from level A accredited schools. Several actions such as benchmark, workshop and training were performed during the intervention phase. The research results indicate that the partnership model optimises the competencies of principals of primary schools in Kebumen Regency, especially their managerial, entrepreneurship and supervision competencies and this has led to improvement in the competencies of teachers and school administrative personnel, as well as that of their educational service.

Keywords: Competencies, educational service, inter-school collaboration, school principal

INTRODUCTION
It has been clearly understood that a school principal is key to the success of an educational unit and plays a crucial role in improving not only the conditions of the school and classroom but also the students’
learning (Bouchamma, Basque, & Marcotte, 2014; Yasin, Mustamin, & Tahir, 2013). As the leader of the school, the principal is expected to organise relevant information, human resources, materials and finances in relation to the school’s current position and its intentions for the future. The school principals should ensure the performance of their students through schools’ vision, mission and objective (Yasin et al., 2013). It is stated by Chau (2002) that the principal is the person who develops goals and policies, as well as provides suitable administrative and technical support to plan, organise, coordinate and implement those policies in schools. The competencies of the principal will enable the school to articulate and publicise the school’s aim to address its short- and long-term targets.

The development of school principals’ competencies has become the focus of attention among the governments in several countries. As reported by Yasin et al. (2013), a gradual licensed certificate system has been implemented in many developed countries to develop the competencies of school principals. In Indonesia, the development of the professional competencies of school principals has been a priority as part of the improvement programme of national education quality. According to the Indonesian education standard, a school principal should acquire competencies related to personality, management, entrepreneurship, supervision, and social skills (ACDP Indonesia, 2016). However, it is reported that the principals have not acquired the competencies towards accomplishing the set goals as clearly indicated in the Indonesian National Education Standard (SNP) (Yasin et al., 2013). The facts on the ground revealed that it is not easy to obtain skilled school principals. A report in 2013 found that, in general, principal’s competency is rated as low, especially in the supervision competency dimension, and in using ICT for management, teaching and learning purposes (ACDP Balitbang, 2013). The competency of entrepreneurship was identified as an area for further development, other than the ability to implement innovations in the school. It also worth noting that principals in remote and rural locations and principals of level B and C accredited schools have lower ratings of competency compared to their counterparts.

In improving student learning outcomes, the improvement of principal and supervisor competency should be done in better planned and integrated programmes which involve the cooperation between the local government and key stakeholders. It is believed that principals’ competency development programmes will require more than just the provision of more training programmes. The inter-school collaboration model has been initiated by the Indonesian Ministry of Education and Culture as part of a programme to enhance the competencies of school principals. The collaboration consists of two or more schools, some of which are high performing, while others are low performing. The performance of school is represented from its accredited level issued by the Ministry. In this case, the level
A accredited school acted as a partner to one or more level B or C accredited schools that aim(s) to work together to bring about educational improvement.

Networking and collaboration have popular and prominent strategies in education to create a self-improving school system. In general, there are various forms of inter-school collaboration that can be interchangeable to an extent and depth of the collaborative relationship (Atkinson, Springate, Johnson, & Halsey, 2007). However, those different forms refer to some form of schools working together to achieve a common goal. The partnerships involving two or more schools of different phases and types exist for a multitude reasons over different timelines and with varying degrees of success in terms of impact and sustainability (Armstrong, 2015). Inter-school collaboration has existed for increasing educational outcomes, particularly in the areas of pupil attainment, engagement and performance. Collaborative learning has been implemented as a teaching method wherein the students collaborate with students from other schools using various online and offline communication tools (Chapman, Muijs, & MacAllister, 2011; Inagaki, 2007; Little, 1999; Stevens, 2007). This approach leads to the development of a virtual education environment so that teaching and learning can be shared across dispersed sites. It has been found that the academy partnerships have a positive impact on student outcomes.

There were also several reports presenting the impact of the school partnership model on social outcomes. As reported by Duffy and Gallagher (2015), the policy of school collaboration initiated by the Northern Ireland government results not only in promoting cross-sectoral shared learning in core areas of the curriculum but also in improving the community relations between different ethnic and political lines. The school improvement partnership programme conducted in UK was also reported to have resulted in the creation of professional learning of staff at all levels (Chapman et al., 2015).

Overall, while the inter-school collaboration has a positive impact on educational and social outcomes, the evidence is not clear as to how this model can be implemented to optimise the school leadership. This study examined the implementation of inter-school collaboration to enhance the competency of school principals in a rural area in Central Java, Indonesia.

METHODS

An action research was designed to evaluate the effectiveness of the inter-school collaboration model in developing principals’ competencies (Pathak, 2008). The principals’ competence in school management and learning systems were examined. Four school principals were nominated for their position in the accredited schools in Kebumen, Central
Java, Indonesia. They represented a level A accredited school that had been appointed as the model school and three level B/C accredited schools which were volunteered to be the influenced schools.

The action research helps in evolving suitable measures and programmes through a scientific approach by analysing the problems, finding effective solution, and improving the work of the educational institutions. Using the action research approach, it is expected that all person involved in the programmes will collectively work for improving the quality of their decisions and actions. In this research, the researchers serve a key role in collaborating with school personnel in conducting action research to develop system-level interventions. Through integrating the key characteristics of the action research process employed by Cardno and Piggot (1996), this study follows a series of six phases derived from Ho (2002). The six phases are described below, along with a description of each phase.

**Phase 1: Forming Collaborations with Key Stakeholders**

In this phase, the researcher initiates a process of building collaborations with the principals from all schools participating in this programme. An important part of this first phase was identifying the school that is capable of being the model school and those which have a vested interest in the interventions to be developed. The selected school principals were then recruited to be equal partners and full participants in the research process. Once the team was formed, the researchers started to facilitate the partnership programme between the schools involved.

**Phase 2: Problem Identification for Action Research**

In the second phase, the team identifies the specific focus of the problem to be addressed. This involves reviewing the policies and existing theories and practices related to the school management. This process helps the researchers and the school principals participating in this project to integrate the theoretical perspectives with the empirical findings.

**Phase 3: Data Collection and Analysis**

In this phase, the team collects and analyses data for the purpose of identifying critical variables during the programme. These data help to achieve an understanding of the problem as a guidance to develop specific interventions (actions).

**Phase 4: Data Synthesis and Generation of Recommendations**

In the fourth phase, the team synthesises the data and findings from the previous phase through a series of discussions between the participating principals. During this phase, specific recommendations for action are generated.
Phase 5: Design of Data-Driven Action/Intervention

In this phase, the researchers and the school principals engage in decision making based on the recommendations from the previous phase to design specific interventions. Those intervention actions may involve the modification or adaptation of a predesigned intervention to fit the needs of the influenced schools.

Phase 6: Evaluation of Interventions

In the sixth phase, the researchers examine the acceptability and effectiveness of the programme with the principals. A self-assessment questionnaire was developed to evaluate the effectiveness of the intervention specifically toward the principals’ competencies. The questionnaire was divided into three sections: 1) School management-related competencies, 2) Learning system-related competencies, and 3) Community empowerment-related competencies.

RESULTS AND DISCUSSION

Forming Collaboration and Problem Identification

The case study is a partnership programme between a model school and some influenced schools. The A-level accredited primary school chosen as the model school is a government-owned school located in Kutosari, Kebumen, Central Java, while the other level B and C accredited schools which had agreed to take the role of the influenced schools are three primary schools located in Wergonayan, Kebumen. Those influenced schools were directed to perform a benchmarking process in order to improve the competencies of the principals in leading the school management activities. The researchers were involved in this project by initiating the inter-school collaboration using the guidance of the Indonesian Ministry of Education and Culture.

In this phase, the researchers conducted a visit to all the schools participating in this programme to discuss the objectives and scope of the inter-school collaboration programme. During the visits, it was found that the principals and staff members in those schools positively responded to the programme. They expected to gain advantages in improving their school performance by joining this programme.

Intensive meetings between the researchers and all the participating principals were carried out to identify the priorities for improvement in each school. The following problems were identified as the most important considerations by the influenced schools:

(1) Most parents were not actively involved in the schools, including in supporting the teachers and principals to achieve the National Education Standard. Working parents’ limited time tended to reduce the engagement of the parents in their children’s education.

(2) The school principals require clear guidance in implementing school-based management as it decentralises authority from the central government to the school level.
The change in the National Curriculum Standard made by the government in 2013 challenges the school leaders to manage the teaching reforms. The challenge is to provide the necessary support for teachers as they follow these new directions.

It is expected that the school principals are capable of managing the available resources to achieve the National Standard of Education. The standard established by the government in 2015 (Government Regulation Number 19 of 2005 on National Education Standards amended by Government Regulation Number 13 of 2015) requires all Indonesian schools to fulfil minimal requirements in learning contents, learning processes, competencies of the graduates, academic and administration staff, school facilities, learning management, financing, and learning assessment standards.

**Recommendations and Design of Interventions**

The problems identified in the previous phases drive changes in leadership patterns. The leadership does not merely focus on administration but also on students’ processes of attitude change to the achievement of key competencies such as spiritual things, social, knowledge, and skills. As identified in the previous phases, the intervention actions of this project were in the form of inter-school collaboration providing opportunities for all the participants in sharing best practices and benchmarking. It focused on the enhancement of school leaders’ competencies in school-related management.

**Benchmarking**

Benchmarking is the process of analysing and comparing the performance of other organisations considered as the good practices with the aim to improve the current performance of an organisation (Kelly, 2005). During the inter-school collaboration programme, the level B/C accredited schools, as the influenced schools, performed a benchmarking process by studying what the level A accredited school did, as the model school. This comparative benchmarking focused on the analysis and comparison of the critical functions identified as the priorities of improvement in the previous phase. According to Kelly (2005), the process laid in understanding how the critical functions are achieved rather than what is achieved.

The functional processes chosen during the benchmarking and conducted within this partnership programme are listed below.

1. **Facilities management**

   It is commonly believed that school facilities can have a profound impact not only on the student outcomes but also on teacher retention. From the visit to the model school, it was reported that that school provides adequate school facilities in supporting the learning process. According to the National Education Standard, it scored 100% in
facility assessment, while the influenced schools scored 80%, 70% and 50%, respectively.

(2) Learning management
The leaders from the influenced schools studied how the model school manages the learning process. A documents review performed during school visit focused on the curriculum, syllabi and lesson plans. Due to the implementation of the 2013 National Curriculum, it was found that the model school encourages parents’ involvement in the learning process.

(3) Financial management
In meeting the standard in school’s financial management, the model school plans the budget not only with the internal school staff but also with the school committee and parent representatives. The information on education-related expenses which are not covered by the government is shared with all the stakeholders for further action.

Workshop
In achieving the standard of learning content, especially related to the changes in the curriculum, the researchers initiated a workshop attended by all principals participating in the project. The workshop aimed to develop the lesson plans according to the 2013 National Curriculum. Another workshop on developing budgets and activity plans was also performed in the following session.

Evaluation of Interventions

Observations
A series of observations were performed to evaluate the impact of the inter-school collaboration project. In terms of facilities management, the principals of the influenced schools have successfully encouraged the parents, especially for procurement of text books and an LCD projector in classroom. It was found that the capability of principals in managing the learning process had improved, as proven by significant changes in learning approaches and assessment methods implemented in the influenced schools. The teachers implemented scientific approach by encouraging the students to observe, ask, think, try and communicate about the subject matter. The learning assessment was conducted by assessing the learning process, learning results and portfolio through an authenticable assessment which contains clear descriptor.

However, due to different socio-economic conditions, the influenced schools can fully adapted the way the principal of the model school manages the financial aspect. In the model school, most of the parents are white-collar workers, while most parents in the influenced schools are farmers. This affected the parents’ involvement in supporting the educational cost incurred.

Interview
A set of questionnaires was developed to evaluate how the inter-school collaboration programme influenced the performance of the school members. Table 1 below concludes the results of the interview.
Table 1 shows questionnaire results on the influence of the optimisation of school principals’ competencies through the inter-school collaboration on teachers, school principals, and school administrative personnel about school management. Out of 30 respondents, 87% stated that it is strongly influential to school principals in terms of school management. This is corroborated by the results of research conducted by Bouchamma et al. (2014) that respondents gave greater weight to the management of education services, followed by human resources, educational environment, and finally, administration. A significant difference was observed between administrative management and the teaching level and school size. The principals whose professional development activities consisted of conventions and seminars also felt a greater sense of personal efficacy on this factor compared to the principals whose professional development was done through mentoring.

Table 1
Questionnaire results on School Management

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Not Influential</th>
<th>Less Influential</th>
<th>Hesitant</th>
<th>Influential</th>
<th>Strongly Influential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influence on Teachers</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Influence on School Principals</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>Influence on School Administrative Personnel</td>
<td>0</td>
<td>10</td>
<td>4</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>10</td>
<td>9</td>
<td>42</td>
<td>29</td>
</tr>
</tbody>
</table>

Table 2
Questionnaire Results on Learning System

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Not Influential</th>
<th>Less Influential</th>
<th>Hesitant</th>
<th>Influential</th>
<th>Strongly Influential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influence on Teachers</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>Influence on School Principals</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
<td>7</td>
</tr>
<tr>
<td>Influence on School Administrative Personnel</td>
<td>4</td>
<td>10</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>11</td>
<td>11</td>
<td>45</td>
<td>19</td>
</tr>
</tbody>
</table>

Table 2 above lists the optimisation of school administrative personnel’s competencies through partnership model on school principals. It demonstrates that 77% of the respondents consider that the optimisation is influential, while 23% consider that it is strongly influential on the school principals. Hence, inter-school collaboration also can improve the learning system. The results of observations of a principal at another school may be transmitted to the teacher who then followed up in the classroom learning. It also
motivates teachers to actively collaborate between friends, teachers to enhance the learning system. This is in accordance with the findings of research by Burton (2015) that effective teacher collaboration incorporates shared or common goals, teacher efficacy, and positive interdependence of teachers. Other related themes also emerged such as effective collaborative practices that enhance the learning environment. This study also reveals how the role of school leadership is needed to encourage and monitor teacher collaboration in order to increase its effectiveness. The three tables denote that the partnership model gives influence to teachers and school administrative personnel. The improvement of school principals’ competencies in school management and learning systems influences teachers and school administrative personnel, and finally enables them to enhance the educational service.

CONCLUSION
Based on the results and discussion, it can be concluded that: (1) the implementation of the inter-school collaboration model to optimise school principals’ competencies to improve the educational services of primary schools in Kebumen Regency was conducted through several steps: (a) prior verification to determine feasibility to be pilot project schools and targeted schools, (b) the first regular training meeting (known as Regular Guidance), (c) on-the-job training, (d) the second regular training meeting, (e) in-house training, (f) mentoring and monitoring/assessment, and (g) dissemination; and (2) the inter-school collaboration model enables optimisation of school principals’ competencies to improve the educational services of primary schools in Kebumen Regency. Evidently, from 30 respondents, 87% said it affects the principal in the School of Management and 77% expressed an impact on the selection of principals in the learning system. Thus, the impact most often felt by the principal of the inter-school collaboration model is on school management. In addition, this model exerts influence on teachers and school administrative personnel.

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REFERENCES


Government Regulation Number 19 of 2005 on National Education Standards that have been amended by Government Regulation Number 13 of 2015 on the Second Amendment to Government Regulation Number 19 of 2005 on National Education Standards.


Ecological Intelligence Values in Indonesian Language Textbooks for Junior High School Students

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ABSTRACT

Ecological intelligence is our ability to adapt to our ecological niche. Teachers can improve students’ understanding on ecological intelligence values and their ability to keep and preserve environment through learning using books. This research aims at investigating and exploring ecological intelligence values of the 2013 curriculum-based Indonesian language (BI) textbooks, comprising of B7 and B8. It was carried out in the exploratory stage with descriptive explanatory strategy and content analysis. On the basis of the results of analysis, it concludes that two analysed Indonesian language textbooks for junior high school students appear to contain ecological intelligence values. Both Indonesian Language textbooks contain eight ecological intelligence values. The ecological intelligence values in BI textbooks are found in materials or readings, exercises/assignments, or evaluation. Nonetheless, the drawbacks of the textbooks lie in the materials which still focus on the cognitive aspect instead of guiding students to do concrete actions for environmental preservation. Research results contribute to the development of ideas and concepts on the need of ecological education, and writers and teachers can use them as reference to develop teaching materials to foster ecological insight and empathy among students towards environmental preservation.

Keywords: Ecological intelligence, Indonesian language, textbook, value

INTRODUCTION

Environmental damage leads to increasing disaster risks in several countries, including Indonesia. Environmental damage level contributes to the extent of such risks. The correlation between environmental damage
level and disaster risks was revealed by the 2012 World Risk Report that 4,130 disasters happened all over the world during 2002-2011 and caused more than one million deaths and material loss of US$ 1,195 billion (http://www.droughtmanagement.info/literature/UNU_world_risk_report_2012).

One of contributing factors that causes natural disasters is human activity. Floods in big cities are the results of land-use changes around drainage basin (DAS) (As-syakur, 2010) and human habit of littering into rivers that reduces aqueduct’s volume capacity (Sartohadi & Suryono, 2003). Illegal logging of forestry natural resources with the aforementioned various backgrounds by Kasia (2011) also influences natural balance. Many efforts to overcome natural disasters have been done such as arranging SSOP Bantal application for early detecting flood-and-landslide-vulnerable areas (Santoso, 2012), improving public participation on waste management (Riswan, Sunoko, & Hadiyarto, 2011), and revitalising the functions of drainage basin through empowering society (Suganda, Yatmo, & Atmodiwirjo, 2009). However, the efforts seem to be partially done and cover physical and technical aspects, while some efforts to overcome disasters giving priority to mental aspect of mindset change and attitude building have not been conducted. Bowers (2010) suggests that exercising ecological intelligence needs to be made part of students’ culturally mediated embodied experiences—which will engage all the physical senses along with memory, and a heightened aesthetic awareness and moral responsibility.

Building love towards the environment can be striven through education. Vallori (2014) points out that good learning involves meaningful learning experience supported by complete literatures corresponding to contexts experienced by learners. Books are a significant factor in education as they provide knowledge, skill, and positive attitude to children on the importance of keeping and preserving environment. It is in line with Khalid’s (2014) argument that books play a vital role in supporting learning. By utilising textbooks based on the value of love towards nature and environment, children are guided to possess ecological intelligence. This is in line with Jung who states that intelligent human puts himself in control of the natural environment (in Utina, 2012).

Ecological intelligence can be fostered provided that children are aware of the importance of living environment. A sustainable society builds and arranges their life by relying on awareness on the importance of living environment. This awareness is so-called ecoliteracy (Capra, 1997), the capability to understand the importance of living environment. Moreover, he postulates that the principles include interdependence, recycling, partnership, flexibility, and diversity. By making a little revision on the ecological principles, Capra (2004) formulates the principles as networks, cycles, solar energy, partnership, diversity, and dynamic balance.
Barkes describes four levels of ecological intelligence as: (1) identifying both biotic and abiotic components of ecosystem, (2) understanding functions and benefits of each component in the ecosystem, (3) comprehending nature and environment management system, and (4) understanding and being able to apply values in ecological system (Pilgrim, Cullen, Smith, & Pretty, 2008).

Human has good adaptive ability, both biologically and culturally (Soemarwoto, 1991), such as adaptive ability when using polluted water. They develop resistance towards diseases in the body, and because of their habits to fight repulsion on dirty water; clean water is no longer considered a main need. This adaptation, though valuable to maintain life sustainability, should be considered as mal-adaptation or unhealthy adaptation. Khachappilly and Mathulla (2014, p. 323) outline that “knowing the body and cultivating the body needs understanding of body-personal, biological, social, religious, philosophical dimensions among other.”

Human needs to understand crises and disasters, as well as provide solution. According to Keraf (2014), the main solution offered is alternative thought or paradigm since the main cause of living environmental crises and disasters is thinking paradigm error. Only by changing paradigm, there will be new behaviour and way of life as a final solution for global living environmental crises and disasters. In reference to Chili’s research results (2014), an individual’s ecological intelligence is determined by teachers. They play an important role in delivering substances related to ecological intelligence during the learning, and hence the materials should be well-prepared. Ecological intelligence refers to comprehension on hidden ecological impacts and problem-solving, combining cognitive skills and empathy on all life forms. Both social and emotional intelligences are set up based on the ability to see from others’ views, to feel what others feel and to show our care (Goleman, 2009). Many experts see that villagers’ ecological intelligence and insight play an important role in the efforts of natural resources management, aegis in biodiversity, and provide a model or way of life together with the environment (Turner, Ignace, & Ignace, 2000).

In reference to the theories proposed by Capra (2004) and Goleman (2009), ecological intelligence values in the textbooks include: (1) identifying the components of ecosystem; (2) comprehending the functions and uses of the components of ecosystem; (3) understanding nature management system; (4) comprehending environmental values; (5) representing concern on environmental damage and pollution; (6) applying environmental behavioural adaptation; (7) solving the problems due to environmental impacts; (8) managing/preserving natural resources; and (9) making use of environment in a positive way.

This research examined systematically ecological intelligence values in Indonesian language textbooks for junior high school students and provides suggestions for the
improvement of the textbooks. The research questions include: (1) What are ecological intelligence values in the textbooks? (2) How are they distributed? (2) How are the strengths and weaknesses of the textbooks, especially with regard to the ecological intelligence values?

METHODS AND MATERIALS
To examine ecological intelligence values in the textbooks, both descriptive and distributive, content analysis was employed. Content analysis can be quantitative or qualitative, or both (Berg, 2001; Kondracki, Wellman, & Amundson, 2002). Qualitative approach is used to obtain general and deep understanding and evidence proof (Creswell, 2011). Hence, the researchers made an attempt to investigate both the surface structure and deep structural meaning of the message (Berg, 2001).

For this purpose, we developed two theoretical frameworks. First, Ecological Intelligence Value Content Analysis Framework to analyse the structure and distribution of the elements of ecological intelligence values in the textbooks and the extent of which the contents of ecological intelligence values are discussed in the textbooks (Kondracki et al., 2002). Second, Ecological Intelligence Value Description Analysis Framework to examine the distortion or limited information presented in the textbooks. A total of three experts (experts in the environment, education and curriculum, and Indonesian language and teaching material development) and four Indonesian language teachers took part in this analysis.

Two Indonesian Language textbooks of ecological intelligence values were analysed, which include: (1) Bahasa Indonesia Wahana Pengetahuan Kelas VII (Indonesian Language: The Means of Knowledge for Grade VII with 16 + 272 pages thick, and (2) “Bahasa Indonesia: Wahana Pengetahuan Kelas VIII (Indonesian Language: The Means of Knowledge for Grade VIII)” written by Fairul Zabadi and Sutejo (B8) consisting of 14+222 pages. Both were issued by the Centre of Curriculum and Books, Research and Development Agency, Ministry of Education and Culture, in 2014. The textbooks were compulsory texts for all junior high school students in Indonesia whose school has applied 2013 Curriculum in three years (i.e., since 2013).

RESULTS AND DISCUSSION
In B7 and B8, eight ecological components were found presented in the materials/passes, exercises/tasks, and assessments/evaluations. The first component is identifying ecosystem components regarding abiotic and biotic aspects. B7 has some explanations on biotic components including soil, mountain, air, water, and garbage. The components integrated into materials of readings and exercises that consist of sea animals, land animals and plants. The components give brief descriptions on introducing environmental components, diversity of marine life, butterfly metamorphosis, container-grown
plants, story of a donkey, and benefits of ornamental fish (B7, 2014: 4, 98, 193, and 243). Meanwhile, B8 concerns more on the knowledge about flora and fauna. The description and utilisation of certain fauna are discussed; one of the quotations is a pest having some functions called the golden snail. The whole life of plants in a certain habitat is called flora, while the whole life of animals is fauna (B8, 2014: 1&2).

Abiotic components are integrated into materials in B7, such as passages and exercises. They include brief descriptions comprising introducing environmental components, soil cultivation, water treatment, formation of rainbow, and waste treatment. The materials give both explanation on the definition, as well as benefits and procedures of the treatment concerning concrete preservation of abiotic components, both naturally and artificially (B7, 2014: 6, 140, 169, and 220). In B8, abiotic aspects such as light, rain, and water are presented. B8 also explains the functions of sun light and air which send heat energy from the sun to the earth. The sun rays received by the Earth will be transformed into other form of energy, as provided in the quotation below.

“Siang itu begitu terik. Pancaran sinar matahari tanpa ampun membakar punggung Emak yang tengah mengumpulkan batu-batu kali dari sungai yang mengering. Tampaknya, kemarau sudah kelewatan. Padahal, sekarang sudah memasuki bulan Desember. Bulan yang disebut-sebut sebagai bulan hujan” (That day is very hot. The sun glow mercilessly burns mom’s back who is collecting stones from drying river. Apparently, the drought has been unusual. Whereas, it is December now; the month which is usually called rainy month) (B8 FZ&S, 2014: 105).

The second component is comprehending functions and uses of both abiotic and biotic components of ecosystem, which are explained in B7. The material related to the functions of abiotic components is performed in the exercise, “Kekayaan alam seperti apakah yang sudah kamu nikmati?” (What natural resources have you enjoyed?) The students are supposed to write down their answers on the abiotic factors such as water, air, soil and light of which benefits have been felt (B7, 2014: 5). Meanwhile, the explanation of rice field ecosystem is presented several times in B8. The dry field resulting from water shortage is discussed in the explanation on ecosystem components. Some components influence one another, and thus, there are some functions and impacts of the loss of abiotic components, as shown in the following quotation.

“Hampir semua lahan persawahan mengering, menyisakan pohon pari yang menguning kering; tidak ada rumput liar yang tumbuh menghijau; hanya ada batang-batang pohon kering yang terus menerus menggugurkan daunnya setiap kali angin berhembus.”
(Nearly all rice fields dry up, leaving the rice trees turning into yellow and dry; there are no verdant weeds growing there; only dry trunks remain which continuously shed their leaves when the wind blows) (B8, 2014: 171).

The uses of biotic components are stated in B7 in materials consisting of questions, explanation on the benefits of marine life such as fish and sea plants for human, explanation on biotic components which can be consumed in the form of cultivated lawn crops including cassava, catfish, tilapia fish, and snapper fish, and information on the benefits of ornamental fish for human (B7, 2014: 5, 26-27, 243).

The third component is understanding the management system of nature and environment. B7 provides a material on management system of abiotic environment including proper water management to prevent flood. Proper water treatment should be based on soil condition such as saturated soil may cause water to be difficult to be absorbed. In addition, rainwater management is necessary, and therefore, water will be well-absorbed by the soil. Moreover, B8 provides materials concerning abiotic and biotic aspects. The abiotic element proposed to provide understanding of environmental management simply conveyed is identifying rivers that are usually used by people to make a living. “Lihatlah, satu-satunya sungai yang kami jadikan sumber air pun mengerling, seolah dihisap tanpa bekas, meninggalkan batu terjal yang membisu (Look, the only river we employ as a water source has been dried up as if it is totally sucked, leaving the rough stones muted) (B8, 2014: 191).

B7 shows material content on the environmental management system of biotic components, either naturally or artificially-managed. The material can provide an understanding of how mutualism symbiosis occurs in cave and river environment, including symbiosis among fish, bats, birds, and insects, by giving mutual benefits. Other contents provide experiences to students to learn how to keep pets. Students will gain manual management system through an interview (B7, 2014: 6 & 23). In addition, the management of biotic components in B8 is explained on the reflection to the attitude on understanding management system of biotic components. Therefore, the book also invites the readers to love animals around them (B8, 2014: 2 & 3).

The fourth component is comprehending environmental value in B7, which is provided in description of local and normative wisdom values. The reading passage entitled “Dewi Sri: Dewi Kesuburan (Dewi Sri: Goddess of Fertility)” shows a belief growing in the Indonesian archipelago as one of the local wisdom manifestations related to abiotic components, comprising water, soil, weather, and air. The story explains how the agrarian society of Indonesia believes that everything they obtain from nature depends on Dewi Sri (B7, 2014: 21). It also provides understanding on the normative values linked to abiotic and biotic environments. The materials providing understanding
on normative value involve instruction or persuasion to keep and preserve the environment.

“Our surrounding living environment is the property that has to be kept and preserved. Therefore, we have to keep and love it. We should not make it dirty by littering and cutting down trees carelessly (B7, 2014: 4)."

The understanding on local wisdom is conveyed in the form of abiotic environment utilisation with handicraft producing activity from used cardboard, with some purposes, utilising wasteful rubbish or garbage which later becomes useful things and developing creativity (B8, 2014: 108 & 146).

Through fable, a local wisdom is informed. It is about animals having human-like characteristics; some of them are good and some others are bad. It shows harmonization between human and animals in life. The material content is presented in the form of interrogative sentence; like an argument conveyed to the readers, “Do you agree if we help each other when a disaster occurs? Why should we do it?” (B8, 2014: 6 & 10). Besides local wisdom value, religious value is packaged in the materials to present ecological value through a story. B8 communicates a message that God is the Almighty. God provides human with ambition and hope.

“The fifth component is performing respective attitude to the environment and concern on environmental damage and pollution. This component is indicated in B7 at the explanation on abiotic and biotic aspects. The question in Task 1, “Have you been responsible for your surrounding environment?” requires students to write manifestations of their sympathy to incidents in their surrounding environment dominated by the damage of abiotic and biotic components (B7, 2014: 5). Meanwhile, one of the materials in B8 is that the information about fable becomes one of potential means of internalising moral values. The students are reflected to be able to learn and imitate good attitude from the
animals to have ethical characters. Also, there is a short story telling an adaptation process. In the story, a character decides to be river stone collector and splitter. The character has its own reason for choosing such rude profession. To him, dry season and drought do not always lead to loss and suffering (B8, 2014: 2 & 172). This concept is in line with Shumba (2011) that “Ecological intelligence expresses appreciation for what is good, appreciates inclusivity, and it demands creativity, innovation, and ethicalness”. The sixth component is solving problem arising from environmental impacts. B7 merely shows abiotic aspects. There exists a material asking students to solve problem in their environment. The explanatory passage entitled “Banjir (Flood)” explains about the causal factors of and the ways to cope with flood, while the passage entitled “Perbaiki DAS, Atasi Bencana (Repair the River Basins, Overcome the Disasters)” containing some ways to overcome erosion through River Basins (DAS: Daerah Aliran Sungai) reparation is a material enriching students with knowledge on individual and group strategies to deal with environmental problems that may occur (B7, 2014: 153 & 249). In the principle, students are encouraged to adapt with environmental problems and find the ways to cope with them. When they do so, they possess what Goleman (2009) calls as ecological intelligence, i.e. an ability to adapt ecological niche.

B8 picks a biography, adapted to material of biotic component utilisation. In the following quotation, students are expected to observe the figure’s character in utilising useless waste, “Kondisi ekonomi yang sangat sulit memaksa Ni Wayan Mertayani harus dewasa di usianya yang masih 14 tahun. Pada pagi hari dia pergi ke sekolah di SMPN 2 Abang, Bali, kemudian dia membantu ibunya berjualan” (The very difficult economic condition forces Ni Wayan Mertayani to be mature in her 14 years of age. In the morning, she goes to school, SMPN 2 Abang, Bali, then helps her mother sell) (B8, 2014: 53)

The fauna utilisation is also performed in an interview text on a golden snail (keong mas), which is considered a pest. The writer tries to introduce the other sides of this. Students who are also readers will be able to use it as intelligence of environmental utilisation properly. “Namun, jangan khawatir, walaupun tergolong jenis hama, keong emas sebenarnya dapat memberikan manfaat yang positif. Selain itu, keong emas juga dapat menjadi komoditas prospektif untuk menambah penghasilan” (But, do not worry; although categorised as a type of pest, golden snail can give positive benefits. Besides, golden snail can be a prospective commodity to increase revenue) (B8, 2014: 98).

The seventh component is managing/preserving living environment resources. Only abiotic aspects appear in B7. The materials on the strategies to preserve abiotic components are presented in some questions, “What forms of discipline behaviors have you conducted to keep your surrounding environment?” The steps can be
implemented individually and collectively; depending on the environmental scale that needs preservation. Other materials linked to dimensions to solve problems arising from environmental impacts, abiotic sub-dimension, are presented in the passage about waste management. One of the activities the students can do to manage waste is recycling, as written in the passage entitled “Teknologi Proses Sampah (Waste Processing Technology)”. Students will be able to make use of it as a material with economic values (B7, 2014: 214).

The eighth component is utilising environment positively on the abiotic aspects in B7 provided in the description of material on making use of land to cultivate plants and raise animals for food. “Dengan berbagai teknologi intensifikasi sederhana, pekarangan dapat menjadi sumber bahan pokok makanan seperti beras, sayur-mayur,…” (“With some simple intensification technologies, land can be a source of staple food, such as rice, vegetables,…”). Another material concerning waste utilisation to be economical goods is an example of the content (B7, 2014: 127 & 220).

The above analysis reveals that B7 mostly uses the themes on nature and environment. The materials dominantly containing the themes are inserted into the passages and questions for enrichment. The materials on environment are various and rich in abiotic and biotic components. Students are introduced to the components, as well as ways to manage, keep, and preserve them. However, there are some drawbacks since the materials are limited on cognitive and sympathy stages, and do not reach to the level of empathy. Meanwhile, B8 textbook generally contains ecological intelligence values. Nevertheless, the establishment of provided context and passage is still general and does not focus on certain approaches and themes. Also, the materials are dominated by cognitive elements and do not emphasise on action elements.

The strength of B7 is the materials on abiotic and biotic environments are considered to be rich and able to provide concrete experience to students to get information directly from the resource person. Meanwhile, the strengths of B8 are: (1) the types of the selected texts are interesting to be linked to environmental governance, and (2) fable as a medium of character education for junior high school students is considered highly appropriate.

In contrast, the weaknesses of B7 are that the materials centre merely on cognitive range and do not direct students to do concrete activities in preserving the environment. Meanwhile, the weaknesses of B8 include: (1) there is no active process in the exercises, questions, and competence test which can stimulate students’ psychomotor, particularly related to environmental governance, (2) the book has tendency to discuss more on students’ cognitive activities, (3) there is no identical tendency among the themes; each of them stands separately without having the main scope of the textbooks writing purposes, and (4)
the purposes of the textbook arrangement do not direct to learning process for the purpose of empowering.

Ecological intelligence contents in both the textbooks are inadequate for teachers to develop students’ insight and competence in preserving the environment. As resulted from Chili’s research (2014), an individual’s ecological intelligence is determined by the teachers. Thus, it is conceivable that the textbooks need improvement on their contents of ecological intelligence. Efforts to develop the textbooks are in line with Abbs and Freebaim’s opinion that students’ need in learning covers the need to face challenge (Cunningsworth, 1995). Students’ future challenges will more complex, particularly those related to ecosystem and preservation. The development of BI textbooks by considering cultural aspects is getting more important. It is in line with Turner et al. (2000) that in some cases, ecological intelligence or insight is often related to local wisdom values of traditional community groups.

CONCLUSION

This research concludes that both textbooks contain eight ecological intelligence values, which are presented in the materials or passages, exercises/tasks, enrichment questions or assessment/evaluation. The strengths of the book are: (1) the materials on both abiotic and biotic environments are rich and able to provide students with concrete experience to obtain the information directly from the resource person, (2) the types of selected texts are interesting to be correlated with environment governance, and (3) fable is an appropriate medium for students’ character building. Meanwhile, the weaknesses of the books include: (1) the materials centre merely on the cognitive aspect, (2) the materials do not accommodate students to make concrete action in environmental preservation, (3) there is no active process in the exercises, questions, or competence tests, related to environmental governance, (4) the books discuss too much on cognitive activity, (5) there is no similar tendency among the themes, and (6) the purposes of the textbooks arrangement do not direct to the learning for empowering. The findings of ecological intelligence values in those textbooks make significant contribution to the authors to create textbooks with ecological concept as required in 2013 Curriculum of junior high school, whereby students are required to possess spiritual attitude, social attitude, knowledge, and skill, including responsibility in preserving nature (Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia No. 21 Tahun 2016/Regulation of Minister of Education and Culture of the Republic of Indonesia No. 21 Year 2016). The results can also be used as teachers’ reference in developing teaching materials in order to foster students with ecological insight and empathy towards environmental preservation.

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REFERENCES


Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia No. 21 Tahun 2016 (Regulation of Minister of Education and Culture of the Republic of Indonesia No. 21 Year 2016).


English Reading Skill and Strategy Development through Supplementary Exercises for Undergraduate Students

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ABSTRACT
The purposes of this research were to: 1) study the students’ reading problems in terms of reading strategies prior to the implementation of the supplementary exercises, and 2) compare the students’ learning achievement in terms of reading skills and strategies before and after implementing the supplementary exercises. The research sample, selected through a purposive sampling technique, comprised 275 third-year students enrolled in the Faculty of Humanities and Social Sciences at Thepsatri Rajabhat University and failed in Reading Exit Exam in the 2nd semester of 2016 Academic Year. The instruments of the study consisted of pre-and post-tests, Reading skills and strategies supplementary exercises, and structured interview. The quantitative data were analysed by means, standard deviation, percentage, and t-test whereas the content analysis was conducted to analyse the qualitative data. The study revealed that the students’ reading problems were classified into two main issues: the confusion of using each reading strategy and less frequency usage. The comparison of the results before and after implementing the reading supplementary exercises showed statistically significant differences at the .01 level. Most of the students obtained better results after learning through the supplementary exercises and could employ each reading strategy with more confidence when retaking the examination.

Keywords: Development, English reading skills and strategies, supplementary exercises

INTRODUCTION
Nowadays, the English language has a significant influence on all people around the world. Smith (1976) stated since English has become the major lingua franca of the world, many people need to use English for scientific, technical, and commercial
purposes. Parisutthiman (2000, p.22) mentioned, “People can use the English language to connect to other people without boundaries, pass information along to others, purchase a wide range of products and services online”. Today’s world has been developing very fast and becoming increasingly globalised, creating a world of communication without boundaries (Sutthisan, 2010). Therefore, people in many countries use English as a second language, and some other countries use English as a foreign language for international communication.

Thailand is also one of the many countries that has considered this language as an essential means for worldwide communication. English is thus specified in Thai Education systems. According to Suphat (2014), Thai Ministry of Education has particularly developed educational policies in terms of studying the English language up to present since prior to 1893. The government is working towards the extension of basic education from 8 to 12 years. That is to say, English has to be taught to students from Grades one to twelve in schools. Panichying (1997, p. 56) added, “The Thai government fully realises the fact that it is necessary that everyone learns English”. In this regard, teachers need to improve students’ all four English skills—reading, writing, listening, and speaking so that they can communicate with other people effectively and proficiently in order to develop not only themselves but also their own country. Wiromrat (2009, p. 2) said, “teachers who train students to use language learning strategies can help them become better language learners”. Similarly, the learner needs to be a willing learner, and to give the necessary time, effort, and social collaboration to the task for high achievement (Long & Richards, 1987).

Reading is one of the most important English skills because students have to read texts and understand the information. It is also reacting to a written text as a piece of communication (Wallace, 1992). Snow, Burns, and Griffin (1998) indicated that reading is one of the most challenging skills in the educational system. Importantly, in the second language learning, reading serves as the primary source of new information about all sorts of topics (Li, 2010). In addition, Hiebert et al. (1985) asserted that teaching reading strategies is a cornerstone in developing learners’ comprehension. Even though reading is perceived as a crucial skill emphasised in all educational institutions, many students still have problems in reading skills; they do not know how to use the reading skills and strategies properly. Chen (2015, p. 1) also stated that “most learners have reading problems because they lack the specific strategies necessary for efficient reading”. Beatrice and Linda (1996) suggested that reading skills are important, so students need to improve their reading ability continuously. To enhance students’ reading skills, reading strategies are crucial to take into account. Galloway and Labarca (1990) noted that readers’ tactics were the strategies or techniques
they used for achieving comprehension, as well as for storing, retrieving and collecting information for planning, regulation, or assessment. The students’ lack of reading comprehension skills will obviously affect the students’ success in school (Anugkakul, 2015). In addition, for any students who wish to develop reading abilities and success in reading, they have to practice reading and using techniques. Slaght and Harben (2009, p. 11) suggested that “the more the students read, the better they will read”. O’ Malley, Anna, Gloria, Rocco, and Lisa (1985) asserted that good learners who were able to apply the strategies perfectly could have considerable effects on facilitating the development of second language skills.

As the instructors at Thepsatri Rajabhat University, the researchers were interested in reading strategies on the account that a large number of students at this university had problems in reading skills. They needed to improve their reading skills and strategies in order to become more successful in their reading, so this research aimed to develop their reading skills and strategies through Reading Supplementary Exercises. Due to the importance of reading skill, as mentioned earlier, the students who can read effectively will apparently have an advantage over the others. Thus, the results of this research will be useful for students’ reading skill enhancement.

PURPOSES OF THE STUDY
The purposes of this research were to: 1) study the students’ reading problems in terms of reading strategies prior to the implementation of the supplementary exercises, and 2) compare the students’ learning achievement in terms of reading skills and strategies before and after implementing the supplementary exercises to the students.

METHODS
This study was an experimental research, conducted with a group of undergraduate students, aiming to develop their reading skills and strategies, comprising context clues, topics and main ideas, skimming, scanning, and making inferences after implementing the supplementary exercises.

The students’ problems related to reading skills and strategies were initially studied by employing the pretest and structured interview. The results were then used to develop the English reading skills and strategies supplementary exercises and manage the learning plans for experiments in this study.

Sample
The participants consisted of 275 third year students majoring in Thai, Chinese, Japanese, English of Arts, English Education, English (English programme), Music Studies, Fine Arts, Law, Public Administration, Local Government, and Social Studies, the Faculty of Humanities and Social Sciences of Thepsatri Rajabhat University, who had failed in the Reading Exit Exam in the 2nd semester of 2016 Academic Year.
Research Instrument

The instrument of the study consisted of:

1) A pre- and post-test comprised 50 multiple choice items with regards to five reading strategies including context clues, topics and main ideas, skimming, scanning, and making inferences. The test contents were validated by three language experts and piloted with another group of students with a reliability of 0.85.

2) Reading skills and strategies supplementary exercises consisted of 5 lessons; context clues, topics and main ideas, skimming, scanning, and making inference. Each lesson comprised a lesson plan for instructors, contents, and exercises after the chapter so that the students could practice more outside the classroom. The reading skills and strategies supplementary exercises were developed from the students’ pre-test results and interview. They were composed by English lecturers in the English Department, the Faculty of Humanities and Social Sciences, Thepsatri Rajabhat University. The contents were tested for accuracy and appropriateness by 3 language experts. The contents and exercises then were improved according to their advice to make the text more reliable and suitable before using with the experimental sample.

3) Structured interview was administered with the 10 students who passed the test with the highest scores and 10 students who failed the test with the lowest scores, before and after implementing English reading skills and strategies supplementary exercises.

Data Analysis

The quantitative data were analysed by means, standard deviation, percentage, and T-test whereas the content analysis was conducted to analyse the qualitative data obtained from the interview.

1. Percentages were used to find out how well the students did in their pre- and post-tests. The test score results were divided into 4 levels and graded in the following criteria: 90% or above referred to as ‘excellent’, 70-89% as ‘good’, 50-69% as ‘fair’, and below 50% as ‘need improvement’.

2. Paired sample dependent t-test was employed to analyse the students’ reading skills before and after the implementation of the reading skills and strategies supplementary exercises.

Research Framework

The independent variables of this research were the English reading skills and strategies supplementary exercises and the dependent variable was the learning achievement of the students’ English reading skills and strategies. The experiment took seven weeks altogether; the first week was testing and interviewing the students to study their problems of the English reading skills and strategies. From Weeks two to six, the students were studying by using the English...
reading skills and strategies supplementary exercises of 5 topics including context clues, topics and main ideas, skimming, scanning, and making inferences. Then, the post-test was taken by the students in Week seven.

**Figure 1. Research framework**

### RESULTS

**Students’ Problems in Reading Skills and Strategies**

Surprisingly, all of the students’ pre-tests scores were lower than 50%. It is reasonable to say that they did not soundly comprehend the texts in the test. Consequently, interview was conducted in order to find out what reading problems they had. Based on the results of the students’ interview prior to studying through supplementary exercises, it was concluded that the two major problem issues that made students’ reading ability somewhat low were as follows:

1) Not only many students had limited knowledge in terms of English reading strategies, they also got confused when they had to use the reading strategies. Besides, some of them did not feel interested in using the strategies when they read.

2) In many students’ perspectives, they thought that reading in English, including using the strategies, was so difficult to understand that they got bored when studying and eventually did not pay much attention in the class.

After gaining results from the interview, the researchers made an attempt to make the English reading skills and strategies supplementary exercises more attractive and easy to understand so that the students could use these materials to review the lessons by themselves after class.
A comparison of the Students’ Learning Achievement in terms of Reading Skills and Strategies

A comparison of students’ learning achievement before and after implementing English reading skills and strategies supplementary exercises is shown in Table 1.

Table 1 illustrates the comparison of the results of the Learning Achievement before and after implementing English reading skills and strategies supplementary exercises obtained by the third year students who failed in Reading Exit Exam. Overall, the students’ post-test mean scores (12.68) were higher than the pre-test mean scores (11.83). There was a significant difference between the pre- and post- tests at the .01 level. It is fair to say that the students’ learning achievement in terms of reading skills and strategies after the implementation of the supplementary exercises was apparently higher.

Figure 2. Comparison of Learning Achievement before and after studying English reading skills and strategies through English reading skills and strategies supplementary exercises
Figure 2 shows the comparison of students’ learning achievement before and after studying English reading skills and strategies through English reading skills and strategies supplementary exercises. From the data, it was found that the average rate of the learning achievement of the students after learning through English reading skills and strategies supplement exercises was higher than the prior scores, or before studying through the supplement exercises. Overall, all the third year students who had failed in the Exit Exam got the pre-test scores lower than 50%, and the students from Fine Arts programme obtained the lowest score with only 30.08% in comparison to those of other programmes in the Faculty of Humanities and Social Sciences. However, after studying English reading skills and strategies through English reading skills and strategies supplement exercises, their scores were significantly higher. About 57.42% of the students who passed the post-test after learning using supplementary exercises. The number of students (78.2%) who passed the post-tests from English Education programme was the highest of all the number of students in any other programmes.

Figure 3 displays the results of the pre-test and post-test on the English reading skills and strategies before and after implementing English reading skills and strategies supplementary exercises. The results revealed that most of the third year students passed the test after studying using English reading skills and strategies supplementary exercises. In terms of their English reading scores, 11 students (4%) obtained excellent post-test scores, 40 students (14.55%) had good scores, and 61 students (22.18%) had fair scores. In other words, 190 students (70.55%) passed the post-tests. However, 82 students (29.82%) still failed the post-tests so this warrants
them to improve their English reading skills and strategies.

Last but not least, 10 students who got the highest post-test scores were selected for the interview regarding the reading strategies taught in the lessons. All of them understood how to use each strategy better, which made them comprehend the texts in the post-tests more clearly. Notwithstanding, only one strategy that was rather difficult for them, i.e. Context Clues, as this strategy requires more knowledge in terms of vocabulary.

DISCUSSION
From the results of students’ learning achievement, before and after implementing English reading skills and strategies supplementary exercises in relation to contextual clues, topics and main ideas, skimming, scanning, and making inferences, the students’ post-test scores were found to be significantly higher than the pre-test score at .01 level. This is paralleled with the research results of Nonghang, Changhan, and Sillaninman (2012), who indicated that using supplementary reading books for students could discipline achievement tests, and the results of their research are relatively similar to this study. That is, all the Matthayom three students enhanced their reading skills after using the supplementary reading books. However, their material did not emphasise reading strategies, which were considered as essential to students’ reading comprehension.

To support that reading materials help improve students’ reading skills, Kongna (2007) conducted a study with Prathom Six students from Luangporchaem Wattakong Aunsorn School, Nakhon Pathom. The research illustrated that their English reading ability was better after they had used English reading supplementary materials. Their reading ability after using the constructed materials was significantly higher than before using the constructed materials at the 0.05 level. Also, the students’ opinions towards the constructed materials were highly positive. His study results were obviously consistent with this research; nonetheless, the materials used to improve the students did not focus on reading strategies. It can be said that this present study may be used as guidance for those who are interested in creating a reading material emphasising on reading strategies for their students. In addition, Hsu (2007) studied the English reading strategy use of four-year technical college students in Taiwan. According to the results, the most often used category was metacognitive strategy category, and this was followed by social affective strategy category. Besides, he also found that effective learners tended to use specific kinds of strategies and that they use strategies more frequently than ineffective learners.

SUGGESTIONS FOR FURTHER STUDIES
According to the research findings, the suggestions on developing the third year students’ reading skills and strategies were that the instructors should provide learning opportunities that include a
variety of activities. This means the teaching approach should be interesting and easy for them to understand because it would motivate students’ participation. Besides, before preparing any supplementary exercises, the instructors should examine the learners first so that they can determine the students’ learning ability and this will then guide the instructors to adjust the contexts to suit the learners’ ability. In other words, the students will gain more knowledge and be ready to apply the English reading skills and strategies in their education and daily lives.

More areas with regards to reading skills and strategies should be studied in greater details. Each of the five categories of English reading skills and strategies in this study is very board and could be further divided into several sub-categories. It would be useful, therefore, to explore more reading strategies such as patterns of organisation, using reference words, word formation, etc.

CONCLUSION
Overall, the results of this study indicated that the third year students improved their English reading effectiveness after learning through English reading skills and strategies supplementary exercises. The results of the pre- and post-tests showed that their English reading skills and strategies were significantly different. Moreover, the number of students who did not pass the test before studying through the supplementary exercises was obviously decreased. Prior to the implementation, 275 students from 12 programmes, including English (English program), English Education, English of Arts, Social Studies, Public Administration, Local Government, Thai, Law, Music Studies, Chinese, Japanese, and Fine Arts, did not pass the pre-test. However, after they had learned through the supplementary exercises, 70.55% of these students passed the exams. On the other hand, only 29.82% of the students still failed the post-tests. After the experiment, it was found that there were many possible factors for this failure. The students may not have been fully willing to participate. They may have felt limited by time, individual indifferences, ignorance, or apprehension regarding their potential to succeed. These factors may have affected their ability and/or willingness to do the English reading skill and strategy test; hence, the results have affected the outcome of the test.

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REFERENCES


Incorporating Transferable Skills into a Pre-service Teacher’s Education Lesson Plans: A Case Study of an Accounting Course

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ABSTRACT

In response to the demand of employers, professional recruiters, or accreditation bodies, typically, higher education institutions incorporate the expected characteristics into their learning curricula. This paper reports a project addressing the lack of transferable skills identified in the curriculum of an Indonesian accountancy education programme. A research and development method was adopted in the research. The three-year-long project involved more than a thousand people participating in the identification, development, testing and dissemination of a set of transferable skills into four national higher education courses, namely Statistics, Cost Accounting, Educational Technology in Accounting Education, and Computerised Accounting. This paper contributes to the knowledge and practice by proposing a modified semester learning plan for the courses that is expected to improve the quality of the graduates. The characteristics inserted in the relevant courses include honest, responsible, obedient, confident, persistent and hard-working, proportionally and logically thinking, creative and innovative, nice and kind, and open-minded. The relevant transferable skills inserted in the courses include communicating effectively, cooperating with work groups, interacting with society, negotiating to achieve a win-win solution, respecting others, being responsible, assessing the benefits of IT use properly, leading work groups fairly and democratically, and expressing opinions in work groups.

Keywords: Characteristic, innovative activities, transferable skills

INTRODUCTION

Often related to generic personal and interpersonal skills, soft transferable skills are considered independent of the field of study (Jones, 2004). They are also regarded as readily deployable skills in...
In response to the demand of employers, professional recruiters, or accreditation bodies, typically, higher education institutions incorporate the expected characteristics into their learning curricula.

The demand for quality improvement of pre-service teacher education is an evolving requirement both of the government and students. A well-prepared educational programme would help students to anticipate their life after graduation (McLarty, 2005; Perrone & Vickers, 2003). It is argued that competitive advantages of graduates could be elevated by a quality development process, especially through teaching and learning processes (Siswandari, 2006; 2007a). Since the competitive advantages of graduates are believed to be increased by the high performance of the educational systems (Datta, Guthrie, & Wright, 2005; Ho & Wearn, 1996), quality planning, quality control, and quality improvement should become the main emphasis of the educational institution. Despite the fact that the quality issue in education is not a recent phenomenon, there has been a growing attention on the importance of incorporating transferable skills in learning to address the discrepancies between skills taught in higher education and those valued by employers.

Addressing the gap between soft skills valued by professional accountancy practices in the workplace and the academic studies of accounting students is the main theme of this paper. The Institute of Educational Personnel Development (Lembaga Pengembangan Tenaga Kependidikan, or LPTK for short) was established to provide pre-service teachers with the ability to compete in the growing rivalry of national and regional labour markets. As it is mandated by the Ministry of Education of the Republic of Indonesia (REFF), Indonesian higher education institutions are required to ensure the quality of education by continually evaluating their teaching and learning standards. While a learning plan is essential in the management of learning (Siswandari, 2007b), the innovation introduced into the management of learning could become one of the pathways (Scott, 2003; Srichan & Dalrymple, 2004) of achieving learning objectives (Rice, O’Connor, & Pierantozzi, 2008).

In light of the incorporation of transferable skills into learning curricula, this paper reports on a three–year-long project of integrating transferable skills into the learning instrument of an Indonesian accountancy education programme. The Semester Learning Plan (Rencana Pembelajaran Semester in Bahasa Indonesia, or SLP for short) was considered essential in embedding the expected skills to meet the future demand of the educational labour market. The research was carried out in conjunction with the project mandated by the Ministry of Education of the Republic of Indonesia.

The rest of the paper is structured as follows. The recent relevant literature is reviewed in the next section. The research method and the results will be elaborated in the following sections. The subsequent section highlights the findings and the
transferable skills can be developed during the learning process (Siswandari, 2006, 2007a). This is in line with Benedict and also Afraz and Ghaemi, who stated that, by integrating soft transferable skills into the curriculum to be continually practised by the students, those skills can be greatly developed (Afraz & Ghaemi, 2011; Benedict et al., 2016).

By equipping various transferable skills, in turn, the LPTK graduates can highly perform their future work as a teacher. In addition, their personal skills also would be significantly developed (Afraz & Ghaemi, 2011).

When all teachers in a country are definitely high-performing teachers, it can be sure that related country is an innovated country since all innovations come from excellent education society at large.

METHODS

For the complete three years of activities, this research applied an educational development method, which refers to the Instructional System Development (ISD), in accordance with the procedure suggested by Gall and her associates (2003). The procedure comprises steps of information collecting and planning, developing preliminary form of product, preliminary field testing, main product revision, main field testing, and disseminating of the final product revision.

The set of procedures was introduced to roughly 1,072 research participants involved in various stages of the research. They comprised students, lecturers, alumni, employers of the graduates, and the accounting association members. The recent
condition of the learning plan was assessed to obtain a comprehensive understanding of the learning structure and the expected outcome of the course.

Types of Required Data

The data required in the study were those related to education and learning with regards to the aforementioned study programme as to develop a draft of characteristic and transferable skills-based learning instruments in order to improve the quality of prospective teachers at the Study Programme of Accounting Education, the Faculty of Teacher Training and Education, Sebelas Maret University. The product development was carried out by continuously promoting the values of character and transferable soft skills.

Data Collection Method

1) FGD (focused group discussion) I on the current learning strategy for the core and supporting courses was conducted with the Board of the Study Programme of Accounting Education. It was done in an effort to identify the positive values and the possible soft transferable skills based on the findings of the study in Year I.

2) The Study Programme of Accounting Education has 18 lecturers with related subjects. Each of them is responsible for creating an innovative SLP related to the subject matter they teach; at the moment, however, based on the research time schedule, only four subjects were equipped with innovative SLP. FGD II was held to determine “who shall insert the types of marked characteristic and soft transferable skills into the SLP” of the taught courses.

3) The questionnaire method was used to collect data on students’ opinions, character values and soft transferable skills relevant to be developed by the learning of certain courses. It was done to complete Point 2.

4) In-depth interviews with 10% of the students and alumni were undertaken to confirm that what they had stated in the questionnaire was accurate. Since the total number of students and alumni of the Study Program of Accounting Education included in this research was 1,072 (860 alumni and 212 students), taking 10% of them to be interviewed was considerably enough (Creswell & Clark, 2007). Besides confirming the validity of the data, it reinforced the concept that would be written in the learning instruments.

5) Documentation. Relevant documents were utilised to develop character values and soft transferable skills.

6) Observation. Observation was carried out to map and then to find the best strategies to increase the character values and soft transferable skills agreed to be developed.

7) Workshop I. Through this workshop all lecturers and representative students
agreed with the types of character and transferable soft skills to be developed through the courses during the learning process.

8) Workshop II. This activity aimed to develop the learning instruments in certain courses which were already interspersed with soft transferable skills.

9) Workshop III. This advanced workshop involved all faculty councils together with Asosiasi Profesi Pendidik Akuntansi (APRODIKSI) leaders and representatives. By this Professional Associations, the formatted result was expected to be disseminated to all members.

Methods of SLP Model Development

1) Information Collecting and Planning
In this phase, identification was carried out on the elements used in the preparation of the quality assurance system in character value and transferable skill-based learning education and teaching at the aforementioned Study Programme captured through surveys and an FGD. The survey method was to capture pieces of information about the practice of quality assurance at the university. The data were then quantitatively and qualitatively processed, and the results were used in the FGD.

The FGD was conducted by presenting competent experts in preparing a character education, with a soft skill and transferable skill-based quality assurance system. The result of the FGD was the quality assurance system based on the character values and the elements of soft skills and transferable skills to be developed in this study.

Another stage which is no less important was reviewing any literature related to the quality assurance system internalising the character values and elements of soft skills and transferable skills found and downloaded from the internet. Based on the literature review and the objective conditions of the field, temporary model planning would be undertaken.

Generally speaking, skills are specific competencies required for implementing a task or job. They are as numerous as the variety of activities and can be developed while the teaching and learning processes are in progress. The QAA in Great Britain defines “transferable skills as skills which can be transferred in the workplace as to accomplish the jobs.” Of all the skills that one possesses, transferable skills are the principal skills required to enter work markets as they are portable skills which are possessed by someone and are ready to be utilised to accomplish jobs in the workplace (Siswandari & Susilaningsih, 2014).

2) Development of Preliminary Form of the Product
In this stage, the prototype model to achieve effective character-based education was created as follows: The prototype model was created in the form of a quality assurance system for education and teaching, along with a learning instrument in which there would be internalisation of character values, soft skills, and transferable skills.
3) Interpretation and Generalisation

The results of the analysis are presented in informative, scientific, accountable ways. The collected data were then comprehensively processed in a descriptively analytic way. The analysis related to the description of various behaviours of variables was carried out in a descriptively analytic way based on various relevant theories and approaches. In addition, the data were qualitatively analysed to see the relationships among the various aspects studied.

RESULTS

Developing and Selecting Relevant Courses

The research has been undertaken since 2015. Part of the research data was collected through a tracer study, which was conducted online at the Faculty of Teacher Training and Education, combined with the results of data-tracing by the research team as of January 2015. This tracing-action was carried out to gain several data from the alumni users in order to improve the capability of the Study Programme of Accounting Education’s graduates. From the view of the users of alumni, they feel fairly satisfied with the alumni’s performance, but are still expecting that the institution will enhance the ‘flexible attitudes’ of their graduates in facing certain situations which require wise solutions to solve the existing problems. To fulfil the users’ expectation, the new SLP was designed by the research team and supported by all lecturers of the Study Programme of Accounting Education, namely an SLP with character and transferable skills. This activity was intended to develop the quality of LPTK for the first step since the SLP will be the most important guidance for learning processes.

The method used to develop the quality of LPTK was inserting the aspects of character and transferable skills into all courses at the Study Programme of Accounting Education. In the first stage, the aspects of characteristic and transferable skills were inserted into only some selected courses relevant to be developed by design. The courses selected and developed in this stage were the core ones. The discussion with the board of lecturers during the FGD resulted in four courses relevant to be developed, namely: Statistics, Computerised Accounting, Cost Accounting, and Educational Technology in Accounting Education.

Reviewing the Aspects of Character and Transferable Soft Skills to be Developed in Each of the Relevant Courses

The result of the discussion with the board of lecturers during the FGD related to the aspects of character and transferable skills to be developed for each relevant course is presented in Table 1 (See Appendix 1). The aspects of character and transferable skills inserted into the respective courses were those suitable for the characteristics of each course.
Strategies of Development of Characters and Transferable Soft Skills during the Teaching and Learning Processes

Based on the results of the workshop attended by the faculty and the students, the strategies of development of characteristic and soft transferable skills during the teaching and learning processes are presented in Table 2 (see Appendix-2). The strategies of development were expected to be quality ones. According to Chamot (2004), learning strategy concerns the thoughts and actions that are used to achieve the learning objectives. Thus, if we employ quality thoughts and actions in the learning process, the objectives will be well achieved. By showing good characteristics and implementing soft transferable skills, it is evident that someone possesses good quality of thought.

Developing Learning Instruments Which Include Characteristics and Soft Transferable Skills Elements

The learning instrument developed in this study was the SLP which includes the character and transferable-soft skill elements. The development of learning instruments associated with the SLP would be further discussed with experts. Here is an example of characteristics and soft transferable skills inserted into the courses in the SLP of the Statistics Part 2 course (see Appendix 1).

In order to develop a more detailed SLP, the characteristics and transferable skills were amended in the learning strategy as a trigger to improve the quality of graduates (O’Regan & Ghobadian, 2004). An example of the amendment of the characters and transferable skills learning strategies for the Statistics Part 2 course is depicted in the following model (see Appendix 2).

DISCUSSION

The innovation of learning plan components, namely the SLP, was achieved by integrating characteristics and soft transferable skills into the learning instruments. These include honest, responsible, obedient, confident, persistent and hard-working, proportionally and logically thinking, creative and innovative, nice and kind, and open-minded for characteristics. In addition, inserted soft transferable skills include communicating effectively, cooperating with work groups, interacting with society, negotiating to achieve a win-win solution, respecting others based on their competencies, being responsible for the assigned tasks in work groups, assessing the benefits of IT use properly, leading work groups fairly and democratically, expressing opinions/arguments in the work groups (Hwang, 2003; Lievens, van Dam & Anderson, 2002; Nabi, 2003; Nabi & Bagley, 1999).

As a result of the insertion of honesty, responsibility, and hard work into the learning materials and later observation during learning process, for example, hopefully the graduates should have invaluable positioning when they show those characters in the work place. Besides, they have higher market values and competitive advantages for their future careers (Fawcett,
Rhoads & Burnah, 2004; Porter & Millar, 1985). In addition, they can support the vision of Indonesia’s President, in which all the citizens must be honest as a way to contribute to the developing and wealthy country.

Further, by inserting communicating effectively, cooperating with work groups, and interacting with society, the students can learn how communication and cooperation will play an important role. Through effective communication people could democratically solve problems and implementing excellent cooperation among people can create monumental works.

Since the highlighted current issue in higher education in Indonesia is the high rate of unemployment, every institution, namely each higher education, has the responsibility to equip graduates with positive characteristics (Scott, 2003) and soft transferable skills. Competitive human resources are definitely needed in facing the globalisation era. However, the way to produce that kind of graduate is not so easy and sometimes very costly. The result of this study offers a cheaper alternative to those who deeply care about their graduates.

Furthermore, by utilising the results of this research that focused on SLP with inserted characteristics and transferable soft skills, each educational actor can optimally consider several relevant aspects that can be inserted into benchmark statements. By including benchmark statements related to characteristics and soft transferable skills, it is expected that each of the universities can prepare their graduates adequately so that they have market value through the quality assurance mechanism (Shanahan & Gerber, 2004). Hence, the Study Programme of Accounting Education as an institution under the LPTK has attempted to create innovation in learning management so as to achieve decent quality standards. In this case, innovation in learning management is related to the element of learning plans because without good lesson plans, the student will not understand the learning properly. This is in line with the claim of Rice et al. (2008), which states that lesson plans that include breakthroughs and innovations will make it easier to achieve the learning objectives.

In addition, the Study Programme of Accounting Education, structurally as a part of the Teacher Training and Education Faculty, should also become the centre of innovation, moral force, and the service industry (Rademakers, 2005; Sahney et al., 2003; Scott, 2003).

A preliminary study, specifically a survey and small experimental research, was conducted in the statistical class. The survey was undertaken in the Public and Private Higher Education of Surakarta where 304 students were involved in order to evaluate the students’ transferable skills level. The related experiment was conducted in Sebelas Maret University, Surakarta, which intended to prove whether the students’ transferable skills could be improved through well-developed SLP for the statistical class. The results of the survey showed that the level
of students’ transferable skills is considered low, with an average score of 5.25 out of 10 (Siswandari, 2009).

In addition, the small experimental study showed that the average score of students’ transferable skills significantly increased after applying a new SLP for the statistical class. In detail, their total score for the aspects of transferable skills increased about 50 points after joining the statistical class. In addition, the students’ achievement improved by 150% for the One-Way Anova topic. The result of this preliminary study indicated that the transferable skills of the students, as well as soft transferable skills, could be improved through a well-developed SLP. These improved skills during the learning period would develop the quality of teachers’ candidate and, in turn, ease them into entering the job market. However, continued research is still needed to develop new SLPs for other subjects to provide more significant evidence.

Again, that new SLP can be used as one of the quality assurance components in higher education, especially those related to the aspects of quality assurance in education. In this case, learning, as a core aspect of education, should be oriented toward graduates’ employment. Furthermore, the new SLP is appreciated by several Deans of related faculties which manage the Study Programme of Accounting Education, when joining the FGD. One of the deans said, “I really appreciate the new SLP that has been developed by the research team from the Study Programme of Accounting Education, Sebelas Maret University; this is the reason I would like to invite the team leader to share the innovation of developing SLPs and its learning strategies with my colleagues.”

CONCLUSION
The Study Programme of Accounting Education has taken the role of improving the quality of Accountancy learning management to actualise the quality of LPTK. It is a must for any education unit in LPTK to continuously make strategic efforts, namely innovation in the learning process, to raise the dignity of its graduates, especially in relation to public trust in the quality of the graduates and the eligibility of the graduates to become great teachers. The innovation in the form of characteristics and soft transferable skills integrated into the SLP as part of the learning system can improve transferable skills, including the transferable skills of teacher candidates. In other words, the SLP, as one of the quality assurance tools, can be considered an important factor in developing the quality of LPTK. Strategic efforts include the preparation of the Study Programme of Accounting Education as “miniature of quality LPTK” with the new design of the SLP, which in turn can be an embryo to develop the quality of Indonesian LPTK. The first evaluation was undertaken for a statistics class and the result showed that the students’ achievement improves about 13 points, i.e. from 75.2 to 88.3. The research team from the Study Programme of Accounting Education would develop step-by-step approaches to improve the teaching candidate. This effort can support the availability of more prospective
teachers who are professional, with better characteristics and soft transferable skills. A teacher who possesses those particular characteristics can help the nation to develop its education and culture. The possession of positive characteristics and transferable skills would potentially enhance students’ capabilities both in vocational and general secondary schools.

REFERENCES


Siswandari. (2007b). Kompetensi, konsep dasar pengembangan kurikulum, dan peningkatan kualitas pendidikan berkelanjutan [Competency, basic concept of curriculum development, and the improvement of continuous education development]. *Jurnal Pendidikan Dwija Wacana, 8*(1).


### APPENDIX-1

Table 1

<table>
<thead>
<tr>
<th>No.</th>
<th>Courses</th>
<th>Characteristics</th>
<th>Soft Transferable Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2. Responsible</td>
<td>2. Cooperating with work groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Interacting with society</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Persistent and hard-working</td>
<td>2. Negotiating to achieve win-win solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Obedient</td>
<td>3. Cooperating with work groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Proportionally and logically</td>
<td>4. Respecting others based on their competencies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>thinking</td>
<td>5. Being responsible for the assigned tasks in work groups</td>
</tr>
<tr>
<td></td>
<td>Accounting Education</td>
<td>2. Confident</td>
<td>2. Assessing the benefits of IT use properly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Nice and kind</td>
<td>3. Cooperating with work groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Respecting others based on their competencies</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Leading work groups fairly and democratically</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6. Stating opinions/arguments in work groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7. Being responsible for the assigned tasks in work groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Proportionally and logically</td>
<td>2. Cooperating with work groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>thinking</td>
<td>3. Stating opinions/arguments in work groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Open-minded</td>
<td>4. Being responsible for the assigned tasks in work groups</td>
</tr>
</tbody>
</table>
**APPENDIX-2**

**Table 2**

*Strategies of Development for Characteristics and Transferable Skills during the Teaching and Learning Processes*

<table>
<thead>
<tr>
<th>No.</th>
<th>Courses</th>
<th>Strategies of Development of Characteristics</th>
<th>Strategies of Development of Soft Transferable Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Statistics</td>
<td>Honesty and responsibility are developed through collecting data from the field. It is intended for the students to become accustomed to speaking based on the facts or the findings in the field. <strong>“Speak by data”</strong> is a message that is instilled into all students’. They must be responsible for what they say and this is all evidence-based.</td>
<td>1. Improving the skills of effective communication with others is achieved through the presentation of data processing which is carried out by the students. This is to train students to be accustomed to speaking in front of people.</td>
</tr>
<tr>
<td></td>
<td>Part 2</td>
<td></td>
<td>2. Efforts to improve students’ ability to cooperate and to interact in society are carried out through their work group work and their assigned tasks to collect data from the field so that they learn to interact with their society.</td>
</tr>
<tr>
<td>2.</td>
<td>Cost Accounting</td>
<td>Honest, confident, persistent and hard-working characteristics of the students start to be built in the first task of this course when students are required to conduct a survey in a manufacturing business without the presence of the lecturers. Obedience is developed throughout the semester in each task because students must adhere to the applicable accounting standards, obey the principles and believe in the applicable methods. Furthermore, the characteristics of proportionally and logically thinking will develop when students finish preparing a calculation in a large book so they can proportionally and logically describe the process of calculating the cost of a good product.</td>
<td>Learning activities to identify the cost and burden of a controlled group in a small manufacturing company and then presenting the results in the classroom will develop transferable skills as follows:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. Communicating effectively: Without ability in effective communication it will be difficult for the students to explain the intent and purpose to businesses they visit and survey that become the object of the group tasks. Furthermore, the students will present the results of the survey in classrooms.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Negotiating to achieve a win-win solution: Through effective communication skills, students are able to influence employers so that they may perform the survey in their company while contributing to the company in the form of information about how to classify the costs and the burden on companies in order to calculate the cost of production.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Cooperating in work groups, respecting others based on their competencies, and being responsible for the task in work groups will be formed in the process of completion of the group tasks, as</td>
</tr>
</tbody>
</table>
Siswandari, Susilaningsih, Sri Sumaryati and Binti Muchsini

APPENDIX-2 (continue)

<table>
<thead>
<tr>
<th>No.</th>
<th>Courses</th>
<th>Strategies of Development of Characteristics</th>
<th>Strategies of Development of Soft Transferable Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>Educational Technology in Accounting Education</td>
<td>Creative and innovative characters are developed by designing learning modes and media on Accounting. The characteristics of confident, kind and nice are developed by simulating designed learning models.</td>
<td>1. To familiarise them with effective communication, students are invited to conduct an interview with one of the Accounting teachers to determine the type and model of instructional media which is commonly used. Then they present the results of the interviews.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. The ability to assess the benefits of using IT properly is developed through the activity of making media/instructional materials in Accounting and using media creation software/teaching materials (Edmodo, Wondershare quiz creator, pow toon).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. The ability to work together in the work groups can be enhanced through group discussions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Through group work practice students are trained to respect other people based on their competencies, to fairly and democratically lead the work groups, to state opinions/arguments in the groups as well as to assume responsibility for the assigned task in group work.</td>
</tr>
<tr>
<td>4.</td>
<td>Computerised Accounting</td>
<td>The characteristics of persistent and work hard, proportionally and logically thinking, and open-minded are developed by searching references using different techniques. Through such activities, the students are trained in persistence, and thinking logically about the learning techniques found. The search for different techniques allow the students to understand a variety of techniques that can be used in completing the accounting cycle so that these activities can be expected to develop their open-mindedness characteristic.</td>
<td>1. The improvement of the skills of communicating effectively and stating opinions or arguments can be achieved through presentations of students findings. This trains the students to become accustomed to speaking and presenting arguments in front of people.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Efforts to improve the ability to cooperate and take responsibility for the group tasks are made through group work, and the students are assigned to report the division of tasks to each member of the group.</td>
</tr>
</tbody>
</table>

APPENDIX-2 (continue)
**Gunungan Wayang Sadat: The Study of Its Religious Values and Its Relevance in Fine Art Learning in High Schools**

Slamet Subiyantoro* and Hasan Zainnuri

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2Department of English Language Education, Faculty of Teacher Training and Education, Sebelas Maret University of Surakarta, Indonesia

**ABSTRACT**

This research aims to explain (1) religious values in gunungan wayang (a leather puppet shaped like a mountain) sadat (the facilities of preaching and conveyance—sarana dakwah dan tabligh), and (2) the relevance of the visual structures of gunungan wayang sadat to arts and culture learning in fine art subjects in high schools based on the curriculum in 2013. The research was conducted in Mireng village, Klaten, Central Java using a qualitative descriptive approach. Research subjects were gunungan wayang sadat and fine art teachers. Data were collected using interviews, literature study, and content analysis. Data source triangulation was applied to increase the data validity. The data were analysed using an interactive model of data analysis, including data collection, data reduction, data display, and conclusion drawing were continuously conducted in a cycle. The research findings indicate that gunungan wayang sadat implicitly and explicitly contains religious values which are in accordance with Islamic values. The religious values contained in the structures of gunungan wayang sadat are highly relevant to the material of fine art learning in high schools based on character education in the curriculum during 2013.

*Corresponding author*

**Keywords:** Creation, gunungan, Islamic values, preaching of Islam, wayang sadat

**INTRODUCTION**

The studies of wayang (puppet show) have been conducted by some researchers. One of them is Sutarno (2002, p. 21) who investigated puppet shows in Javanese culture. Abdullah (2008, p. 39) conducted an ethnolinguistic study related to Javanese
terms in sculpturing and colouring wayang purwa (the first shadow puppet) in Surakarta City. Wayang kulit as a medium of character education was reviewed by Arifin (2002, p. 75), and a study related to wayang kancil (mouse deer puppet) was conducted by Nurwanti (2013, p. 95). Meanwhile, a similar study of the wayang kulit purwa show in Surakarta style was carried out by Junaidi (2010, p. 141).

A study of another type of wayang, which focused on wayang klithik (a flat wooden shadow puppet) as a medium to help autistic children learn to speak, was conducted by Sunardi (2016, p. 195). A study focusing on the figure of Dewa Ruci is utilised as an alternative to the education system (Isnaniah, 2010, p. 41). The contents of a visual arts teaching course, such as wayang, could be planned according to postmodern art education and these planned course contents could be taught with different instructional methods. Postmodern art education approaches can be suggested for all the art education courses that take place in teaching programmes (Kaynar, 2012, p. 1049).

The research of wayang wong was historically examined with reference to the Priangan cultural background (Rusliana, 2000, p. 45). Wicaksana (1998, p. 85) studied wayang sapuh leger (Hinduism for purification) on its functions and meaning for Balinese people. The functions include inaugural ceremony, purification rites, social institutions, and reflection of aesthetic expression. A study concerning gunungan wayang purwa has not been associated with religious values.

Of the aforementioned studies, there is no study focusing on gunungan wayang sadat (a mountain-like leather puppet), its connection with religious values, and its relevance to the curriculum of 2013. The present study, therefore, seeks to examine the religious values of gunungan wayang sadat and its relevance as a teaching material of fine art learning in high schools based on the curriculum during 2013.

METHODS

The research was conducted in Mireng village, Trucuk subdistrict, Klaten regency of Central Java using a qualitative descriptive approach. The research subject includes gunungan wayang sadat made by a dalang (puppeteer) of wayang sadat named Suryadi. A gunungan was selected using purposive sampling out of four provided gunungans. Data were collected using interviews with a wayang maker and high school teachers, a literature study, and content analysis of gunungan wayang sadat. To gain data validity, data source triangulation was applied by crosschecking interview data with the results of observation and content analysis. The data were then analysed using an interactive model of analysis, comprising data collection, data reduction, data display, and conclusion drawing. The aforementioned analysis components were continuously conducted in a cycle until valid data were obtained.
RESULTS AND DISCUSSIONS

Results

Below are research findings which include the comparison data of gunungan wayang purwa and sadat, elements of shapes and meanings of gunungan wayang sadat, as well as visual aspects and the relevance of gunungan wayang sadat to enrich fine art teaching materials based on the 2013 curriculum.

Table 1
The comparison between gunungan wayang purwa and wayang sadat

<table>
<thead>
<tr>
<th>No</th>
<th>Types of Gunungan</th>
<th>Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Top</td>
</tr>
<tr>
<td>1</td>
<td>Wayang purwa</td>
<td>Plain</td>
</tr>
<tr>
<td>2</td>
<td>Wayang sadat</td>
<td>the word Allah</td>
</tr>
</tbody>
</table>

To find out the religious values of gunungan wayang sadat, some data are demonstrated in Table 2.

Table 2
The elements of shape and meaning of gunungan wayang sadat

<table>
<thead>
<tr>
<th>Shape</th>
<th>Meaning</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demak mosque</td>
<td>The structures of three worlds</td>
<td>Islam, faith (iman), perfection (ihsan)</td>
</tr>
<tr>
<td>Calligraphy</td>
<td>The Islamic Creed (syahada)</td>
<td>Ashadualla ila ha ilallah wa ashaduanna muhammadarosulullah</td>
</tr>
<tr>
<td>The six stars</td>
<td>The six articles of faith</td>
<td>• Belief in Allah</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Belief in His angels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Belief in divine books</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Belief in prophets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Belief in the day of judgement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Belief in God’s predestination</td>
</tr>
<tr>
<td>The five wings</td>
<td>The pillars of Islam</td>
<td>• Shahadah (sincerely reciting the Muslim profession of faith)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Salat (performing ritual prayers in the proper way five times each day)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Zakat (paying an alms (or charity) tax to benefit the poor and the needy)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sawm (fasting during the month of Ramadan)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hajj (pilgrimage to Mecca)</td>
</tr>
<tr>
<td>Tendril ornaments</td>
<td>Plants</td>
<td>Life</td>
</tr>
</tbody>
</table>

Fine art teaching materials are closely related to parts of gunungan wayang sadat in terms of a number of visual elements with such Islamic concept-based forms as the Demak mosque, calligraphy, the six stars, the five wings, and tendril ornaments. Meanwhile, in relation to the method of teaching fine art, the structure of those visual elements can be used semiotically/semantically as a teaching method to raise students’ emotional intelligence, and as a teaching aid to internalise religious values, attitudes, and skills in performing good deeds. In addition, the data of the visual elements of wayang sadat in relation to teaching materials in fine art subjects are displayed in Table 3.

**Table 3**
The visual elements of gunungan wayang sadat and their relevance to the teaching materials of fine art in high schools based on the curriculum (2013)

<table>
<thead>
<tr>
<th>Color</th>
<th>Meaning</th>
<th>Application in Gunungan</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>It symbolises purity, sanctity, smoothness and softness.</td>
<td>Mosque, yard, calligraphy</td>
</tr>
<tr>
<td>Black</td>
<td>It symbolises valour, strength and death.</td>
<td>The upper limit of the gunungan</td>
</tr>
<tr>
<td>Gold</td>
<td>It symbolises immortality and perfection.</td>
<td>The mosque, border of the gunungan</td>
</tr>
<tr>
<td>Brown</td>
<td>It symbolises warmthness, serenity, naturalness and calmness.</td>
<td>Wings, bottom part, the mosque roof</td>
</tr>
</tbody>
</table>

**DISCUSSION**
The gunungan in a wayang kulit purwa context is often referred to as kayon or hayat which literarily means living. Its structure consists of three parts, comprising top, middle, and bottom parts. The top part is taper-shaped which reflects that the world above is abstract, sacred, and pure; it goes towards God’s power. The middle part is the visible part, which is round in shape, describing the real world, similar to the world we live in as part of our daily lives. The third structure reflects an underworld described by arrangements in temples which are called kamadhatu.

Generally, in the world of wayang purwa performing art, gunungan is used in opening and closing scenes. For the Javanese society, the gunungan tradition is closely related to the philosophy of life (sangkan) and death (paran) or sangkan paraning dumadi – that is, remembering the origin and destination of life (Sutarno, 2002, p. 34). The Javanese traditional society considers that human perfection is in life and death. Humans exist in order to live a perfect life and die peacefully.

Some elements existing in gunungan wayang sadat include the mosque shape with a Demak motif. A mosque is the heart of Islam and the House of Allah (Haryanto, 1995, p. 195). The mosque roof consists of three structures. The top structure describes three phases of world, comprising life before birth, life in the world, and life after death. The three structures in Islam can be
transformed to conceptual levels which are so-called Islam, *iman* (faith), and *ihsan* (perfection) (Gazalba, 2000, p. 247). Islam means total surrender to Allah. *Iman* is belief in Allah and should be orally stated and proved with good deeds involving worship, both through the relationship between humans and the one with Allah. *Ihsan* means to believe and feel that Allah always watches and pays attention to human movements and activities in life. In addition, Murtisari (2013, p. 123) states that belief in God has become a core source of values among the traditional Javanese people and how they are further developed into their daily norms of conduct. The aforementioned level is the top level of being a Muslim since it involves a feeling of being physically and emotionally sincere.

There are a door and two windows in the picture of a mosque, and these form an upwards tape shape which represents the oneness of Allah. The windows are in the left and right sides of the door, which symbolise that the world and its contents are balanced. The world simply consists of two kinds since they were basically created in a pair; for instance, man and woman, day and night, the strong and the weak, the rich and the poor, etc. Meanwhile, the one door symbolises an uneven number, which means that Allah has no pair and no one can rival Him since He is the only Creator and the first existing in the world. On the other hand, the Earth and its inhabitants are only His creations, so they are mortal or can be damaged. In this case, the door symbolises the path to life perfection and death, confirming that the only possible way towards Allah is Islam.

The calligraphy in the *gunungan* written in Arabic language is *syahadah* (a declaration of Muslim faith). It is in the first sequence of the pillars of Islam since it underlies the other pillars, and therefore its existence is very fundamental. The *syahadah* expresses that there is no God but Allah, and that Muhammad is the messenger of Allah, and therefore, it is meant to be a declaration that one is a Muslim. It is hence what differs a Muslim and a non-Muslim. The *syahadah* is the foundation of Islam; it implies the acknowledgement of Allah’s existence and that the Prophet Muhammad was sent as the servant representative in the world and that his behaviours should be imitated or followed as he is the most perfect human among others.

The other structure is the six stars that symbolise the six pillars of *iman* (faith), involving belief in Allah, His angels, divine books, His prophets, the day of judgement, and His predestination, *Al Qadar* (Kaelany, 2000, p. 38). Like in a building, *iman* is similar to the foundation; it is not visible but its existence underlies and exerts strong influences on the robustness to support the building. In behaviour context, *iman* will also be the foundation of behaviour as it serves as a benchmark to see individual behaviour. Therefore, a faithful person should believe, be able to orally declare, and able to prove it with his/her good deeds in daily life.

The tendril ornaments are the symbols of plants of which leaves are connected
to each other. The world is full of green plants. The food daily consumed by human includes grains harvested from plants which symbolise life and fertility. Plants are the forms of Allah’s mercy as the universe Creator to His servants, those living in the world. In line with these symbols, Caleste (2016, p. 74) concluded in his study that religion is found to be a particular salient predictor for life satisfaction.

Compared to gunungan wayang sadat, gunungan wayang purwa has different shapes and meanings. They are not the same both in structures and in shapes. Its top part has a tapered shape, while the middle part contains a house, animals, plants, and guard statues. Furthermore, in the bottom part, a yard is seen.

At the top part of gunungan wayang sadat is the word of Allah. The middle part is decorated with syahadah calligraphy, and at the bottom part is the mosque picture. Thus, gunungan sadat explicitly and implicitly contains religious values which are Islamic values.

**Gunungan Sadat and its Relevance as Fine Art Teaching Material in the Curriculum of 2013**

In the culture and art curriculum for high schools, fine art subjects are integrated with other arts. In the 2013 curriculum, there were 18 educational values which placed an emphasis on character, such as being religious, honest, tolerant, disciplined, hard-working, creative, independent, democratic, curious, patriotic, being appreciative of achievement, communicative, peaceable, enthusiastic about reading, aware of the environment, sociable, and responsible. One of these is religious value, namely the values of the six pillars of faith (rukun iman) represented on the structure of gunungan, which serve as a concept or an idea in actualising them for worship addressed to Allah.

The specific benefits of the study of gunungan wayang sadat include improved knowledge, understanding, knowledge of Islamic values through visual language in the form of gunungan wayang sadat art, developed positive attitudes towards Islamic values, and improved implementation of the values in accordance with the five pillars of Islam (rukun Islam).

Fine art subject materials are closely related to visual aspects such as colour, lines, shapes, textures, and the values in which they are closely related to meanings or symbols. The most dominant visual aspects in wayang sadat comprise shape and colour. Shape aspects consist of the mosque, Arabic script or calligraphy, stars, wings, tendril ornaments. The aforementioned shapes are regarded as relevant material sources for high school students in fine art subjects for the purpose of embedding one’s character with religious views.

The colour applied to pictures of a mosque yard, mosque, and calligraphy is white; this symbolises purity, sanctity, smoothness, and softness. The colour black is applied to the basic shape of the gunungan in the top part to represent valour and strength on the one side, and death or the other world on the other. The golden colour
of the mosque and border of the gunungan symbolises immortality and perfection. A brown color is mostly applied to pictures of wings, the bottom part of the gunungan, and the mosque roof. This colour symbolises warmth, serenity, naturalness, and calmness (Effendi, 1978, p. 66). The visual aspect cannot be separated from the philosophical meaning aspect, so it also includes character values.

Clearly, there exists an intrinsic or implied value. Both colours and shapes are symbolically used. The various aspects of shapes and their symbolism should be related to its application aspect since it deals with art creativity on the one hand and appreciation value on the other.

The aforementioned aspects of shapes and colours strengthen the symbolic meanings of gunungan wayang sadat as the manifestation of the Islamic religious values created by the maker named Mr Suryadi. The symbolic shapes are exhibited through the three-roof mosque describing the world and levels of faith in Islam, the calligraphy of syahadah, six stars, five wings, and tendril ornaments in gunungan wayang sadat. The picture of gunungan which is a transformation of the wayang kulit has good visual elements for fine art education in high schools based on the 2013 curriculum which emphasises character values or value education.

CONCLUSION
The research findings indicate that aspects such as shapes and colours strengthen the symbolic meanings of gunungan wayang sadat. Therefore, gunungan wayang sadat contains Islamic teaching-based religious values explicitly and implicitly in accordance with moral education. The religious values contained in the structures of the gunungan are highly relevant for the teaching materials of fine art in high schools in the area of character education as required in the 2013 curriculum. In reference to the aforementioned findings, it was suggested that high school fine art teachers should utilise gunungan wayang sadat as an appropriate teaching material for the purpose of the embedding of students’ religious values.

REFERENCES


Cases of Thinking: Communication between Teacher and Students through Discovery Learning in Biology

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ABSTRACT

The research aims to identify patterns of communication between teacher and students when they construct knowledge. Identification was based on the category of thinking process in the dimension of knowledge of Bloom’s Taxonomy. Research was a quasi-experimental pre-post test non-equivalent control group, in which the experiment class was treated with discovery learning, and the control was taught with the conventional method. The control class consisted of 31 students and the experiment class, 28 students. Both classes learned about the reproductive system. The conversations between the teacher and students were analysed based on Bloom’s categories. Research results indicate that: 1) teacher and students have a relatively similar distribution of thinking category; 2) discovery learning changes the distribution of thinking categories of teacher and students; 3) communication between teacher and students in discovery learning is clustered in concepts and facts; and 4) recalling (C1) and understanding (C2) were more dominant during the process of learning.

Keywords: Category, conceptual communication, discovery, factual, Taksonomy-Bloom, thinking

INTRODUCTION

Communication is a competence that is needed in the globalisation era (Binkley et al., 2012; Darling-Hammond, 2010; Dede, 2010; Kyllonen, 2012), primarily non-routine communication (Darling-Hammond, 2010). Non-routine communication is used in problem solving, and therefore communication becomes an important part in a learning process. Communication is a competence that requires more knowledge.
Communication, both oral and written, is used to achieve intended learning, but oral communication can better illustrate a thinking process exactly and be less influenced by other persons’ considerations. Oliveira (2010) states that oral communication has practical social functions of acquiring and exploring students’ experiences, as well as encouraging them to give meanings to transmitted experiences. Oral communication in the classroom is the interaction between a teacher and students, and among students, in the form of statements and questions. The response, which is described as a statement or a question, is a reflection of communication of a learning approach design conducted during the learning process. Kawalkar and Vijapurkar (2013) stated that there is a relationship between students’ cognitive scaffolding and the teacher’s support to solve the problem, and therefore the oral communication that occurs in the classroom is a reflection of a cognitive process that blends in with the teacher’s support. All types of oral communication in the form of questions and statements cover students’ roles in creating the cognitive process (Cardoso, Eris, Badke-Scaub & Aurisicchio, 2014).

The cognitive process is divided into several categories, from recalling or remembering (C1) to creating (C6) in the knowledge dimensions of facts, concepts, procedures, and metacognitions (Anderson et al., 2001; Krathwohl, 2002), each of which has characteristics that visualise the cognitive process. The category of the cognitive process identified in various knowledge dimensions (Anderson et al., 2001) serves as a basis to identify and categorise the cognitive process of all oral communications that occur in the learning process.

Teacher’s questions have a key role in building and developing students’ communication skills that show the cognitive process primarily through inquiry learning (Chen, Hand, & Norton-Meier, 2016; Kawalkar & Vijapurkar, 2013). Discovery learning is closely related to inquiry learning (Chen et al., 2016), and they are often inseparable (Goel & Joyner, 2015; Sutman, Schmuckler & Woodfiel, 2010). Hammer (1997) and Reynolds (2014) stated that discovery learning is a type of learning that gives experience to students in doing a project in a limited amount of time based on problems which are encountered during the learning process, resource utilisation and problem resolution. According to Reynolds (2014), discovery learning is a type of learning which aims to find a concept that is followed with curiosity, in which the teacher’s questions in such learning have the same role as those in inquiry learning.

In general, teachers’ questions are classified into four groups: questions to trigger ideas, moderator, trainer, and participant (Chen et al., 2016). All questions are used to trigger the cognitive process of the students (Kawalkar & Vijapurkar, 2013), and as a result, students will respond in the form of statements which are involved in the cognitive process as well.
of cognitive process for teachers’ and students’ questions and statements in both conventional and discovery learning serves as a visualisation of cognitive scaffolding.

This research aims to identify the quality of students’ thinking processes by analysing the communication process between a teacher and her students during the learning process. The questions to be answered were: 1) What is the impact of discovery learning on the thinking process of students? 2) What is the quality of teacher communication in discovery-based learning? and 3) How have the students’ questions and statements changed during the learning process?

METHODS

A pre-post test control group, following the design by Drew, Hardman, and Hosp (2007), was employed in the present research. Samples were taken using purposive random sampling by selecting two classes for the control and treatment groups. The control group consisted of 31 students and there were 28 students in the latter group. Both groups were taught by the one biology teacher who is the assigned teacher for those classes. The former group applied conventional learning as daily practiced by the teacher, while the latter group used and implemented a discovery learning lesson plan, the syntax of which was proposed by Veermans (2003). Prior to the experiment, permission was granted by the Educational Board of Surakarta Regency, school management, and role teacher, as well as students. The teacher was also trained to acquire the syntax of discovery learning before the lesson got started.

The implementation of discovery learning was measured using Veerman’s syntax, which was adjusted to the given materials. The process of learning was monitored and adjusted to the curriculum design following Forbes and Davis (2010). Data of communication comprising the teacher’s and students’ questions and statements were obtained from direct observation and recording the conversations which occurred during the learning process. The teacher’s and students’ questions and statements were analysed based on the categories of Bloom’s knowledge dimensions of facts (F), concepts (K), procedures (P), and metacognitions (M), and cognitive levels C1, C2, C3, C4, C5, and C6 (Anderson et al., 2001). Based on this categorisation, a number of 24 categories were obtained: FC1, FC2, FC3, FC4, FC5, FC6, KC1, KC2, KC3, KC4, KC5, KC6, PC1, PC2, PC3, PC4, PC5, PC6, MC1, MC2, MC3, MC4, MC5, and MC6. The quantity in each category shows the number of individuals involved in delivering a statement or a question. Each question and statement contained in the category of knowledge dimension has dissimilar qualities of thinking.

The analysis of the quality and quantity of the teacher’s and students’ questions and statements indicates their communication competence during the implementation of discovery learning. According to Veermans (2003), the implementation
of discovery learning comprises several stages, including: orientation, hypothesis generation, hypothesis testing, conclusion, and regulation. The quantity and quality of the teacher’s and students’ questions and statements were computed in each subtopic among five subtopics which were discussed, namely: 1) the structure of the reproductive organs; 2) the formation process of sex cells or gametes; 3) ovulation, menstruation, fertilisation, gestation and childbirth; 4) breast milk and family planning; and 5) disorders and diseases in the human reproductive system.

The teacher’s and students’ questions and statements prior to the implementation of discovery learning were used as pretest data, while data obtained after the implementation of discovery learning on the fifth topic (disorders and diseases in the human reproductive system) were used as posttest data. The percentage calculation was based on the teacher’s and students’ questions and statements when discussing the subtopics. The analysis results were categorised and accumulated in each category of the cognitive process on knowledge dimensions.

The communication between the teacher and students in the learning process consists of: 1) teacher’s statements (TS) and questions (TQ); and 2) students’ statements (SS) and questions (SQ), both calculated and analysed in control and treatment groups.

RESULTS

The classifications of the analysis results were separated into statements and questions. The distribution of teacher’s and learners’ statements by grouping the categories of knowledge dimensions, before and after the treatment using discovery learning, is seen to be dominated by the knowledge dimensions of facts and concepts as in Figure 1.

![Figure 1. Distribution of teacher’s and students’ statements after treatment in the treatment and control class](image-url)
Figure 1 shows that communication in the form of statements of teachers and learners is dominated by concepts and facts. In reality, this shows that the process of constructing knowledge does not involve many scientific procedures to concept building. The analysis of thinking processes by Bloom’s Taxonomy of teacher’s and learners’ statements in the knowledge dimensions of facts, concepts, procedures and metacognition in detail is shown in Table 1.

Table 1
Percentage of thinking process in teacher’s and students’ statements in the knowledge dimensions

<table>
<thead>
<tr>
<th>Dimension of knowledge</th>
<th>Thinking Process</th>
<th>TSCC Pre</th>
<th>TSCC Post</th>
<th>SSCC Pre</th>
<th>SSCC Post</th>
<th>TSTC Pre</th>
<th>TSTC Post</th>
<th>SSTC Pre</th>
<th>SSTC Post</th>
</tr>
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<tr>
<td>Factual</td>
<td>C1</td>
<td>31.43</td>
<td>15.60</td>
<td>11.11</td>
<td>16.00</td>
<td>18.90</td>
<td>1.47</td>
<td>9.86</td>
<td>1.44</td>
</tr>
<tr>
<td></td>
<td>C2</td>
<td>2.86</td>
<td>14.68</td>
<td>6.94</td>
<td>12.00</td>
<td>1.22</td>
<td>2.94</td>
<td>0.00</td>
<td>4.33</td>
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<tr>
<td></td>
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<td>0.00</td>
<td>0.00</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.47</td>
<td>0.96</td>
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<tr>
<td></td>
<td>C4</td>
<td>0.00</td>
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<td>C5</td>
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<td>0.00</td>
<td>0.00</td>
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<td>0.47</td>
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<td>Conceptual</td>
<td>C1</td>
<td>50.00</td>
<td>51.38</td>
<td>26.39</td>
<td>30.00</td>
<td>57.32</td>
<td>46.95</td>
<td>46.15</td>
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<tr>
<td></td>
<td>C2</td>
<td>11.43</td>
<td>15.60</td>
<td>55.56</td>
<td>34.00</td>
<td>13.41</td>
<td>19.85</td>
<td>32.39</td>
<td>31.73</td>
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<tr>
<td></td>
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<td>0.94</td>
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<td>1.47</td>
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<td></td>
<td>C5</td>
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<td>0.92</td>
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<td>0.00</td>
<td>0.96</td>
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<td>C6</td>
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<td>0.00</td>
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<tr>
<td>Procedural</td>
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<td>12.50</td>
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<td>Metacognitive</td>
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<td>0.00</td>
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<td>C4</td>
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</table>

Note:
TSCC Pre : Teacher statement precontrol class  TSTC Pre : Teacher statement pretreatment class
TSCC Post : Teacher statement post control class  TSTC Post : Teacher statement post treatment class
SSCC Pre : Student statement precontrol class  SSTC Pre : Student statement pretreatment class
SSCC Post : Student statement post control class  SSTC Post : Student statement post treatment class
Table 1 shows the percentage of teacher’s and learners’ quality of thinking identified from the statements during the learning process, generally accumulating in C1 and C2 for the factual and conceptual dimensions that Khan and Inamullah (2011) found, including in the categorical low-thinking process. The analysis of thinking processes is also conducted on the questions of teacher and learners as part of communication during discovery learning, as shown in Figure 2.

Communication in questions of teachers and learners in the dimensions of knowledge and the thinking processes is figured out in Figure 2. The distribution of teacher’s and learners’ questions is still dominated by knowledge of facts and concepts, but in the treatment class, teacher and students also achieved the dimensions of procedures. Categories of thought processes of teacher’s and students’ questions in more detail on the dimensions of facts, concepts, procedures and metacognition are shown in Table 2.
Table 2 shows that the questions of teacher and learners clustered on the thinking processes C1, C2, C3, and C5 on the knowledge dimensions of facts and concepts, but on C1 and C2 for the knowledge dimensions of procedures in the treatment class. The knowledge dimensions of metacognition for the statements and questions of teachers and students are zero.

DISCUSSION

Discovery learning, in general, exerts an influence on communication in the form of teacher’s and students’ statements and
questions. Saab (2005) concludes that there is a significant relationship among discovery learning, specifically the stages of hypothesis formulation, design research, and conclusion drawing. The stages of hypothesis, design research and conclusions require understanding and argumentation that are identified from the statements and questions of teachers and learners; this is supported by the research of Chen et al. (2016) which showed that teacher’s questions have the opportunity to increase the thinking and improve the participation of learners. Kawalkar and Vijapurkar (2013) stated that all questions are inducers to start learners thinking.

The present research indicates that communication in the form of questions has a bigger change than statements. The indications of communication that occurred in the discovery class indicate that questions are a more thoughtful part of learning than statements. Research carried out by Rahmawati, Widoretno, Suciati Sudarisman, Ramli, and Ariyanto (2016) revealed that discovery learning enables the improvement of students’ questions.

The difference between the percentage change of statements and that of questions in discovery learning exists due to: 1) questions, the essence of the cognitive process (Chen et al., 2016; Kawalkar & Vijapurkar, 2013; Oliveira, 2010). Discovery learning is a type of learning which requires the cognitive process more than conventional learning (Oliveira, 2010). A statement is an answer which is already provided in a book, or is based on an experience that an individual perceives; 2) discovery learning is defined as a type of learning which constructs knowledge according to phenomena presented based on Veermans’s (2003) stages of learning. The stages require more information which start with questions. Teachers and learners practice asking each other questions to understand the facts, concepts and procedures, so the assumption is that using discovery learning increases the quantity and quality of questions from both teacher and learners.

The aggregate distribution pattern on the knowledge dimension of concept points out that concept serves as the easiest component to be transferred in learning, as shown by what has occurred so far. The noncontextual transfer of knowledge often happens in conventional learning. Another reason is the concept construction requires a process of thinking of greater quantity. The mastery of concepts is a teacher’s attempt to transfer knowledge that begins with facts. The use of facts based on those obtained from natural phenomena or events is an attempt to make contextual learning.

The knowledge is orally transmitted and students only listen and clarify their knowledge on a certain topic in their book. It is logical and is in accordance with its analysis results that cognitive processes of communication in the form of teacher’s and students’ statements and questions identified includes recalling or remembering (C1) and understanding (C2), whereas in fact they are considered as lower order thinking (Turiman, Omar, Daud, & Osman, 2012). All conditions which occur in the process
of one-way knowledge transfer are inversely proportional to the constructivist philosophy which demands facts or phenomena for knowledge construction (Gunckel, 2010; Pedaste et al., 2015).

According to Zohar and Barzilai (2015), education allows students to gain Higher Order Thinking Skills (HOTS). Being identical to general education goals, discovery learning aims to gain HOTS, comprising: using (C3), analysing (C4), evaluating (C5), and creating (C6) teacher’s and students’ statements and questions, and therefore, this method presents a collective attempt to improve the cognitive process. In fact, only communication in the form of questions was identified in C3, C4 and C5. Therefore, it can be assumed that discovery learning enables teacher and students to change the cognitive process through curiosity by asking questions. The solutions and answers manifested in statements, however, were not visualised in similar cognitive processes. The imbalance of the change in cognitive processes based on the analysis of the teacher’s and students’ statements and questions creates a research gap to reveal further research on teachers’ competencies and supporting factors in intertwining effective communication.

Statements and questions accumulated in the knowledge dimension of concepts imply that understanding a concept is important to develop deeper comprehension since it serves as a representation of connection (Boles, Goncher, & Jayalath, 2015). Understanding of the knowledge dimension of concepts without that of supporting facts does not belong to the expected learning outcome. Gunckel (2010) proposes the Experiences-Patterns-Explanations (EPE) model of science, and states that a meaningful concept is obtained from many experiences, facts, and phenomena. The expected learning outcome is not limited to the understanding of the concept, but rather to the implementation of the concept in daily life. Analysing and creating something, which is related to problem solving, is a challenge for the learning outcome to fulfil. This confirms Kyllonen’s (2012) statement that the need for effective, efficient, and meaningful communication is an important skills requirement for the 21st century world of work.

The results of the analysis of the cognitive process using Bloom’s Taxonomy on communication in the form of the teacher’s and students’ statements and questions were found in questions which belong to conceptual knowledge with cognitive processes of C4 (analysing), and C5 (evaluating). The cognitive processes of C4 and C5 are included as HOTS (Khan & Inamullah, 2011; Turiman et al., 2012). In statements, however, similar cognitive processes were not found, or they were even found in a lower category. The fact that questions convey higher cognitive processes triggers an attempt to gain HOTS through discovery learning.

Limbach and Waugh (2010) and Oliveira (2010) stated that one effort a teacher should make to develop HOTS is that he should teach using convergent questions which require answers from C1,
C2, and C3, as well as employing divergent questions which require answers from C4, C5, and C6. Unfortunately, in the present case, the teacher has not optimally posed the divergent questions, and therefore, communication in the form of statements does not change the distribution of the cognitive process as well as the knowledge dimension, even by implementing discovery learning.

CONCLUSION
Discovery learning changes the teacher’s and students’ communication, particularly that in the form of questions. However, divergent questions were not mastered by the teacher, and therefore, the identified statements did not show the high level of the cognitive process. The change in the cognitive process on questions was identified to contain facts, concepts, and procedures with the cognitive processes of C1, C2, C3, C4 and C5, while statements of change were found in the dimensions of facts and concepts with the cognitive processes of C1 and C2.

ACKNOWLEDGEMENTS
The researcher would like to express her gratitude to the Indonesian Directorate General of Higher Education (DIKTI) for the PUPT (preeminent research in DIKTI) for the PUPT (preeminent research in higher education) research grant in the fiscal year 2015-2016. This gratitude is also addressed to school principals and biology teachers, as well as students who participated in the research.

REFERENCES


*Designing and conducting research in education.* 


The Effectiveness of a Continuing Professional Development Programme Using Direct Modality for Principals: A Process and Result Evaluation

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ABSTRACT

School Principals’ competencies could be improved through continuous professional development (CPD) programme. Such a programme for principals in Indonesia has been implemented through direct modality since 2014. However, the implementation of this programme has lacked evaluation. This research aims to (1) assess the supporting and inhibiting aspects that contribute to the programme’s success, and (2) measure the effectiveness of CPD in improving the school principals’ competencies. This research was a survey involving 46 school principals in three Districts of Central Java, Indonesia. Both quantitative and qualitative methods were employed in this research. Questionnaires and interviews were used to collect data, which were analysed using a descriptive quantitative method supported by data source triangulation. The research shows that (1) the training process has been implemented with appropriate components, including assessment, learning materials, and delivery modes. Nevertheless, training facilities, infrastructure, and locations are less than conducive to learning, and (2) CPD does not fully contribute to improving principals’ competencies, human resource management, and quality of instruction.

Keywords: Competencies, evaluation, principals, professional development

INTRODUCTION

School principals are teachers assigned to the additional task of leading a school. As leaders, principals have an important role in their schools’ development. Principals should conduct their duties with full mandate and be responsible for the quality of their schools’ performance (Sahenk, 2010). This
means that school principals have a major role in achieving the established quality standards (Luddin, 2013).

Under principals’ leadership, schools are expected to reach, or even exceed, the national standards of education as indicators of school’s quality. In achieving these quality standards, schools must have qualified human resources, and particularly, professional principals. As such, school principals’ competencies must continuously be improved through a continuous professional development programme (Luddin, 2013). This is in accordance with Ministerial Regulation No. 28 of 2010, which explains that all school principals must undertake a Continuing Professional Development (CPD) formulated for them.

**CPD for Principals with Direct Modality**

CPD for principals is widely acknowledged to be important for the pursuit of improvement in teaching and learning (Hargreaves, 1994; Harland & Kinder, 1997). In research literature, the relationship between the development of principals and schools is well established (Day, 1999). Though there are many interpretations of CPD, at its core is nothing other than reflection activities of professional learning. As Day (1999) suggests, CPD encompasses all natural learning experiences and those conscious and planned activities that are intended to be of direct or indirect benefit on both individual and group bases. Previous research projects have asserted that the quality of professional interaction, staff development, and relentless pursuit of teaching and learning improvement are the key characteristics of school effectiveness (Gray, 2000; Harris, 2002; Maden & Hillman, 1996). In addition, the research has acknowledged the importance of principals’ engagement in continuous development that meets their own personal and professional needs.

CPD for Principals is one of the four principles in the Professional Development for Education Personnel Programme (ProDEP) – an education partnership between the Government of Indonesia and the Government of Australia (Australia’s Education Partnership with Indonesia). The Workforce Development Centre, as the coordinator appointed by the Human Resources Development Agency of Education and Culture — Education Quality Assurance (Ministry of Education and Culture)—the secretary of the ProDEP programme—has worked in collaboration with the Australian government to encourage the implementation of CPD for principals. This programme has taken the form of personal development through training using Main Learning Materials (MLM). In ProDEP, CPD for Principals has been implemented through three types of modalities: direct modality, working group modality, and online modality. Of the three modes, CPD with direct modality has been widely implemented in Indonesia. Therefore, this study has focused on its implementation.

The **Technical Guidelines for CPD for Principals using Direct Modality**
Continuing Professional Development Programme

(Kementerian Pendidikan dan Kebudayaan: 2015) state that the CPD programme is a learning activity for school principals that is realised through direct guidance by the principals’ superiors. These superintendents mentor their subordinates, in this case the principals, through synchronous guidance throughout the training period. CPD for principals is organised by the Institute for Education Quality Assurance (LPMP) for the principals in the basic education level, i.e. elementary and junior high schools. The activity begins with the assessment of the performance of the principals by the supervisor. From the results of the performance evaluation, an analysis is conducted to determine the priority of needs through negotiations between the principals with the school superintendent. In this way, the priority of Main Learning Materials agreed to be given in one semester. An analysis of the learning materials needed by every school principal is done to determine their needs for basic training through an in-on-in pattern. This involves principals, school supervisors, and trainers. In the In-1 activity, the principals play the role of participants, school superintendents as companions, and trainers as facilitators. In the On (OJL) activity, principals act as mentees, superintendents act as mentors, and lecturers conduct monitoring and evaluation. In the In-2 activity, principals play the role of participants, the school supervisors play the role of assessors, and the trainers play the role of assessors (verifiers).

Evaluating CPD for Principals with Direct Modality

Particular school principals need professional development (Garet, Porter, Desimone, Birman, & Yoon, 2001). This is to ensure a positive impact at the school and classroom level (Hopkins & Harris, 2001). A lack of staff development opportunities, poorly conceptualised programmes, insensitivity to the concerns of individual participants, and irrelevance to school conditions seem to be evidence that the programme has had little impact on teachers’ or their pupils’ performance (Day, 1999). It is important, therefore, that any evaluation of CPD measures the gap between the objectives of the programme and its outcome.

A wide variety of methods can be used to evaluate the CPD programme. However, combined quantitative and qualitative measures will produce more holistic results (Creswell, 2003). A specific method of evaluation is required to measure each variety of programme, especially when CPD programmes are complex and multifaceted (Schwartz, Lichon, James, Melniz, & Olson, 1977). Evaluation of CPD usually serves two main purposes: summative and formative. These two goals can best be served by collecting data in different ways; for example, test scores are often used for summative assessment, while interview and survey data can be used for formative evaluation (Scannell, 1996). The subsequent step is data validation. To minimise bias, data must be collected from a variety of stakeholders, rather than just one group. In
addition, using a variety of research methods ensures a greater degree of validity (Smith, 2002).

For evaluation of CPD to be most effective, feedback on evaluation should be provided to participants where possible (Schwartz et al., 1977). Providing continuous feedback that is useful to programme developers is also one way of reducing the ‘excessive evaluation anxiety’ that is often found to be a problem in many evaluations. Such a problem is characterised by conflict with evaluators, refusal to cooperate, stalling and resistance, and trying to hide weaknesses of the programme. Evaluation anxiety often comes up as a result of negative past experiences with evaluation, high personal stakes in programme innovation, and fear of negative consequences—especially when evaluation is conducted by external parties or senior management.

Based on description of the execution of CPD for principals with direct modality, principals’ activities are designed to be ideal programmes because they are conducted in several stages and oriented towards sustainability. This design is recommended by studies by Desimone (2009); Garet et al. (2001); Hunzicker (2011); Lieberman and Pointer Mace (2010); as well as Penuel, Fishman, Yamaguchi and Gallagher (2007), all of which have stated that educators’ professional development is effective when its implementation is continuous and long-term. This implies that professional development in teaching and learning should be done gradually, from level to level. Additionally, other researchers have made another important recommendation: that effective professional development programmes be long-term and assessed for the purpose of programme redesigning. In fact, based on the research conducted by Visser, Coenders, Pieters and Terlouw (2013), the evaluation of professional development programmes in education has been found as a major benefit, in the sense that educators’ competencies are updated. This requires a study intended to evaluate the process and outcomes of CPD for principals utilising direct modality. The evaluation model that is relevant for that purpose is the Formative and Summative Evaluation Model.

The terms “formative” and “summative” need not be complicated. However, in the past few years, their definitions have become confusing. This is especially true for formative assessment. In a balanced assessment system, both summative and formative assessments are integral to information gathering.

This research focused on evaluating the process of the CPD program for principals utilising direct modality. This evaluation will show how much the programme has improved principals’ performance.

METHODS
This research was a case study which was conducted through a survey by involving 46 out of 79 basic and junior high school
Continuing Professional Development Programme

principals from three districts in Central Java, Indonesia. They are Districts of Sragen (SRG), Sukoharjo (SKH), and Purworejo (PWJ). The research employed purposive random sampling where the samples were assigned under two criteria. First, the participants were the school principals from the basic education schools with the minimum accreditation scores of B (Good). Secondly, all of the participants should have experienced the CPD programme for principals with direct modality that has been conducted consecutively since 2014. The data were collected by means of questionnaire and interview. The questionnaire was used to collect the quantitative data, while the interview was for and qualitative data. Prior to the employment of the instrument, the questionnaire was measured in terms of validity and reliability. Evidently, the construct validity showed that all 20 items of the questionnaire were usable to collect the quantitative data with the probability value of 0.904 under Cornbach’s Alpha. Beside the questionnaire, interview was also conducted among 10 out 46 participants to collect the qualitative data.

The data were then analysed descriptively upon the quantitative and qualitative measures. Percentage was used to measure the results of the main quantitative data. Additionally, the conclusion drawn from interview was used qualitatively to support the validity of the research findings of both the process and the output of CPD programme.

RESULTS

The results of this research focus on the two aspects of evaluation. They are the evaluations on the process and output of CPD programme of school principals.

Evaluation on the Process CPD Programme

On the questionnaire, the participants were asked to choose a number from one to five to best describe their experiences with the CPD programme that they had joined. To evaluate the process of the CPD programme, the participants were asked to respond to the questionnaire consisting of 8 (eight) items. The questionnaire was constructed using the Likert scale, where each responded item was scored in the range of 1-5. Scale 1 reflects the lowest value and 5 for the highest. A full description of the responded questionnaire items is given in the following table.
From the data above, claims with high averages are as follows: effectiveness of the learning material used in the training (4.0), effectiveness of the learning delivery (4.0), the method used in the training (4.0), effectiveness of the learning assessment (4.0), and effectiveness of learning activities (3.3). Meanwhile, the average scores were found for effectiveness of the training place in service learning (In-1) (2.5), effectiveness of the facilities and infrastructure required (2.8), effectiveness of the use of time in learning (2.8), and effectiveness of mentoring by supervisor (2.9). In general, the advantages of process conducted to run the CPD programme were found in the learning material, delivery system, method, and assessment of the training process. On the other hand, location, facilities, time allotment, and learning activities during the training process need special caution for improvement.

**Evaluation on the Output of CPD Programme**

The principals surveyed selected five of the seven listed activities that, in their view, should be ensured for their professional development. They judged the effectiveness of these activities on a scale ranging from 1 to 5, as follows: 5 (very effective), 4 (effective), 3 (rather effective), 2 (ineffective) and 1 (very ineffective). Although some responses had a value of 5, the averages were generally between 3 and 4. These seven factors are described in Table 2 below:

<table>
<thead>
<tr>
<th>The effectiveness of components in the process of CPD program</th>
<th>X</th>
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<tbody>
<tr>
<td>The training location in service learning (In-1)</td>
<td>2.5</td>
</tr>
<tr>
<td>Facilities and infrastructure required</td>
<td>2.8</td>
</tr>
<tr>
<td>Quality of the Main Learning Materials</td>
<td>4.0</td>
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<tr>
<td>Delivery of content in the Main Learning Materials</td>
<td>4.0</td>
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<tr>
<td>Use of time in learning</td>
<td>2.8</td>
</tr>
<tr>
<td>Methods used in the study</td>
<td>4.0</td>
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<tr>
<td>Assessment used in the training</td>
<td>4.0</td>
</tr>
<tr>
<td>Learning activities</td>
<td>3.3</td>
</tr>
<tr>
<td>Mentoring by supervisor</td>
<td>2.9</td>
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</table>
Three activities are considered effective in principals’ professional development. Among them are the creation of school development planning (4.4), developing the school curriculum (4.2), and finally the funds obtained to achieve the goals of education improvement. While the CPD programme for School principals is considered effective in managing the administrator in the school (3.5), and improvement of counselling activities in schools, it turns that CPD programme is not effective in improving the management of teachers in the school (2.5), and improving the quality of teaching and learning (2.8). In conclusion, creating the school development, curriculum development, and funding the school mission become important output of the CPD programme. Meanwhile, improving the system to manage teachers’ performance as to improve their instruction needs crucial attention in the CPD programme.

**DISCUSSION**

The evaluation of the process and output of the CPD programme of school principals can be developed in the following discussion.

### Evaluation on the process CPD Programme

As indicated in the results that CPD programme is very effective in the aspects of learning material used in the training (4.0), effectiveness of the learning delivery (4.0), method used in the training (4.0), and effectiveness of the learning assessment (4.0).

In terms of effectiveness of learning materials and delivery, CPD programme has been running since 2014. It means that within three years, the curriculum has been reviewed and experienced several modifications in such a way that it fulfils the needs of school principals in the respected areas. The instructors, furthermore, were selected from among the senior school principals and university lecturers. Additionally, these instructors fulfil the minimum requirement of training in the national level. Such a training is conducted in the Training Centre of School Principals under the Ministry of Education and Culture. Hence, the instructors are quite familiar with the sequences of the syllabi prepared for the presentation in the

<table>
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<tr>
<th>The effectiveness of components in the output of CPD program</th>
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<tbody>
<tr>
<td>Improvement to manage the teachers in his school</td>
<td>2.5</td>
</tr>
<tr>
<td>Improvement to manage the administrator in his school</td>
<td>3.5</td>
</tr>
<tr>
<td>Development of school curriculum</td>
<td>4.2</td>
</tr>
<tr>
<td>Creating school development planning</td>
<td>4.4</td>
</tr>
<tr>
<td>Fund raising to achieve its goals in the education unit</td>
<td>4.0</td>
</tr>
<tr>
<td>Improving the quality of teaching and learning</td>
<td>2.8</td>
</tr>
<tr>
<td>Improvement of counselling activities in schools</td>
<td>3.6</td>
</tr>
</tbody>
</table>
implementation of the CPD programme of school principals.

This fact is also supported by the statement of participant who commented,

“*I appreciate the main learning material used in this direct mode of CPD program is good because it is arranged in such a good sequence that each chapter reflects the actions that we should do to refresh and accordingly improve my school performance* (principal of District SKH).

More interestingly, other participant said,

“...*the learning material is presented in a very nice way. The use an advance organizer, for instance, really makes me impressed on the main ideas of the learning materials. Firstly, I could not figure out what it means when the instructor said ‘advance organizer’. Then...I realize that what the instructor is telling is not in the module but it is previewed through graphics and summary. Yet, I easily make the assignment well done in the activity of “In1 – On – In2”. Oh...great...and fun as well. Almost 90% of us could finish the learning assignment*” (principal of District PWJ).

However, some other principals argued that there were some components with low average. These include: (1) the effectiveness of facilities and infrastructures, (2) the effectiveness of the training place in service learning, (3) the effectiveness of use of time in learning, and (4) the mentoring by supervisors. These were all indicated by the facts that CPD participants did not like the training location. A big number of the school principals (85%) commented that,

“*the location of the In service learning (In-1) of CPD was not appropriate. As stated by some of the participants ....That is true the training takes place in newly established school building...but I sometimes cannot withstand with the smell from the cattle... I feel disturbed particularly when we are doing the assignment seriously...*” (principal from District PWJ).

Some other participants also complained about the learning facilities, including libraries and other sources of learning. Electricity and Wi-Fi connection were insufficient for the online modality of learning used. Some participants (60%) even complained about the facilities. For instance, the lack of electricity has caused serious problems during the learning activities. Nonetheless, other learning facilities such as classroom furniture are fully provided. However, internet connection is very bad since the electrical current is on and off so instructional presentation is frequently not running well. Not to mention the frequent Wi-Fi disconnection while browsing for additional learning material, which is the
worst during the learning process. As stated by a participant,

"...I often get frustrated in getting the assignment done due to the black out in the time when everyone is busy with browsing, and the class suddenly burst into messy crowd...." (principal from District SRG).

The limited electrical power caused frustration among the participants not only during the time when they were browsing for additional material, but also when they were trying to download the worksheet for urgent completion of final assessment as well as assignment. One participant grumbles,

"...how can I finish the assignment on time? Downloading the worksheet is impossible.... I wish the training programme provide printed example to make the assessment work ..." (principal from District SRG).

Another participant said,

"....learning activities are running quite well along the schedule. The learning materials are delivered in accordance with the time allotment. I am happy to have finished with the exercises in the module prior to training. Time for learning is so short. I notice some do not have enough break time even for revising the assignment to submit...." (principal from District SRG).

No one is believed to be able to work successfully beyond the overloaded burden (Bubb & Earley, 2007).

Evaluation on the Output of CPD Programme

Prior to the training in CPD programme, every participant was required to prepare a lesson plan as part of the curriculum applied to their respective schools. The researchers found most of them (85%) prepared good lesson plans, and also showed a better performance in putting the lesson plans into practice. They even showed the most
sophisticated media of learning during the practice. One of the participants commented that,

“the instructors were impressed with the media we prepared. The instructors also agreed with the lesson we prepared because it was already aligned with the policy of curriculum and syllabi that is nationally applied to schools” (Principal of District PWJ).

However, there were some other participants (15%) who had prepared the lesson plan poorly. These participants did not fully grasp the curriculum development in their schools. The reason is that the principals trust their vice principal too much with the curriculum development. It is evident that the two activities considered least successful by the principals are improving teacher management in school and improving the quality of teaching and learning. Nonetheless, such principals learn almost nothing from the training activities. One principal said

“...it seems that CPD programme, to some extend, had tried to give some guidance on how these principals learn better, but such principals remain unable to make changes on the improvement of teaching and learning in the very short time of CPD programme” (Principal of District SKH).

Another school principal also commented that,

“in general, managing the teachers to improve their instructional performance is not too difficult. The problem, however, is because each of the teachers has very different subject matter that is not trained in the CPD programme. The CPD programme mostly provides training to manage teachers in Science, Mathematics, and language. So, managing teachers of skills or counselling is not as easy as managing teachers of other subject matters. None of the school principals masters specific subject matter” (principal from District PWJ).

This means that, in spite of the fact that the CPD programme is well organized and implemented in the appropriate procedure in managing teachers’ performance, the quality improvement of teaching and learning depends much on the participants themselves (Bubb & Earley, 2007).

In general, it implies that the effectiveness of CPD implementation, as judged by the principals, varies. Data showed that CPD has the least impact on principals’ competencies in managing the teachers in their schools. In other words, the CPD programme needs to be modified so as to improve the principals’ competencies in making teachers perform better, with greater responsibility and accountability.
The second dissatisfying effect of CPD is the principals’ limited competence in improving teachers’ instructional performance in their classrooms. The limitation of the school principals in guiding the teachers in their respective school causes the problems in guiding teachers with specific subject matter which is beyond the principal’ knowledge. The school principal can go deeply on the technical aspects of instruction when he does not have the qualification nor knowledge of the respective subject matter. It implies that guiding the teachers on the improvement of teaching skill is limited to the general theory of teaching and instruction. In short, during the CPD training, discussion on the general principles of teaching and students learning is much fruitful for the school principals.

Hence, it is recommended that the implementation of the CPD programme for school principals using direct mode should be done in the respective areas with more appropriate environment and facilities. Along with the development of communication technology and easy access to information, the CPD programme can be implemented using a combined system of direct and online modes.

CONCLUSION

It can be stated that the principal training, through the CPD programme, has been implemented effectively, except for the issues pertaining to the location of the training and its infrastructure.

1. The implementation process of the CPD program went well in some aspects such as learning material and sophisticated media applied to the presentation through professional instruction. The problems seem to be more technical such as the limited facilities and comfort of the programme location.

2. However, the findings revealed that most principals did not consider the output of the CPD program as effective. The output of the training gives a little relevance to the condition of their school and has not improved the quality of the learning process at the school. This is related to the complex situation faced in the field when managing educators, particularly when comparing it to other components of the education unit.

REFERENCES


Civic Agriculture Concept as an Educational Strategy for the Formation of Good Citizens to Sustainably Protect the Environment

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2Geography Education, Faculty of Teacher Training and Education, Universitas Sebelas Maret, Surakarta, Indonesia.

ABSTRACT
This research shows that in agrarian countries, the farmers’ life pattern changes from agricultural to non-agricultural. This condition is caused by their low access to lands, which results in poverty and lost generation of the farmer. This research used the socio legal approach, which is the integration between legal research and social research. The results of research: 1) Civic agriculture is a concept, which is developed in a society, which bears agrarian potentials in which the citizens are aware of their agrarian culture identity. The concept of civic agriculture is relevant to the theory of ecological citizenship as a form of awareness to perform collective movement which is based on the bond of citizenship in an agrarian country; 2) The important thing to do is to create citizens’ awareness to know more about civic agriculture; therefore, the citizens will have responsibilities and concerns in applying it in their attitudes as to implement citizens’ abilities in utilising land as agrarian resource in order to preserve sustainable environment. The developed educational strategy is oriented to the adherence to the agrarian laws as to prevent the land utilization for merely personal and economic interests.

Keywords: Citizen, civic agriculture, education, strategy

INTRODUCTION
As an agrarian nation, Indonesia has potentials to support the sovereignty of world’s food; this should have implications for the improvement of food security and protection of agrarian resources. Lands as
resources should be able to bring prosperity for the citizens.

Data issued by the National Land Agency of the Republic of Indonesia in its Strategic Plan of Years 2010 – 2014 regarding the use of land in Indonesia showed that the use of land in Indonesia is currently not in compliance with its potentials as an agrarian land, as indicated by data which revealed the narrowing of agricultural land in Indonesia from 1990 to 2012. Of 8,481,754 hectares (Ha) of agricultural land, the width decreased to 8,068,529 hectares (Ha). Thus, for 22 years, Indonesia has lost the agricultural land of 413,225 hectares (Ha), or about 4.8% (Rejekiningsih, 2014, p. 70).

The availability of land for agricultural activities becomes one of the factors associated with the fulfilment of food needs. AKATIGA Foundation (Maguantara, 2005, p. 25) claims that “in the agrarian nations such as Indonesia, the main cause of poverty and lack of food is the low access of rural people to the land.” The low access of citizens to the land can be identified by the inequality of land ownership in the countryside, which contrastively shows the life of rural population between large landowners and the majority of poor villagers.

Civic agriculture is a concept developed in communities that have agrarian potential or agricultural lands. Citizens, as the part of agrarian community, should have agrarian awareness and cultural identity, primarily associated with the sense of solidarity and responsibility to live together. Land, as a social space whose existence guarantees the agrarian life, should be used as a place for social and cultural bond. Citizens’ awareness of the existence of land as shared social space will prevent the use of land which is only oriented to individual and economic interest.

In the global era, almost all nations in the world encounter various problems and conflicts including energy issues and depletion of natural resources. Thus, it is important to establish citizens’ readiness especially the young citizens, who have the understanding and skills needed to engage and participate in the life of world’s communities. One of the efforts is inculcating civic knowledge, skills and attitudes through education, both inside and outside school (Wahab & Sapriya, 2011, pp. 235-236).

The global economy is on the welfare of all organisational stakeholders through a sound social environment for effective human interaction in managing contemporary ideas and values (Arora & Arora, 2005, p. iii). According McClintock, Pallana, and Wooten (2014), “whereby innovative agriculture should also protect the natural resources, landscape, and soil water, and increase the environmental” (as cited in Mohd-Azmi, Jesse, Sarah, Zuraidah, & Hambali, 2016, p. 910).

As an agrarian nation, it is important to establish a citizen who has a commitment as agrarian citizen, especially in preserving agrarian resources for the benefit of people’s welfare. Agrarian resources covering land, water, space, and natural resources are
gifts from God the Almighty to the people of Indonesia and are national assets that shall be protected and preserved in their function as part of sustainable environment. Therefore, they must be managed and utilised optimally for the present and future generations, in the context of a fair and prosperous society. The availability of agrarian resources in this globalisation era becomes the problem encountered by all nations in the world, particularly nations that have agrarian potentials. In agrarian nations such as Indonesia, the main cause of poverty and lack of food is the low access of rural people to the land as an agrarian resource.

Civic agriculture instils the spirit of collective awareness of the importance of utilizing land for agricultural activities, especially in countries with agricultural potential, so that it becomes the source of life for all peoples, mainly farmers. So important is the effort to form knowledge, skills and attitude of citizens who have the potential of agriculture in order to develop the concept of civic agriculture.

This research is a development of research dissertation researcher on the Citizenship Education Study Programme, Graduate School of Education University of Indonesia 2014, entitled: The Land Law Enforcement in The Implementation of The Social Function Principles to Land Rights (The Role of Citizenship Education Study for Establishment of Legal Citizen Awareness). The results showed that the Civic Agriculture, who have the competence to maintain balance individual interests, social interests and the public interest on the ground, and the ability using the right to land. Based on this research, the development should contribute to the formation citizenship education awareness of citizens to keep the benefit of sustainable natural resources for future generations.

It is important to know the concept of civic agriculture and develop educational strategy to establish good citizens who have a commitment as agrarian citizens, especially in preserving agrarian resources for the benefit of people’s prosperity.

METHODS

The implementation of this research happened scientifically, as it was in the normal circumstances in which the state and condition were not manipulated, which emphasised the natural description. Data of research were collected through natural circumstances or natural data collection. Therefore, this research required direct involvement of researchers in the field (Lincoln, & Guba, 1985, p. 97).

This research used socio legal approach, which is the integration between law research and social research. The use of this approach was intended to understand the relationship and linkage between law aspects and reality in society. In this context, the law was seen not only as an independent or esoteric normative entity, but also as a real part of social system related to other social variables (Soemitro, 1998, p. 34).

Characteristics of socio-legal research methods can be identified through the following two points (Bedner, Irianto, Michiel, & Wirastri, 2012, pp. 5-6). First, a
socio-legal study of textual studies, articles in legislation and policy can be analysed critically and clarified the meaning and implications of legal subjects. Second, socio-legal studies develop new ‘methods’ between legal methods and social science.

This research was conducted in cooperation with *Konsorsium Pembaharuan Agraria (KPA)*/The Consortium for Agrarian Reform, Jakarta, which has done an innovation to establish *Desa Maju Reforma Agraria (Damara)*/Advanced Village of Agrarian Reform because the KPA via Damara focuses on the development of children, youth, farmers, women, integrative agriculture, and education, democracy. The establishment of Damara should be done as the effort to transform the village into the concept of agrarian reform, the land control as an agrarian resource, which can bring welfare to the people, especially farmers.

The data of research were collected through:

1. Observation, with the object of research is Damara.
2. Interview with the KPA, coordinator of Damara, *Serikat Tani Rukun Makmur dan Paguyuban Petani Penggarap Tanah Oro-Oro (PPTO)/RukunMakmur Peasant Union and Oro-oro Land Cultivator Community and Kelompok Perempuan Sekar Jagad/Sekar Jagad Female Group in Pundung Sari Village, Semin Sub-district, Gunung Kidul Regency, Special Region Province Jogjakarta (DIY).
3. Content analysis on various secondary data obtained during the research for further analysis such as Annual Report of KPA in 2015 and Assessment of Damara of Pundung Sari Village, Semin Sub-district, Gunung Kidul Regency, Special Region Province Jogjakarta (DIY).

The data were analysed by using interactive data analysis, which consisted of three flows of activities performed simultaneously, namely; data reduction, data display, and conclusion/verification (Miles & Huberman, 1984, pp. 21-22). Data reduction was performed though selecting data, drawing attention on important matters, identifying the sources of data, and categorising the data. Data display included the summary of data equipped with schemes and diagrams. Conclusion drawing/verification was done through interpretation process and determination of meanings of the displayed data.

**RESULTS AND DISCUSSION**

**Concept of Civic Agriculture for Maintenance of Agrarian Resources in Rural Areas**

The findings of the research show that agrarian countries such as Indonesia are currently faced with traditional agricultural life pattern, which is merely oriented to agricultural land utilisation, neglecting its maintenance. Most of farmlands are dominantly controlled by landlords as their owners. Meanwhile, the farmers merely play role as farm labourers. This condition leads them to think the fulfilment of their
personal needs only as they do not own any control for the farmland cultivation. As a result, the sense of togetherness in farmland cultivation starts to diminish, leading to the loss of identity and self-awareness within bond of citizenship in agrarian countries with agricultural potentials. Many farmlands have been converted to non-agricultural functions, which causes the environmental ecosystem sustainability to be not preserved anymore. Even the environmental ecosystem encounters damage due to pollution. The farmers are under pressure because they are unsecured in doing their farm. They frequently experience crop failures and bad marketing process of their agricultural products. This condition emerges because the agricultural life has not been guaranteed by both the government and the spirit and mindset of the farmers, and the existing agricultural affairs have not been integrated with other fields particularly economy and technology.

A 2005 study (Social Security Office, 2005) revealed that more than 30% of agricultural workers were in debt. The amount of debt among these agricultural workers increased significantly as compared to the level of household debt among workers in general. Globalisation has a direct effect on farm worker stress. Land is the important natural resource for Thai farmers. In the past, Thai farm workers had a lot of land. At present, Thai farm workers are selling land to the capitalist class so their land holdings have decreased. This has had an influence on stress (as cited in Kaewanuchit, Muntaner, Labonte, & Johnson, 2015, p. 170).

Citizenship is the relationship of the individual not to another individual or a group, but essentially to the idea of the state (Heater, 2004, p. 1). While globalisation raises problems about the relationship between the individual and macro societal structures, the second set of forces leading to a revival of the nation of citizenship concerns the relationship between human beings and nature (Turner, 1993, pp. 1-2).

This condition brings about important implications to the concept of citizenship, which is based on the theory of ecological citizenship. Deane Curtin (as cited in Isin & Turner, 2002, p. 293) claims that “ecological citizenship is promising because it resonates deeply with Western ideas about what it means to lead a full human life.” Ecological citizenship discusses about how man as an individual whose self-identity (moral identity) adapts with environment as to own community. Kalidjernih (2010, pp. 160-161) claims that because human beings rely on nature, environmentalist movement occurs and tries some effort to preserve environmental sustainability to prevent environmental exploitations, and to promote accountabilities of natural resources. Man is responsible not only for human beings but also tofor nature.

Civic agriculture is a concept that is developed in the communities that have agrarian or agricultural potentials. Citizens as the part of agrarian communities must have awareness and identity of agrarian
culture, primarily related to the sense of solidarity and responsibility to live together.

Theory of civic agriculture is very important to be developed on the agrarian communities with agricultural potentials due to increasingly vanishing identity. A movement is required to make the citizens aware that they must have orientations to preserve the environment so that its potential as an agrarian country is preserved sustainably and collectively with full sense of responsibility.

Civic agriculture can promote citizenship and environmentalism within both rural and urban settings not only through market-based models of economic behaviour but also through common ties to place and physical engagement with that place. The nature and potential of civic agriculture not only as an alternative strategy for food production, distribution, and consumption but also as a tool and a venue for “grounding people in common purpose” for nurturing a sense of belonging to a place and an organic sense of citizenship” (DeLind, 2002, pp. 217-224).

To apply the civic agriculture, the following four aspects must be performed:

1. Giving the farmers some understanding that they are not only individual human beings as they are doing agricultural activity to fulfil their daily needs, but also social human beings as part of citizen who have a purpose to utilise the land for collective agricultural business. Therefore, the agricultural activities are oriented not only to the agricultural infrastructure from each farmer, but also to the strengthening of the togetherness feeling in managing agricultural land to fulfil mutual interest.

2. Caring and paying attention to the farmers, in order to create safety and a peace of mind in doing agricultural business. It is a duty not only for the government through its connection to the farmers, but also for the farmers through collective cooperation pattern.

3. Considering land as a mutual-living space, containing history, culture, custom, and future for the entire human races. It is important to develop responsibilities and respects for the land, through environmental maintenance, awareness of the land’s values and acceptance toward cultural practice for land preservation.

4. Developing passion and collective responsibilities to utilise land for social collective space in relation to social culture.

The concept of civic agriculture is closely relevant to the theory of ecological citizenship as a form of awareness to perform collective movement which is based on the bond of citizenship in an agrarian country. Civic agriculture prioritises the sustainable maintenance of farmlands by integrating it with the pillars of economic life so as to bring prosperity to all citizens. Meanwhile, ecological citizenship is a community awareness movement within the bond of citizenship which has responsibilities toward the nature and environment.
Civic agriculture also has aligned with Damara initiated by the KPA since 2013, and since 2016, Civic agriculture has been applied in several rural areas. One of which is Pundungsari Village, Semin Subdistrict, Gunung Kidul Regency. Damara Programme exists due to the primary problems experienced by the agrarian countries, namely: (1) the land tenure is unequal/the land ownership is limited; (2) the cultivation techniques and appropriate agricultural technology do not evolve; and (3) the capital growth is low. Such problems make the economic growth in rural areas slow and creates poverty pouches. As a result, the villagers of productive age are not interested in agriculture, but they prefer working as cheap labourers in urban areas or as Indonesian workers overseas. The surplus of productive age labours for agriculture in rural areas is absorbed by other sectors outside the villages.

Damara is a programme formed by the KPA, which attempts to transform the village in the concept of agrarian reform, namely, to control the land as agrarian resources that can bring prosperity for people, especially farmers. The KPA as the initiator of Damara has a passion to “Build the Village”, based on the fact that village with its people and area has high economic potentials. Damara develops the integration concept between land ownership and land protection to keep its utility for agricultural activities, for keeping the land away from non-agricultural functions. According to the KPA, this concept is the implementation of agrarian reform programme in the forms of asset and access reform. Damara focuses its development in certain aspects, such as children, youth, farmers, women, integrative agriculture, education, and democracy implementation. Education is an activity conducted in Damara through optimising the capacity of local organisation in the village as an effort to solve agrarian dispute in some areas.

Damara is established due to several issues, situation in the middle of society such as agrarian conflict, agricultural resource disposition, and village exploitation. It urges the society to solve the dispute such as structural disparity in asset ownership and management. Damara is a term used to develop village sovereignty through power management, governance, production management, and ownership planning. There are many activities in Damara, which are concerned with the agrarian reforms such as establishing organisation, empowering local society through educational activity and training, building passion and awareness for local society related to agrarian living, conducting economic consolidation in the village, solving agrarian disputes in the local society, and many more.

Galih Andreanto from Department of Campaign and Advocacy of the KPA, argues that Damara programme in the form of management, governance, maintenance, and ownership is integrated and based on social justice, managing people’s economy to prevent people from selling their land to merely achieve prosperous living. Damara’s agrarian reform process is started by solving agrarian or ownership dispute (power
management), and it is then followed by the governance in the form of Sustainability Land Use Planning (SLUP). Next, it goes to production management (started from individual to collective bases according to the local village’s economic potentials). The final process is a consumption and distribution management. This agrarian reform programme runs structurally with the intention to solve the agrarian disputes in society.

The findings of the research in Damara Programme in Pundungsari Village, Semin Sub-district, Gunung Kidul Regency, showed that several activities performed are in harmony with the concept of civic agriculture, namely: (1) Giving a certainty on land-ownership asset for farmers, who previously do not have; (2) Providing financial assistance for farmers in the form of easy-access credit; (3) Providing protection in the form of advocacy for farmers to do agricultural activities; (4) Providing easy-access for new information and agricultural technology assistance; (5) Creating awareness of agrarian law (land); (6) Providing education and training; and (7) Providing easy-access to production facility and marketing assistance.

Land maintenance, as the part of environmental maintenance in Damara, is conducted by forming and recruiting trainers from every training centre. Giving the sustainable eco-knowledge includes power, utility, consumption, and distribution management to society. Principally, land utility is done in collective, democratic, eco-friendly, and ecology-oriented way, which is pointing on justice and people’s prosperity in areas with agrarian characteristics.

At the end, the sustainability of Damara hopefully can make the citizens devoted to their land more, by keeping its characteristics as agrarian land by developing agricultural business and production management integrated to local business through village cooperative establishment in order to make real impact for villagers’ prosperity.

Land as social space whose existence guarantees agrarian live should be able to become a space in establishing social cultural relationship. Citizens’ awareness toward land as shared social space will prevent land utilization merely for personal-oriented and economic interest. Civic agriculture defines thoughts of citizens who are capable of utilising the land for agricultural activity, which is integrated to economic activities that is oriented to the production capacity, agricultural products and food crops marketing and who have responsibilities to preserve the land as shared living space on behalf of citizenship in agrarian country.

This concept goes well with Damara’s programme to transform the village toward agrarian reform concept, which is land mastery as agrarian resource that is able to gain prosperity for the entire nation, especially farmers. The activity is oriented to utilising the land for collective interest and increasing people’s prosperity equally through land utilisation for agricultural production activities. Damara programme is concerned about agrarian reform, which is a continuous process related to land
arrangement as fair, sustainable, and eco-friendly agricultural resources. It is also well-coordinated, integrated, and accommodative to dynamics, aspirations, and participations of communities. Civic agriculture is integrated into Damara programme which is concerned about social transformation in conducting land utilisation for ‘agrarian-traditional’ agricultural activities; it becomes social structure where agriculture is no longer exclusive but it is integrated to support an objective, to achieve equal prosperity for all people.

Civic agriculture is a concept, which is developed in a society, which bears agrarian potentials in which the citizens are aware of their agrarian culture identity. Civic agriculture is based on the knowledge of land existence as a collective social space so that it induces collective relationships and responsibilities.

Civic Agriculture Concept as Education Strategy to Form Good Citizens in Utilising Agriculture Resources to Preserve Sustainable Environment

Civic agriculture engraves collective awareness spirit and the importance of utilising the land for agricultural activities, especially for nations with high agrarian potentials; therefore, it becomes a livelihood for all people, mainly farmers. It is essential to form citizens’ knowledge, skills, and attitudes in order to develop the civic agriculture concept.

The important thing to do is to create citizens’ awareness to know more about civic agriculture concept. Therefore, the citizens will have responsibilities and concerns in applying it in their attitudes as to implement citizens’ abilities in utilising land as agrarian resource in order to preserve sustainable environment.

It is very important to form knowledge, attitudes and skills in the civic agriculture concept at young generations as young citizens in the agrarian potential nations. Farmers as the actor of agricultural productive activities will have a replacement for human resources by establishing the awareness on young generations who are able to develop civic agriculture concept. Thus, the young citizens who have knowledge, attitudes and skills as well as civic agriculture concept will be formed. Young citizens in the civic agriculture concept are able to develop their knowledge toward ecofriendly agricultural concept, an attitude which supports the establishment of responsibilities and concerns as the agrarian citizens, also agricultural activities oriented to efficient technology and productive economy.

Riyanto (2009, p. 43) claims that civic education can be used to form good citizens. The purposes of Civic education are in harmony with the concepts developed in civic agriculture, namely citizens who have a sense of nationality and patriotism especially national identity awareness as agrarian nation, the strengthening of the personal welfare improvement and social welfare, and the strengthening of social skills and intelligences.

Heater (2004, p. 1) claimed that the civic identity is enshrined in the rights conveyed
by the state and the duties performed by the individual citizenship, who are all autonomous persons, equal in status. Good citizens are those who feel an allegiance to the state and have a sense of responsibility in discharging their duties. As a consequence they need the skills appropriate for this civic participation.

Winataputra (2001, pp. 317-318) claims that the development of all aspects of human personality requires Citizenship Education, which includes knowledge, values, attitudes, and skills to be good citizens. According to Sapriya (2012, p. 23), as an academic study, Citizenship Education is an integrated discipline and generally has a speciality in which the domain of its study is multi-faceted with cross-disciplines. Such concept indicates the integrated linkage of Citizenship Education to other various disciplines to encounter multidimensional civic affairs. The multidimensional civic affairs require various approaches to encounter them. Civic Education which integrates various fields of science has contributions to the development of all aspects of the personalities of citizens which include knowledge, values, attitude, and skills of the good citizens so that they are able to participate and to have responsibilities in the life of community, nation, and state.

Citizenship Education methodologically is a science which is a development of social study tradition, namely: citizenship transmission (Barr, Bart, & Shermis, 1978, p. 18). This development develops into a scientific structure which is known as Citizenship Education with systemic paradigm that contains three domains, namely: academic domain, curricular domain, and social and cultural domain (Winataputra, 2001, pp. 317-318). In general, the objective of Citizenship Education development is to cause every citizen to be a good citizen in terms of Civic Intelligence, Civic Responsibility, and Civic Participation. Furthermore, according to Jarolimek and Parker (1993), the primary missions of Social Studies are to help the students to learn (1) social world where they live and how they learn to solve social realities; (2) civic knowledge; (3) attitudes; and (4) civic skills, and to participate in community life (as cited in Wahab et al., 2011, pp. 99-100).

To apply the civic agriculture, an approach is required as Citizenship Education requires in an attempt to shape good citizens so that they have abilities to apply the civic agriculture. In the concept of civic agriculture, farmers as citizens do not have individual perspectives anymore, but they have a strategic role to participate and a responsibility to preserve the lands as sustainable natural resources for the greatest prosperity of the people.

The education conducted is integrated in various training programs which are implemented for the farmers as well as for the young farmers. Civic Education can be done by formal institutions in school level, youth organisations, or social institutions, for example farmer group or farmer organisation.
Based on the research findings, an education model is developed, which has a civic agriculture concept with the perspective of Civic Education as to establish good citizen at Damara. Several activities of training have been conducted, which aim at conducting educational activities both on farmers and young farmers and which are relevant with civic agriculture concept.

Of the various activities of training, the citizens’ knowledge formation is crucial. It includes knowledge of land law, organic agriculture, appropriate agricultural technology, and cooperative activity. Furthermore, from such knowledge, some skills that the young generations at Damara should have are developed. The skills include organic farming skill, appropriate agricultural technology creation, compost-making (naturally), irrigation system-making, land identification, and the skills to manage rural economy based on agrarian reform. The attitudes that must be owned as the heir of the farm at Damara are disciplined, obedient, honest, brave, solid, intelligent, open and active.

Civic Education is relevant at the level of farmer organisation in cooperation with school institutions. The role of educational institutions is to establish knowledge, attitude and skills of the young generation, which is relevant to civic agriculture at Damara including: 1) Educational institutions that can play the role to guide the implementation of Damara by implementing the agricultural education collaboration, cooperatives and agrarian law; 2) Establishment and recruitment of trainers in each Damara training centre; 3) Provision of easiness to the young generation in learning about the knowledge of land and agrarian law; 4) Provision of socialisation and agricultural technique training; and 5) Provision of scholarships for young people who want to get involved in the agricultural sector.

It requires educational strategies to empower the young generation of farmers, which include: (1) Persuasive education for rural welfare; (2) Implementation of andragogy education (adult education) with keep digging the skills of young generation of farmer; (3) The growing of a strong interest to the young generation of farmer in case of land benefit as the agrarian reform-based agrarian resources; (4) The growing of awareness through periodic training socialization and activity evaluation; (5) The implementation of agricultural practice in field for the young generations of farmers; (6) Preparation of agricultural curriculum in school level, particularly in vocational high schools.

Civic agriculture concept strategically fits to be done through Civics education both at formal institutions and at informal institutions in farmer organizations or farmer groups at the area which has potentials as agrarian area.

Education which is able to develop civic agriculture is very important to do as the effort to supply the young citizens in facing the global era challenges to keep the sustainable agrarian resources for the next generations. Civic agriculture becomes the objective to create citizens’ competencies which have skills to process the land as
agrarian land based on the principles of the use and utility of equitable land which is based on agrarian reform. The developed educational strategy is oriented to the adherence to the agrarian laws as to prevent the land utilisation for merely personal and economic interests.

Education strategy of the civic agriculture can be done through formal education of Citizenship Education and/or can be integrated with other relevant subject matters including extracurricular activities at Primary School through University, particularly in the areas with agrarian potentials. In addition, it can also be taught at Youth and Community Organisation and family.

The concept of civic agriculture through education in the community aims at forming the important knowledge for agrarian citizens, particularly the farmers of young generation so that they are able to well manipulate the realities they encounter as parts of agrarian communities. In addition, it also forms behaviours which are capable of sustainably preserving the environment-based lands for the future generation. Its primary objective is to form competencies or abilities of citizens who have business skills integrated with economic activities as to reach the greatest prosperity of the people.

CONCLUSION
The availability of agrarian resources particularly land in the global era becomes the essential need for citizens in a nation which has potentials as agrarian nation. Every agrarian nation should make efforts to protect their land in order to sustain its usefulness for the next generations. Education becomes the important tool to create citizen’s awareness about knowledge, attitude and skills in preserving lands in order to preserve its potential as agrarian land. Civic agriculture concept is an alternative solution to face problems due to the use of agrarian land which does not consider the land usefulness for the greater welfare of the people.

Education strategy which is able to develop civic agriculture should be done to create good citizens in utilising agrarian resources in order to protect the environment, which is done by creating citizens’ knowledge, attitude and skills oriented to obedience toward the agrarian law as to prevent land utilisation for personal and economic interest. Education attempts to transform toward a society which is fair and prosperous, based on the utilisation of agrarian resources in agrarian reform.

REFERENCES


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