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Edutainment Games and Mental Skills

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ABSTRACT

Easy edutainment games are usually found on the internet, which reinforce different mental skills in users/players. These games that are mostly originated from card and board games of ancient times are able to enhance complex mental skills and concepts in their users with simple yet subtle methods. Different researches have used different criteria to assess video games; however, no specific study has attempted to analyze the educational aspects of free, simple, and low volume internet games that are made by non-famous and non-mainstream game producers; the games that absorb a more extensive population of players at more different situations of everyday life. The study, on the basis of the cognitive theory of learning, targets these easily accessible games that are made by very small budgets and are often played as hobbies by people from different age groups, compared to high-budget games that target specific players of specific skills and ages. This study resulted from a research on 100 free and easy to access internet computer games, attempts to examine them on the basis of a list of mental skills from the previously available literature. The outcome of the study is two comparative tables, the results of which show that free, simple, and low volume internet games also play a great role in promoting mental and feeling-related skills and should be taken more seriously than mere hobbies.

Keywords: Computer & video games, edutainment games, game, mental skills

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INTRODUCTION

It's over a decade that video-computer games (VCGs) industry has changed into a profitable, even more than Hollywood industry. It seems that the main customers of this industry are young children and destructive effect of unsuitable contents

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(violent and sexual) available in these games has caused a moral panic, even in western societies. Yet, educational benefits of these games are so remarkable that researchers and pedagogists cannot neglect them. According to Gee (2003), there have been considered 31 progressive educational principles, which are not found in educational systems of the world.

In recent years, the development of information technology is rapidly grown under the popularization of the Internet. Pedagogy and teaching strategy tend to become the integration of digital learning environment, for which digital game-based learning is an example. Digital game-based learning is a relative new interdisciplinary research field which combines the game theory, learning theory and information technology processing. Various studies pointed out that integrating the "game" into learning process is a great positive and effective way for learning. It could be taken into account that digital game-based learning is strongly an interactive learning method because most of children like games (Gee, 2003; Kim & Kim, 2005; Nagy, Komuves, Bojda, & Iszaly, 2005; Prensky, 2007; Shaffer, 2006).

With the variety of growth of games, the attention has been turned into the educational aspect. Yet, educational aspects are not limited to merely educational games but they consist of simple games (such as card games) the educational capacities of which are little paid attention to. These games are easily and freely downloaded from the internet or can be played online. In this paper, having studied 100 simple and easy to access internet games, we tried to elicit their educational capacities.

In order to provide a literate regarding this group of games that are classified into edutainment category, in the following we define the educational aspects of traditional games first, and then we consider the new entertaining capacities provided by modern video games, and in the end we talk about the simultaneously educational and entertaining opportunities of these modern video games.

Educational Games

Human being has attempted to transfer concepts and experiences through various media. Therefore, edutainment games are not human being's new invention. They are games basically designed and manufactured to educate a special topic, to expand the concepts and to make the people understand specific skills during the play.

Game has a long history and even scholars cannot investigate the origin of game and the time it came to exist. Psychologists think that the infants start to play game in their childhood and the first game they become familiar with is to play with their hands (Garner, 1998). When they grow up, they will find more ways to play their hands, such as: grabbing objects, using hands to make things to other appearance, and so on. Besides the function of game, it is also a method for children to know things. Many researchers find that games do not only existing in the human society

but also games exist in the life of mammals. Thus, Karl Groos the German biologist modified Spencer's conserving mental theory (Spencer, 1968), and Schiller's surplus energy (Evans & Pellegrini, 1997), proposed an evolutionary instrumentalist theory of play (Groos, 1912). He proposed that playing game is not an activity without a purpose but a preparation for the real life in advance. Giving examples such as playing house is a game for girls to be familiar to the housework and piggyback fight is a game for boys to gain physical power to withstand enemies for someday. In addition to the above games, there are some classic paper-based games like hang man, crossword, and Sudoku. These games are all popular and famous. The reason why they are successful games is that the game can attract people and lead people to ecstasy state. The usage of these games is approximately to develop skills or just for fun. As time goes by, people know the importance of education and also realize that games are not merely for fun but also can ease the tension atmosphere. And this is the original idea why people combine learning and play together. This is the origin of game-based learning (Hsu, Wu, Huang, Jeng, & Huang, 2008).

Since game is a human activity and not a specific subject matter, the nature of this inquiry is decidedly interdisciplinary (Bittanti, 2004). In fact, these games are various types of simultaneous combination of entertainment and educational skills. Huizinga (2016) wrote, "Let my playing be my learning, and my learning be my playing."

One notable characteristic of these contemporary games is the emphasis placed on maintaining an enjoyable gaming experience, which is often prioritized over the regularity and frequency of learning content. Whereas this may initially seem a misguided approach in consideration that a positive learning outcome is the ultimate goal, one must consider that the effect of doing the opposite, that is, prioritizing learning content over gaming, is considerably worse. Without an immersive gaming experience, the benefits of using games as a motivational vehicle for learning become compromised. It has been identified by a number of authors that an educational game must be a game first and an educational tool second (Peirce, Conlan, & Wade, 2008).

Games provide a forum in which learning arises as a result of tasks stimulated by the content of the games, knowledge is developed through the content of the game, and skills are developed as a result of playing the game (McFarlane, Sparrowhawk, & Heald, 2002).

Educational games, basically mind dependent, which are generally known as edutainment games are classified into board games, card games, and video games, explained as follow.

Board Games

Board game is a game with specific rules formed by displacing elements on a board or sheet. There are different games, some of which are at the preliminary level and free from implicit concept. Board game is of a long history among societies with samples

found in Egypt, Mehen, in China, Go, in Maya, Patolli. The oldest game is Senet in Egypt dating back to 3500–3100 BC. The most strategic game is Weiqi, considered as a superior are along with painting, music and calligraphy in ancient China and Confucius focused on using it in Analects (Bell, 1980; Parlett, 1999).

In this game, simple movements brought various and complex destinations and they prevented from withdrawing against the opponent propagating mental skills. Although Weiqi is a set of current rules in simple geometric models on the game board, there appears a complex interaction and balance that reflects different stations of life while using real and unreal world representations. The created models in this game are but artistic achievements to insight realized through creative spirit.

The main indices on which board games are based are chance, strategy, and diplomacy so that the best game exploits all these three. Diplomacy is the most interesting factor meaning the cooperation in play posed in three or more person games. Its aim is to prevent from other superior opponent's victory.

The most important feature of board games is the need to high concentration and adequate mastering on all aspects of games such as possible movements and predicting different situations, consequential interactions with opponents on turning the loss to victory in one moment. Board games with specific rules organize the aggressive tendency of human being while teaching various methods of overcoming undesirable situations (Gobet, Voogt, & Retschitzki, 2004).

Many scientific researches show that chess game as one of the ability most well-known of board games increases reading, mathematical reasoning and intelligence the cause of which has been related to brain connections.

Card Games

Card game is a game that uses specific cards, directly. They are classified into different versions based on their origin and use. The victory of card games dates back to the ninety century A.D in china. Its modern version dates back to the late 1300 in Egypt in the form of a 52 set of paper cards. These cards represented an artistic ability in their production and the artists tried to enhance the artistic quality of the cards through using modern methods or capabilities (Katz, 2004; Rau, 2004).

Some cards have been designed to teach indirectly particular subjects in the field of history or mathematics and in general to increase memory power.

Card games can help to increase some abilities such as team working, strategy, logics, intuition, and risk assessment in players. They can increase abilities of classification, counting, prioritizing, follow-up spirit, and endurance.

Recently, Charles R. Nesson, a professor of law faculty in Harvard University founded an association entitled Global Poker Strategic Thinking Society (http://gpsts.org) to introduce the benefits of card games where the law students try to

increase their capacities through playing card games. According to professor Nesson, playing card games helps to bring up more knowledgeable lawyer.

Professor Arnold I. Barnett, from management faculty in M.I.T, says that there are many problems in poker that can let students understand the red situations of life. The researches of the past two decades show that the students playing card games in schools have higher potentiality in learning (Rivlin, 2007).

Video Games

While it took several millennia for games to evolve from being played in a sandbox to a virtual video world, it has taken only a couple of decades for video games to progress from mere moving dot and lines (e.g., *Pong*) to three-dimensional graphical avatars playable on the Internet (e.g., *World of Warcarft*). At one time, particularly in the 1970s, the term *video games* meant "games played in a video arcade." However, in today's context, the term is used broadly to include all digital games playable on a device with video screen, which would include computers, game consoles, cellular phones, and mobile devices.

Video games and computer games have become an important part of young people's lives particularly in advanced countries. Young people are often called the Net Generation (Lippincott, 2005; Topscott, 1999), the Gamer Generation, and Digital Natives because they have embraced and learned to speak the digital language of computers, video games, and the Internet (Carstens & Beck, 2005). However, the impact of growing up with digital technologies is unclear. The assumption is that digital technologies are changing the new generations' values, learning skills, and educational achievements (Prensky, 2001). The interest is increasing in computer games as the next generation's educational method, and the research body on learning based on games is growing more than ever before. The focus of the research includes increasing specific abilities of teachers in using computer games and the effects of gaming. Recently, some researchers have addressed the learning processes and different individual factors for efficient learning (Chamorro-Premuzic & Furnham, 2003; Shaffer, Squire, Halverson, & Gee, 2005).

During the past two decades, graphics and visual effects are promoted along with the growth of technology and widespread of videogames, so that they have found a deep concept and complexity to make them out of one dimensionality and to create a virtual environment for users simulated with the real world. The transmission of information and concept becomes so easy. Some basic features of today computer games influenced by modern technology growth are given in the following sections.

Experiencing Impossible Conditions and Situations

Users enter the game environment while providing different virtual situations that are inaccessible in the outer world, such as driving crazily, bank robbery, consequent

homicide, and airplane control. And then they start to play a role in the form of main character to experience wonderful situations.

Lack of Necessity to Physical Activity

In fact, all of the simulator games are taken from simulated board games rather than strategic and diplomatic environmental games. The game provides the possibility of entering into any situation without physical activity, so that the only activity you need do is to press some keys to fight a dragon. The retiredness does not have meaning and the game continues to the infinity.

Lack of Keeping Pre-requirement

Another feature of games is lack of necessity to primary requirements to attain predefined situation so that we do not need any skill to climb a wall. These games mostly place the player in a situation to experience different states. We can drive in a crowded street without having a car or any skill of driving. Every complex skill can be obtained through learning simple ones which can be possible freely.

Choice of Situations

The chance of changing the situations in a game is another feature so that the player can choose environment, geographical location and even his opponents based on his taste to increase his innovative faculty. Computer games, therefore, realize all the conscious and unconscious expectations of players and provide the experience of situations that are not possible in real world.

Therefore, the number of the audience of computer games increased dramatically and these games turned into most popular entertainments. According to the Entertainment Software Association, surprisingly in 2013, in the U.S.A. averagely five games have been sold through the year in each second (www.theesa.com).

Among all tools and edutainment methods, video games are considered historically as the most critical version as they were interwoven with subjects like thought-free entertainment, increase of social isolation, racial discrimination violence propagation and consumerism. But departure from mere entertainment to educational imprinting has opened a new horizon and this is the side feature of the games. This can be similar to films in which violence and crime are common but are placed in margin. According to Catharsis theory, action films are also useful as they provide the experience of violence (Chiang, Cheng, & Lin, 2008; Mahood, 2008).

To make genres or age classes in cinema confirms this fact that experiencing some films can be useful although there are some violences. Various genres and versions appearing in the games are representative of this trend.

Nowadays, video games can be used as an electronic medium enjoying all the characteristics of educational purposes for users to interact with specific audience. They provide an interactional environment so that the users can develop all their skills. Their efficacy, especially where promotion of a skill is under the vision, is very outstanding,

the examples of which can be seen in genres of management simulation, life simulation and vehicle simulation.

Simple versions of these games are designed to result in determined educational aims. The website of Noble prize foundation uses some games with scientific content to help children understand the discoveries of Noble Nominees (http://www.nobelprize.org/educational).

Most advanced games provide extraordinary environments to educate all the details of different political systems in which players are obliged to make specific decisions.

"Game enthusiasts already know that games are great, smart entertainment." said Mark Simmons, Games Quarterly's Publisher and the coordinator of National Games Week, "We are encouraging individuals, schools, games stores, organizations, libraries, everyone, to hold a Games Day event during National Games Week, showcasing the fun of game for family and friends" (Simmons, National Games Week).

This can help the children to acquire most essential skills in digital-based life to raise their abilities. New medium of educational games creates the simultaneous possibility of access to educational and entertainment content of environments for tutors in different fields.

Beck and Wade conducted a large-scale study of 2,500 business professionals to determine whether the experience of gaming and growing up surrounded by games, changes attitudes, expectations, and abilities related to how the video game generation performs in the business world. The results indicate that gamers see the world very differently than do their parents, teachers, or other non-gamers. The structure of the game molds the gamers' experiences, leading different expectations from learning environments and problem-solving situations. In brief, Beck and Wade identified several ways in which digital natives are unique in their expectations (Beck & Wade, 2004).

In adapting computer games with educational systems, we face the issue of classification and regulation in which the proportion of game-entertaining aspects with scientific content is posed. In fact, far reliance on content and removal from game have decreased the attractively of games and turned them in to a software while high focus on the aspect of entertainment has made it a ubiquitous medium with educational applicability.

The Entertainment Software Association states "Video games are no longer only a form of entertainment for children and young adults. The industry, its customers and its technology have vastly advanced in the past three decades. Entertainment software is now one of the fastest growing industries in the U.S. economy. And video games are driving technological and societal advancements that serve gamers and non-gamers alike" (www.theesa.com).

Learning theory is based on three main learning philosophies: cognitive theory, constructivism, and transformative learning. Cognitive theory is more concerned

with understanding the processes of the absorption of information by the brain and transformative learning theory is concerned with the effects of environmental factors on the learning process. However, the cognitive theory is focused on the relations between the experience and the knowledge and the way our experiences through the processes of learning turn into knowledge. In other words, cognitive theory tries to understand how our experiences in the world can affect our knowledge, understanding, and future behaviors.

Earlier learning theory argued that the mind works like a calculating device, something like a digital computer. On this view, humans think and learn by manipulating abstract symbols via logic-like rules (constructivism). Newer work, however, argues that people primarily think and learn through *experiences* (Cognitive theory) they have had, not through abstract calculations and generalizations. People store these experiences in memory—and human long-term memory is now viewed as nearly limitless—and use them to run simulations in their minds to prepare for problem solving in new situations. These simulations help them form hypotheses about how to proceed in the new situation based on the past experiences (Barsalou, 1999).

The Wide Applicability of Educational Games

Tutors and teachers have strongly confirmed the positive effects of entertainment games and use the educational provisions in their trade and business classes. They embrace the modern technology used in these softwares to transfer their material, to teach life skills and to reinforce positive habits in students in different ages. Gee concludes that: video games intermix instruction and demonstration, a more effective learning technique than the "memorize-and-regurgitate style" found in most classrooms (Gee, 2003).

The National Education Association (NEA) serves as a guiding force for instructors, cataloging information that prepares teachers for incorporating video games into the classroom. In the official website of this association, it is announced that Electronic Arts' *SimCity* is among the NEA's recommendations. The building game, which has shown to improve students' problem-solving and analytical skills, plays an important role in many "gaming schools."

The *GXB Learning Series* is another video game line gaining popularity as an educational resource. Designed by teachers for both school and home use, the game offers content drawn straight from U.S. state and national education standards.

Schools across the country are also incorporating interactive video games, such as Konami's *Dance Dance Revolution* and Nintendo's *Wii Fit* into gym classes. "Exergames" such as these are attractive to young students and provide new resources for financially strapped physical education departments.

More than 200 American colleges, universities and technical schools, including New York University, the Art Institute of

Seattle and Marist College, offer programs and courses in videogame design and development. Carnegie Mellon University and the Georgia Institute of Technology offer master's degrees in game development, while the University of Southern California offers a graduate degree in interactive media and an undergraduate degree in video game development (NEA, www.theesa.com).

Most of the games are well designed that they can fulfill the requirements of all age groups to attract them toward a global competition. This helps to spread the games in the family so that all members can involve the games and reinforce mutual relationships.

According to a 2017 report by the Entertainment Software Association almost two-thirds of American households play video games: gamers age 18 years or older represent 72% of the video game-playing population and the average gamer is 35-years-old. Families are playing video games together as well, the report finds. Sixty-seven percent of parents play video games with their children at least once a week.

The outstanding results of computer games have been observed not only in schools and universities but also in companies and firms to increase occupational skills.

According to a study by the Entertainment Software Association, 70% of major employers utilize interactive software and games to train employees. One entertainment software company, Games2Train, has developed employee training games for American Express, Bank of America, IBM, JP Morgan Chase, Nokia, and Pfizer. In addition, Canon uses a video game in which repairmen must drag and drop parts into the right spot on a copier to train technicians. IBM has also produced *Innov8*, a free, interactive game that teaches graduate students business and technology skills.

Video games and their technologies are also being used as a vehicle to reach and educate the public. In response to the recent financial crisis, the United States Treasury Department launched *Bad Credit Hotel*, an online game that teaches consumers the basics of good credit. The United Nations World Food Programme, meanwhile, created the *Food Force* video game to educate children about world hunger. Allstate Insurance is now offering a video game to its drivers to improve their driving skills (NEA, www.theesa.com).

Professor Zach Rosenthal from Duke University devised a wider game to accelerate the treatment of the addicted in which the addicted person can create a world full of joy and delight such that he can increase his patience and power to control attraction toward the drug (abcnews.go.com).

The famous psychologist Stokes and Lappin (2010) suggest specific computer games entitled "Brain Video Games" to increase strength and durability of brain to tolerate long term pains for patients with chronic migraine. The results show that 70% of patients have heal successful treatment.

The report published in the magazine "Archives of Surgery" shows that the

computer games are highly useful for surgeons and laparoscopic surgeons can especially reduce their errors and increase their mastery (Curet, 2007).

The Educational Capacities of Games

There have been a lot of debates about the educational capacities of games and the abilities the players achieve. Today, most authorities try to transfer social skills to players through games, which are possibly done without danger and high cost under careful supervision. Pilot experiencing in a completely virtual environment is a common example, which is used in flight institution professionally. The efficacy of the games, however, is different and the nature of learning can be promoted in three aspects increasing awareness through game content, self-learning, and growing skills.

Increasing Awareness through Game Content

Most games are of specific content, educational or scientific, designed to satisfy a special need such as teaching a subject or directing the users so that the prerequisite to continue the game is to master the scientific content along with using techniques dominant in the game. For example, in designing political and official system of a country in a strategic game or social simulation, we need to study the game guide and to have scientific mastery on available systems. But a game related to dinosaurs era is an indirect teaching of history. Directness or indirectness of a game refers to entertainment factor such that dominancy of either can determine the types of the game.

These types of games are known as edutainment games commonly produced by the order of a firm or an organization to offer specific content. The games available on the noble prize site or most historical and geographical games are included in edutainment games. These games are used to epitomize the social principles and rules; making a driving system of rules in a country and to teach it to all drivers. On the other hand, there are some negative effects especially in military tied or violating the realm of a country by changing the name of the city or islands.

Self-learning

Self-learning, known as an outcome of simulated processes from game content, is it most remarkable result of educational games on technological advancement in recent decades. Today, educational games are regarded as the inseparable tools of virtual classes for which there is no need of supervisor. Self-learning can be viewed as the process of attaining knowledge and individual abilities consciously through implementing the game. Simulating games of driving, management are enumerated in this class. The games of recognizing and classifying figures and colors, scientific puzzles and counting games, designed for children, are all so in this category. In a higher level, games designed to teach vocational or professional skill, such as

pilot or tank driver, are based on the same features. Getting more knowledge or being updated is the general aim of these games.

Raising the Abilities

Video games can promote personal abilities during the game in different aspects. There are two different skills, visible and of invisible in players which must be paid attention to. Visible skills are those which the players will see the growth after the games vividly such as chess games or card games after which the players will feel some mastery and will have fewer mistakes for the next round.

In fact, player's skills would increase in driving, chess, banking, and accounting through these games. Most games like educational games designed to increase elementary student's skill in multiplication and division are in this class.

Invisible skills are those whose promotion the player doesn't have any knowledge about and may also neglect them. These are widely spread, usually dependent on indirect abilities of mind, known or mental sports.

These skills are defined in psychology of mind and compared through scientific measurements and tests. They are distinctive from other main factors of games such as content such as a violent game can increase mental abilities such as reaction speed, reasoning or concentration.

Games and Growth of Mental Skills

There has appeared a great literature about the effect of games on mental abilities of player by; yet, there is not a comprehensive list of these abilities.

The main reason, perhaps, is that the researchers have focused on some features and neglected others, depending on their approach to education. As a rule, we have followed an inductive method and enumerated some abilities as: conversation skill, negotiating skill, thinking differently, eye and hand coordination, concentration, problem-solving skill, memory, modeling ability, literature and speech conversation (encouraging players to define the events of the game, increasing audio perception of other persons' views, and using language to animate the events and thoughts in the game), promotion of mathematical skills, creativity, group and social skills, attending power, relation power, artistic creation skill, decision making, computer skills, durability, compatibility of auditory and visual senses, communicative coordination (participation in group discussion) numerical skills (computational skills, understanding numerical concepts) cooperation with others (developing social abilities) the ability to solve the problem (recognition of problem), planning, observing and supervising the affair progress, revising the solutions, memory reinforcement, positive individualism in learning (self-esteem), sense of leadership and control, percepting three-dimensional spaces, and cognitive abilities.

Undoubtedly, this list of mental abilities reinforced by educational entertainment games will be longer.

METHODOLOGY

This research is an evaluation analysis based on a structured questionnaire, in which a small selected group of analyzers are asked to report their evaluation of a target population according to the specified group of evaluation factors.

The most important issue in this research was to find the appropriate evaluating factors to appraise the research. The review of present literature showed that there was no clear-cut list of factors to discuss about, therefore we relied on the most repeated mental skills in the available literature, specifically in regard to learning theory; yet there was no comprehensive framework to base on. The result was a list of 30 mental skills that were relative to video games as well, including leadership and control, perception of 3D spaces, action speed, cognitive abilities, inductive reasoning, speedy mind information processing, thinking simultaneously, crisis management, statistical understanding, English learning, information management, visual understanding, deductive reasoning, thinking differently, eye and hand coordination, concentration, problem-solving skill, memory reinforcement, modeling ability, conversation skill, mathematical skills, creativity, group and social skills, decision making, computer skills, control over computer's mouse and keyboard, durability, compatibility of auditory and visual senses, numerical skills, and self-learning.

Regarding the target population of the study, the main criteria for the selection of the games were their free and easy availability on the web and their belonging to the group of hobby games, in that they were easy to download and run by any age group and in any situation. In order to give a more natural sense to the research, no list of games were prepared before the analysis process, that is, the study did not have a specified list of target population. For this purpose, any of the five members of the analyzing group (male and female students of sociology at the University of Tehran aged between 20 and 28 years) was asked to find and play 20 games they desired (considering their free and easy availability on the web) in any situation they preferred in a period of 2 weeks. After 2 weeks, the list of 20 games played by each analyzer was handed to another member of the group to play in the next 2 weeks, and this process continued until every five members of the group played every game one time. So that, the population was decided during the analysis by any one of the analyzers in the first 2 weeks and was tested by all other analyzers in the following weeks. This method intertwined the preferences and analyses of different analyzers and therefore helped to have a more acceptable population and analysis process.

A binary evaluative method was used for the evaluation of the games and each analyzer had to decide if any played game did or did not have any one of the 30 specified mental skills. For this purpose, the analyzers were asked to fill out Table 1 instantly after playing each game to specify which properties were found in that game.

At the end of the tenth week, the results of the tables of the five analyzers were summed together, and the mental skills that had been identified for a game at least by three members were decided as the mental skill presented by that game.

RESULTS

As it can be seen, the existence or nonexistence of each mental skill in any game is reflected in Table 1. A quick glance at this table shows where the filled (black) cells of the table are concentrated more that is which mental skills are provided more by the examined 10 games. Comparing the number of skills presented by each game reveals that 6) Killer Sudoku, 35) Dons-Pyramid, 22) Gude balls, 36) X Triple, and 47) Farm Frenzy with respectively 19, 19, 18, 18, and 18 number of filled cells (skills) present the highest number of skills. A deeper look into this table shows that new games like Elements 4, Night Shift Legacy and Atlantis Sky Patrol produced in terms of abilities and capacities of new media are in a close competition with traditional games such as Dons-Pyramid and Killer Sudoku know long for their mind reinforcing capacities. This can be attributed to the capacity of multimedia in demonstrating simultaneous aspects. Comparing other data on the table shows correlations among features such as the extent of applying skills along with their accessibility.

This also brought the possibility of comparing the features with each other. For example, it can be determined what percentage of games use educational skills. Table 2, as a derivation of Table 1, presents the percentage of each mental skill within the whole collection of 100 examined games. As the number of games is 100, the percentage respective to any skill is in fact the sum of the number of games that presented that specific skill. This table provides an appropriate chance to compare the percentages of availability of all 30 specified skills among all of the game. As observed, "ability to think simultaneously" with 93%, "concentration" with 92%, and "inductive reasoning" with 86% have allocated the highest ranks and "computer skills" _unexpectedly_ with 1%, "compatibility of auditory and visual senses" with 2%, and "conversation skills" with 3% have allocated the lowest ranks.

Computer games are not separated tools from daily life and provide opportunity for human beings to realize their ideals, potentiality and skills in wide spans. As an integrated theme with technological life, video games have helped humans to find new solutions for their problems and let them think about unforeseen events going to happen.

Investigating video and computer games, usually low volume and most popular, showed that these games were full of grounds so that the players could use them to fulfill their mental abilities.

These games had subsidiary effects on some mentality and skills of players in that the players raised their skills unconsciously, such as eye and hand coordination, concentration. This research showed that strategic games use high-quality performance

Table 1

Comparison of mental skills in edutainment games

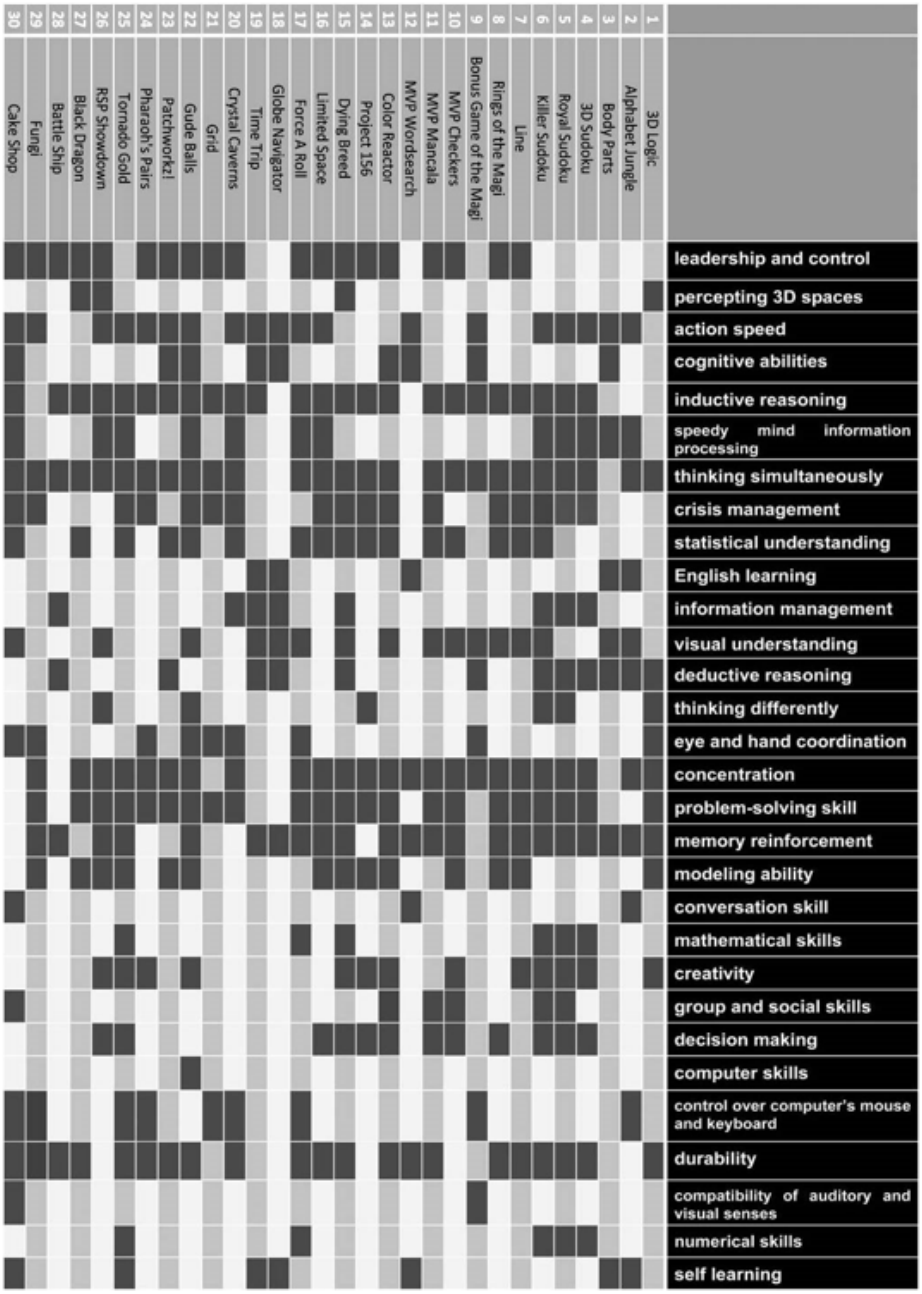

Table 1 *(Continue)*

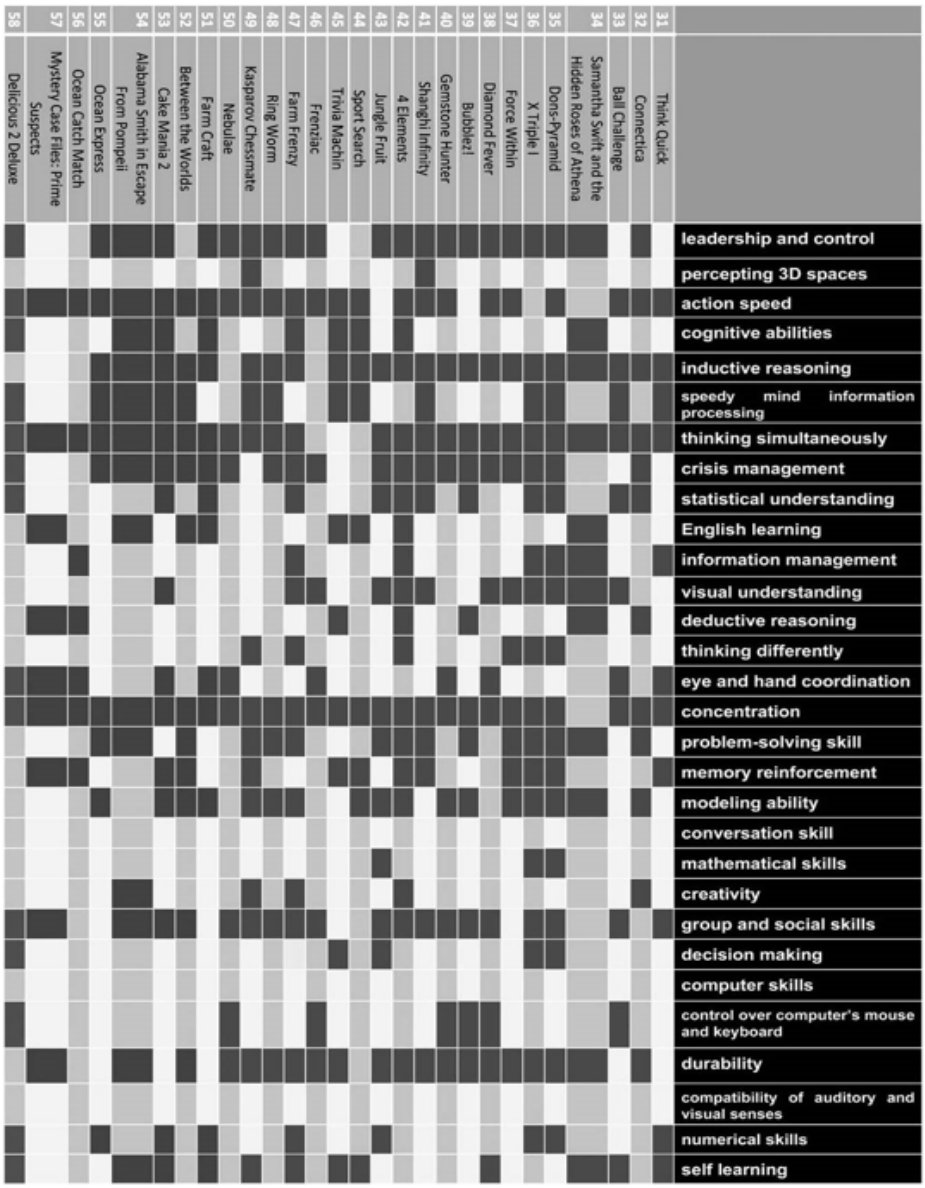

Table 1 *(Continue)*

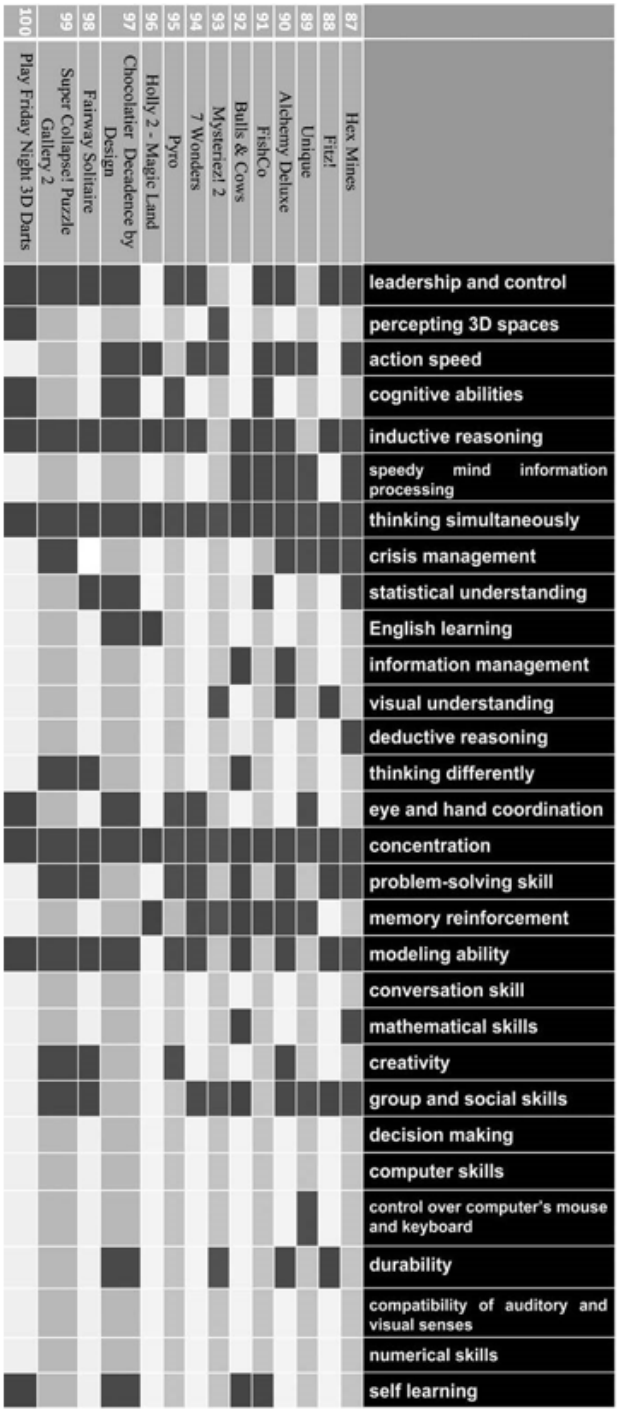

Table 2

Comparison of the quantities of abilities in all 100 games in percent.

%	Ability	#
70	leadership and control	1
11	percepting 3D spaces	2
75	action speed	3
35	cognitive abilities	4
85	inductive reasoning	5
47	speedy mind information processing	6
93	thinking simultaneously	7
60	crisis management	8
40	statistical understanding	9
24	English learning	10
23	information management	11
36	visual understanding	12
24	deductive reasoning	13
27	thinking differently	14
44	eye and hand coordination	15
92	concentration	16
62	problem-solving skill	17
58	memory reinforcement	18
62	modelling ability	19
3	conversation skill	20
12	mathematical skills	21
32	creativity	22
60	group and social skills	23
22	decision making	24
1	computer skills	25
29	control over computer's mouse and keyboard	26
65	durability	27
2	compatibility of auditory and visual senses	28
29	self-learning	30

in mental and behavioral aspects which indirectly increased the players' capacity. It also showed that the fusion of ancient games and digital technologies can bridge the previously separate arenas of learning theory and entertainment under the title of edutainment. Therefore, learning theory could be used as a steering wheel in order to deepen the merely entertaining levels of digital games and enter learning aspects, implicitly or explicitly, into them.

There arises, the last but not the least, problem of usability of these games. The world idea is searching for a logical solution to direct the computer games but it cannot deny their existence. Any way digital technologies are proceeding very fast and introducing new dimensions of digital life every day, so that it does not seem so far the day that the digital and real aspects of a life would not be separable any more. Then a life in which everything would be virtual and not so different from a game.

CONCLUSION

This study was only a small attempt in order to understand the learning aspects of a group of easy-to-access low-budget games that were freely available on the internet to play. We hope that it persuades further studies to try to evaluate a wider variety of games including high-budget strategic ones, with more variant evaluating populations from different ages, genders, and education levels. Of course, the more complex the games become and the more intertwined their different entertainment and educational aspects become, the deeper and the more accurate studies are required. Such studies generally play an important role from two related points of view: game producing companies will pay more attention to the educational aspects of the games they produce, and educational systems will make more use of games in their educational programs.

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