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# Affective Intervention Based on Learner Emotions for Online Learning in Video Conference Applications

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## ABSTRACT

Research on facial emotion recognition for learners has been conducted widely. However, research on how to deal with emotions detected during learning with computer systems has not been widely conducted. Therefore, this study aimed to develop a personalized verbal affective intervention through motivational messages to help learners regulate their negative emotions (sadness, anger, fear, and disgust). The system is developed for higher education learners on the Google Meet video conferencing application for online learning activities. The system was tested on 32 learners of Software Engineering at Universitas Pendidikan Indonesia. The learners were asked to fill out the Instructional Materials Motivation Survey (IMMS) questionnaire after the learning process to measure their learning motivation. Based on the questionnaire results, it can be concluded that personalized affective intervention, considering the ARCS Model, positively impacts learners' motivation during synchronous online learning. This study suggests that a learning intervention based on the learner's emotion recognition can positively affect the learner's motivation and experience in using video conferencing apps during synchronous learning. This study can be a valuable reference for future research in implementing ARCS aspects that match learners' emotional and emergent algorithms of affective interventions.

*Keywords*: Affective computing, emotion recognition, online learning, web application

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## INTRODUCTION

In synchronous online learning, the use of video-conferencing applications is prevalent in replicating traditional classroom learning (Henriksen et al., 2020; Mouheb et al., 2022). Learners often experience negative

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emotions due to the self-directed nature of online learning, physical and psychological separation without direct contact with educators and peers, which may hinder their learning process and outcomes (Deublein et al., 2018; Kouahla et al., 2023; Lee et al., 2021; Marchand & Gutierrez, 2012). Meanwhile, the emotion recognition process is related to affective computing because it aims to recognize a person's affective state, which is then analyzed to create an appropriate response (Yadegaridehkordi et al., 2019). Many studies have been conducted on FER technology in learning activities. However, this system has not been able to provide adaptive and personalized responses or feedback based on the learner's detected emotional states (Septiana et al., 2024).

Affective interventions can play a role in improving a learner's self-awareness, self-regulation, empathy, and social skills, which are important for well-being and academic success (Hasson-Ohayon et al., 2006; Oliveira et al., 2021).

Based on the background described, this research will focus on implementing effective interventions in the browser extensions used by learners. Affective interventions are provided through verbal motivational messages designed based on the ARCS Model to address negative emotions detected in learners' facial expressions. Affective intervention is provided according to each learner's preference for synchronous online learning. Providing effective intervention according to each learner's preference is expected to positively impact the learner's experience using video-conferencing applications in synchronous online learning activities to motivate the learner and create a more positive learning environment to achieve maximum learning outcomes.

## METHOD

Motivational messages have been developed to address four negative emotions in online learning activities: Sadness, anger, fear, and disgust. Learners' facial expressions were analyzed to classify their emotions. The system performs emotion recognition for the user every 5 seconds with the support of face-api. js. Learners will receive motivational messages based on the learners' personality questionnaire data and their current emotions. The motivational message pop-up will be displayed for 5 seconds. The system was tested on 32 learners in a 120-minute learning course. Then they asked to fill out the Instructional Materials Motivation Survey (IMMS) questionnaire

## RESULT AND DISCUSSION

Each of the total average values of the ARCS aspects received the "High" criteria as shown in Figure 1. In addition, according to the learners, affective intervention was considered relevant to the emotions they felt (relevance). This indicates that motivational messages designed by considering the learner's emotional state, linking the emotional state to personal skills and learning objectives, matching interests, and using analogies can make the intervention highly relevant for the learner.

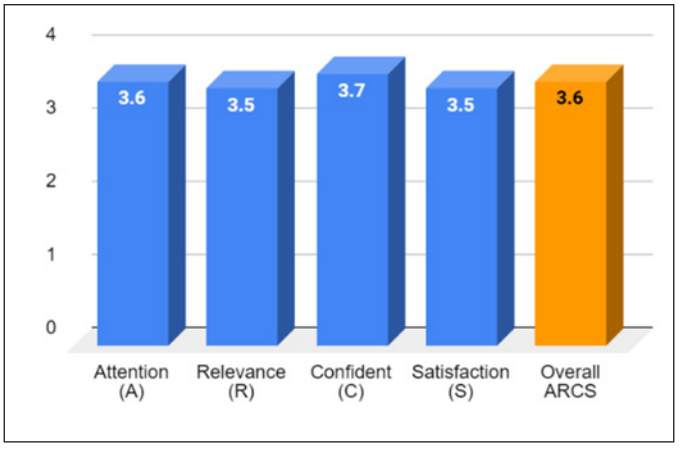


*Figure 1.* Result of system evaluation based on IMMS

## CONCLUSION

The development of affective interventions aims to address the negative emotional states that arise during synchronous learning activities by providing motivational messages that are personalized according to learner preferences and personality. Based on the IMMS test results, the implementation of the ARCS Model as an effective intervention design strategy had a significant positive impact on learners' learning motivation and experience in using video conferencing applications for synchronous online learning activities. Other factors such as personality, communication preferences, or previous learning experiences may influence the outcome of the learner's motivation level and learning experience to affective intervention. The results of this study can be developed into further research related to examining which aspects of the ARCS Model are most suitable for dealing with each negative emotion.

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