

*Evaluate the Correlation Between Online Learning Motivation and Learning Effectiveness  
for Students Enrolled at the Taiwan Institute of Technology  
During the COVID-19 Pandemic*

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**Abstract**

During the COVID-19 pandemic, following the policy of “Learning Never Stops,” schools of all levels in Taiwan adopted a flexible and interdisciplinary approach to maintain educational continuity, and online teaching became one of the main methods of achieving this goal. Our research used the ARCS model to evaluate any correlation between online learning motivation and the learning performance of students enrolled at the Taiwan Institute of Technology during the pandemic. Our objectives are: (1) to evaluate the level of online learning motivation of students enrolled at the Taiwan Institute of Technology during the pandemic; (2) to evaluate the online learning effectiveness of the students enrolled at the Taiwan Institute of Technology during the pandemic; (3) evaluate the correlation between online learning motivation and learning effectiveness for the students enrolled at the Taiwan Institute of Technology during the pandemic. The subjects are all students enrolled at an Institute of Technology in Taiwan. A research instrument was developed using the ARCS model of Motivation, coupled with a literature review. The study was conducted via questionnaire investigation. After the collection and analysis of the data, our conclusions were: (1) the students’ level of online learning motivation was average; (2) online learning was effective in the case of these students.

Keywords: Institute of Technology, Online Learning, Learning Motivation, Learning Effectiveness

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## **1. Introduction**

### **1.1 Research background and motivation**

In Taiwan, under the impact of the COVID-19 pandemic, schools at all levels adopted online learning and teaching activities in a diverse and flexible manner, with teachers teaching through video livestreams or by arranging asynchronous digital instructional materials for students' autonomous learning (K-12 Education Administration, MOE, 2021; Centers for Disease Control, Ministry of Health and Welfare, 2021).

In Taiwan, the development of the Internet and Web 2.0 in recent years has actively promoted online learning and enabled teachers to use synchronous online teaching methods during the pandemic. Therefore, this study was motivated to investigate the correlation between online learning motivation and the learning effectiveness of students in the institute of technology in Taiwan during the COVID-19 pandemic.

### **1.2 Research purposes**

Based on the above background and motivation, the specific purposes of this study were as follows:

- (1) To investigate the online learning motivation of students in the institute of technology in Taiwan during the pandemic
- (2) To examine the online learning effectiveness of students in the institute of technology in Taiwan during the pandemic

### **1.3 Research scope and limitations**

There are many different types of courses that use online learning, but the research scope of this study focused on using online learning for course design, and its findings are therefore not suitable for generalization to other forms of online learning.

## **2. Literature Review**

### **2.1 Current development of online learning**

Online learning refers to teaching and learning through the Internet, where teachers and students are not subject to physical or distance limitations, and the content is delivered over the Internet to enhance learning and interactivity in synchronous and asynchronous environments (Singh & Thurman, 2019). The United Nations Educational, Scientific and Cultural Organization (UNESCO) has developed the *Education 2030 Framework for Action* to address digital teaching methods such as online learning, hoping to achieve equity in education through technological advances and thereby compensate for the unequal distribution of educational resources (UNESCO, 2015). Safibullaevna et al. (2020) argued that online learning significantly increases students' interest in educational materials and affects learning effectiveness. In addition, Triyason et al. (2020) suggested that the use of information technology to work or study in unrestricted areas will become a new pattern in the future due to the impact of the COVID-19 pandemic. In Taiwan, in response to the impact of COVID-19, the government announced a plan titled *Implementing Measures for Distance Learning at the Junior College Level or Above*, to increase students' opportunities for digital learning at home due to the pandemic (Kuo, 2020).

## **2.2 ARCS motivation model**

Keller (1983) explored the mutual impacts among learning motivation, instructional design, and learning effectiveness by examining the instructional system model and integrating the psychological theory of motivation with the instructional design model. Later, Keller found that personal and environmental factors influence students' behavioral performance and learning effectiveness. Personal factors include learning motivation, self-expectation, and knowledge, while environmental factors include motivation strategies and design of learning effectiveness; these factors generate interactive impacts on each other and create a systemic cycle. Keller (1984, 2010) proposed the ARCS motivation model, which is consisted of four major dimensions, namely attention, relevance, confidence, and satisfaction. Attention aims to capture learners' interest and stimulate curiosity for learning; relevance aims to satisfy learners' personal needs/goals and make them develop positive attitudes; confidence aims to help learners believe that they will succeed and can control their success; and satisfaction aims to reinforce a sense of accomplishment with rewards. The ultimate goals are to enhance the learner's attention to the course through a systematic motivational design, make the learner feel that the content is relevant, and give the learner the confidence and ability to learn through guidance, thereby giving the learner a sense of accomplishment by completing the course (Keller, 1987). The four key elements of the ARCS motivation theory also need to be considered by teachers when designing courses.

## **3. Research Design**

A questionnaire survey method was used to collect the data on students' learning motivation and learning effectiveness related to using online learning in an institute of technology in Kaohsiung City to understand the correlation between learning motivation and the learning effectiveness of using online learning. The specific research structure, research subjects, research tools, data processing and analysis are described below.

### **3.1 Research structure**

According to the research purpose of this study, the ARCS motivation model was used to investigate the relationship between the online learning motivation and effectiveness of students in the institute of technology in Taiwan during the pandemic.

### **3.2 Research subjects**

This study searched the EBSCOhost international journal database to find relevant studies, and the results of the studies related to the use of online teaching from 2015 to the present showed that few studies have focused on issues related to the institutes of technology. Therefore, the institutes of technology were taken as the object of this study. A total of 48 junior students from the College of Design at an institute of technology in Kaohsiung City were selected as the sample for this study through the convenience sampling method.

Since this group of juniors had experienced the changes in teaching and learning during the COVID-19 pandemic, they had personal experience and insight into the differences between online teaching and traditional face-to-face courses, which enabled this study to understand the correlation between the motivation and effectiveness of online learning among the students of the institute of technology in Taiwan during the pandemic.

### **3.3 Research tools**

#### *(1) Online learning motivation questionnaire*

This study adopted the questionnaire survey method. After compiling the data from the literature review, we chose the Motivation Strategies for Learning Scale proposed by Pintrich (1991) and the Instructional Materials Motivation Survey (IMMS) designed by Keller (1987) as the basis for the development of the questionnaire. We also considered the factors affecting online teaching and learning motivation in the literature review to finally develop the first version of the questionnaire on online learning motivation. The questionnaire dimensions were simplified via revising the items in the first version as indicated by an expert review. The questionnaire was then developed into a formal online learning motivation survey.

The online learning motivation questionnaire consisted of 20 questions addressing the four dimensions of attention, relevance, confidence, and satisfaction. Each dimension had five questions scored according to a Likert five-point scale, with answers ranging from 1 (strongly disagree) to 5 (strongly agree), with a higher score indicating higher student learning motivation.

A total of 48 questionnaires were collected and eight invalid questionnaires were excluded, resulting in a total of 39 valid questionnaires (a response rate of 81%). The Cronbach's  $\alpha$  value was 0.938 according to the reliability analysis after the questionnaires were returned and met the reliability criterion of 0.7 or above, indicating that the questionnaires had a certain degree of reliability. Additionally, the Cronbach's  $\alpha$  values of all deleted items were lower than the original 0.938, which indicated that the remaining items in the questionnaire were necessary. Finally, the validity of the questionnaire was confirmed by academic experts.

#### *(2) Assessment of learning effectiveness*

The assessment of learning effectiveness was based on the final exam score of the online course, which was graded by the instructor (out of 100 points).

### **3.4 Data processing and analysis**

The questionnaire survey results of this study were compiled and processed in Excel, and then analyzed using SPSS for Mac version 26.0 statistical software. The Cronbach's  $\alpha$  coefficient was used to check the reliability of the questionnaire, and descriptive statistics were used to present the mean and standard deviation of each question as well as summarize the sample profile. The data were sorted from the highest to the lowest mean of the students' learning motivation. Then, the students' learning effectiveness scores were analyzed by one-way ANOVA to understand the correlation between learning motivation and the learning effectiveness of online learning of students in the institute of technology.

## **4. Research Results**

The purpose of this study was to investigate the correlation between the learning motivation and learning effectiveness of online learning among students of the institute of technology. The questionnaire data obtained were analyzed by descriptive and inferential statistics, and the research results were as follows.

Thirty-nine questionnaires were collected from the junior students in the College of Design of the institute of technology, of which 13 were male and 26 were female.

The total mean score of the 39 questionnaires was 3.289, and all questions received a score above 3, except for Question 13. This mean was in the middle and upper range, indicating the students had some degree of motivation to learn online. Among the questions, Question 10 and Question 18 had a mean score of 3.56, which was the highest mean score, while Question 13 had a mean score of 2.97, which was the lowest mean score.

Question 10, "In online digital teaching, I am motivated to use the online digital learning materials because they link to content I have already learned" and Question 18 "Online digital teaching with digital instructional materials can be one of my instructional materials for revision" received the highest scores because, with online learning, systematic content can be used as a learning node, and it is possible for individuals to identify their own weaknesses through the online learning platform and use the online digital instructional materials as a material for repeated review. This result coincided with that of Moore and Kearsley (2012), who suggested that online learning-based instructional materials can help students repeatedly study and query through online materials and make it easier for them to preview or review material, as students may pause at any time when they do not understand to look up data online. This result showed that online learning-based instructional materials can be used as teaching materials for students to use when reviewing their courses later.

The reason for the low score (2.97) for Question 13: "Using online digital teaching with online digital instructional materials can increase my confidence in taking exams" was that even with online learning and digital instructional materials, the students continued to have additional concerns about the exam. In addition, the study also found that Question 2, "Changing classroom teaching to online digital teaching is livelier than using textbooks alone" was more frequently given a negative score (i.e., disagree, strongly disagree) than the other questions. This result showed that online learning classrooms do not become livelier with the use of multimedia, and that traditional classrooms are livelier and have more interpersonal interactions. In the past, foreign scholars conducted studies on the real-time feedback discussion system of online learning, and the results showed that although the establishment of online discussion forums is helpful for students to ask questions in an anonymous manner, it can easily lead to poor-quality questions or questions being ignored, resulting in low teacher-student interaction, ineffective classroom performance, and dull and uninteresting course (Wu, 2015; Qin & Fu, 2017).

## **5. Conclusion**

The purpose of this study was to investigate the correlation between the learning motivation and learning effectiveness of online learning among students at the institute of technology in Taiwan during the COVID-19 pandemic. The research findings discussed below were summarized according to the research purposes and results of this study.

(1) From the literature review, we found that online learning has entered a mature stage in Taiwan. From the development of digital learning-related policies 20 years ago to the promotion of online learning integration in schools at all levels nowadays, it is evident that Taiwan is paying more attention to online learning, which is becoming more popular in the education field and is increasingly being used as a method of learning for students.

(2) The literature and fieldwork revealed some discrepancies regarding the motivation for online learning of the students in the institute of technology in Taiwan; however, this result did not mean that students in the institute of technology in Taiwan could not accept online

learning as a learning method. There may be more factors that were not considered in this study, such as the length of the course and the type of teaching course.

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