Research on The Learning Experience and Effectiveness of Digital Action Learning on Design Education

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Abstract
In this research, based on the concept of a smart learning environment, learners use digital mobile devices to learn appropriate activities and content at the appropriate time to obtain the convenience, expediency, and immediacy of mobile learning. Design practice and skills are the core curriculum of design education, which requires a larger amount of teaching support and a communication platform. The general learning management system (LMS) has limitations. Therefore, the research uses digital technology LineBot and Line OpenChat as teaching support. It mainly investigates the learning experience and effectiveness of students in the design department with the aid of digital learning models. The research takes "learning readiness", "learning participation", "learning satisfaction and confidence" and "learning effectiveness" as variables. The results show that the use of action learning teaching enables design students to have better learning readiness, learning engagement, and learning satisfaction and confidence, and the aid of digital action learning has significantly improved learning effectiveness.

Keywords: Design Education, Digital Technology, Action Learning, Learning Experience, Learning Effectiveness

Introduction

This research uses the concept of a smart learning environment. For designing courses that are not tested by examinations, the general learning management system (LMS) has limitations. Design practice and skills are the core courses of design education, and we need a larger number of teaching demonstrations and communication platforms. How can mobile device-assisted teaching maintain the essence of teaching and learning without becoming a game tool? Mobile device-assisted teaching can maintain the essence of "teaching" and "learning". It can make students get rid of too much Internet stimulation, and can seize the resources of students' concentration, making students pay more attention to professional learning content (Freeman, et al., 2014). Therefore, practical implementation and effectiveness research are used to test the effectiveness and application of digital technology to support design teaching.

Literature Review

Trends in Action Learning

The application of action learning in the teaching classroom changes the traditional learning style, and the use of smart phones by students has become the mainstream of action learning. Smart mobile devices increase students' participation and interest in self-regulation. The content of different teaching support makes students more mobile and collaborative (Lahiri and Moseley, 2012), but it also creates the possibility of lack of attention and distraction in learning (Klimova, 2019). For practical design education, how can intelligent auxiliary tools not lose the essence of "teaching" and "learning", or become a game tool, which can draw students' attention from the complex and visually stimulating Internet information and capture students at the same time, it attaches great importance to learning professional learning resources and teaching materials (Freeman, et al., 2014). With this as the goal, this research uses Linebot and Line OpenCaht as digital mobile teaching tools to guide students in the timely classroom teaching application, coordinate with the arrangement of learning situations, provide real-time search, feedback and knowledge acquisition channels, and open up opportunities for learners to actively explore, arouse interest and motivation to improve learning effectiveness.

Digital Technology and Teaching

Using digital tools to support teaching materials and communication in this research, students can learn independently, ask anonymously, flexible time, and an auxiliary learning tool that asks and knows immediately. A collaborative group is established by teachers, teaching assistants, clients and students, including teachers' teaching guidance, assistant technical support and customer information provision. Students can get support more quickly; teachers supervise or guide students' learning attitudes and design suggestions. Clients can also understand young people's views on products or brands with students' questions and design needs. Students, teachers and clients can communicate more directly.

Action Learning

Smart mobile devices increase the participation of students in self-regulation, and different teaching support content makes students more mobile and collaborative (Lahiri and Moseley, 2012). Students also have the possibility of lack of concentration and distraction due to mobile devices (Klimova, 2019). Social APPs (Line OpenChat and LineBot) are used as an action teaching tool, combining theoretical teaching in the classroom and practical training outside

the classroom. A digital action tool that students can check and know and discuss in time. Students can learn independently (self-directed learning), anonymous questioning, flexible time and an auxiliary learning tool that asks and knows immediately.

Learning Readiness

Learning readiness refers to the student's psychological preparation status or learning action in response to a specific situation. Learning readiness can be summarized into four aspects: self-regulated learning, classroom participation, active learning, and sense of identification.

Learning Engagement

Learning engagement refers to the degree of effort and quality of involvement when students perform learning activities. Engagement is closely related to students' learning enthusiasm, knowledge of learning, and investment time, and it is also affected by the degree of classroom participation and interactive communication.

Learning Satisfaction and Confidence

The definition of learning satisfaction in teaching research refers to a subjective feeling of satisfaction in the learning process. The greater the degree of conformity with the feeling, the higher the satisfaction.

Learning Effectiveness

Learning Effectiveness refers to the effect of learning behavior presented by learners through the process of teaching and learning. It is also the main basis for achieving the teaching goals and the expected learning goals.

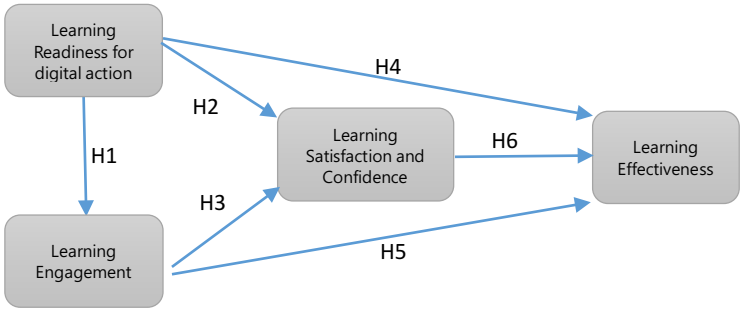
Research Design

This research takes advertising design as an experimental course and cooperates with the new creation team to coordinate design activities. Incorporate the professional theories, practical skills and advertising cases of the course into action learning. Teachers use LineChat and OpenChat to provide teaching support and communication tools according to different course progress. After combining the learning experience in the classroom and outside the classroom, a questionnaire survey was conducted, including learning readiness, learning engagement, learning satisfaction and confidence, and learning effectiveness surveys.

Research Objectives

The purpose of this research is as follows:
1. Use mobile apps to strengthen students' self-directed learning.
2. Establish teaching of digital technology to support design education.
3. Understand the learning effectiveness of students through mobile devices.

Proposed Model and Hypothesis



Picture 1. Proposed Model

According to the research purpose, hypotheses are as follow (see picture 1):

1. Learning readiness has a significant relationship with learning engagement (H1).
2. Learning readiness (H2) and learning engagement (H3) will increase learning satisfaction and confidence.
3. Learning readiness (H4) and learning engagement (H5) have a significant relationship with learning effectiveness, respectively.
4. When students are satisfied and confident in learning, they will have good learning effectiveness (H6).

Participants

This research is an experimental design for practical teaching, and the participants are 79 senior students at design school.

Research Method

The difference in performance of students' "learning readiness", "learning engagement", "learning satisfaction and confidence" and "learning effectiveness" will be used for item analysis and internal consistency and related analysis as item identification and homogeneity verification. The single-factor variance analysis is whether there is a difference in the scores of the test data before and after the test. It is used to understand the interactive relationship between learning satisfaction and self-confidence and learning effectiveness of students with different levels of learning engagement and teaching practice under digital learning readiness.

Questionnaire Scale and Variable Measurement

Learning readiness does not include the indicators of the system, hardware, and support (school administration). After modifying the learning readiness based on the concept of the flipped classroom, it is divided into self-regulated learning, classroom participation, and active learning. A four-dimensional scale for action learning readiness and sense of identification (Nicol, 2006; George, Kinzie, Schuh & Whitt, 2011; Roehl, 2013). The Student Learning Engagement Scale (SLES) is divided into three parts: classroom teaching, online activities, and action implementation. Classroom teaching refers to the willingness of students to discuss in class, share knowledge with peers, and operate in the classroom. Online activities are the attitude and participation of online learning, including the ability to help, share or participate actively. Action implementation is the offline implementation process active participation, assisting others. The Learning Satisfaction and Confidence Scale (SCLS) was developed by Jeffries and Rizzolo (2006). It was obtained by scholars verifying its reliability and validity

(Unver et al., 2017), including learning satisfaction (Satisfaction with current learning) and learning confidence (Self-confidence in learning) two major items, used to measure students' satisfaction with simulation activities (5 items) and learning self-confidence (8 items), a total of 13 scales. Learning effectiveness is based on eight dimensions and 26 factors proposed by Pulkka & Niemivirta (2013), of which eight dimensions include: interest, teacher function, quality of teaching materials, course satisfaction, quality of evaluation methods, student effort, and achievement as well as multiple perspectives such as classroom participation, to measure the changes in the teaching materials and content of this research.

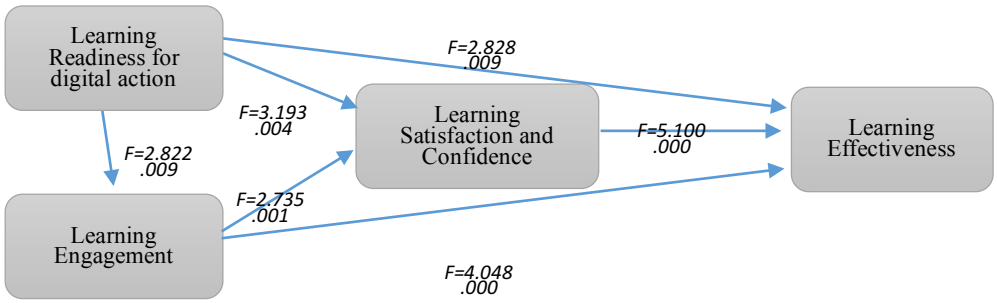
Results

Reliability and Validity

According to the results of a single-sample T test (see table 1), each variable has reached a significant level, indicating that the participants' learning readiness, learning participation, learning satisfaction and confidence and learning effectiveness have significant differences.

Table 1. Single Sample Verification Analysis Result

	T	df	Sig	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Learning Readiness	59.698	78	.000	3.81519	3.6880	3.9424
Learning Engagement	61.969	78	.000	4.25038	4.1138	4.3869
Learning Satisfaction and Confidence	66.938	78	.000	4.17405	4.0499	4.2982
Learning Effectiveness	82.736	78	.000	4.30684	4.2032	4.4105



Picture 2. Verification Results Between Variables

Table 2. ANOVA of Research Variances

		SS	df	MS	F	p
ANOVA of Learning Readiness						
Learning Engagement *H1*	Between group	26.203	60	.437	2.822	.009
	Within group	2.785	18	.155		
	total	28.989	78			
Learning Satisfaction and Confidence *H2*	Between group	21.903	60	.365	3.193	.004
	Within group	2.058	18	.114		
	total	23.961	78			
Learning Effectiveness *H4*	Between group	15.096	60	.252	2.828	.009
	Within group	1.602	18	.089		
	total	16.698	78			
ANOVA of Learning Engagement						
Learning Satisfaction and Confidence *H3*	Between group	15.706	32	.491	2.735	.001
	Within group	8.255	46	.179		
	total	23.961	78			
Learning Effectiveness *H5*	Between group	12.322	32	.385	4.048	.000
	Within group	4.376	46	.095		
	total	16.698	78			
ANOVA of Learning Satisfaction and Confidence						
Learning Effectiveness *H6*	Between group	15.573	57	.273	5.100	.000
	Within group	1.125	21	.054		
	total	16.698	78			

For the participant of different learning readiness, the learning engagement $F_{(60,18)}$=2.822, p=.009<.01; learning satisfaction and confidence $F_{(60,18)}$ = 3.193, p= .004<.01; learning effectiveness $F_{(60,18)}$=2.828, p=.009<.01; For the participant of different learning engagement, the learning satisfaction and confidence $F_{(32,46)}$ =2.735, p=.001<.01; learning effectiveness $F_{(32,46)}$=4.048, p=.000; For the participant of different learning satisfaction and confidence, the learning effectiveness $F_{(57,21)}$ = 5.100, p=.000. Hypothesis 1 to 6 are confirmed.

Conclusions

The result shows that learning readiness for digital action has a significant relationship with learning engagement, which can increase satisfaction and self-confidence in the course, and improve learning effectiveness. In the digital age, traditional teaching methods are constantly being updated. To improve teachers' teaching quality and build students' self-confidence in learning, it is necessary to use flipped teaching and use more flexible teaching methods to enhance students' engagement and interest. Learning and communication using digital action will be able to create design teaching with the three characteristics of "lively teaching", "real-time interaction" and "learning initiative".

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