Using a Participatory Learning Model to Enhance Mobile App Design and Development Skills with Glide Platform

Ekkaluck Saengduenchay* and Kitiyakorn Noenthaisong

***Abstract*—The aim of this study was to investigate the impact of using participatory learning through the Glide Platform on the mobile application design and development skills of second-year digital communication students. The research employed cluster random sampling, and the research instruments included a participatory learning plan, a skill assessment form, and a learning assessment test. Participatory learning was facilitated through the Glide Platform, which allowed real-time design and development of mobile apps in class. Statistical measures such as mean, standard deviation, percentage, and effectiveness index were utilized. The study revealed that students achieved scores on the skill assessment form significantly higher than the minimum of 70% criteria, indicating the effectiveness of participatory learning. The effectiveness index of participatory learning in enhancing mobile application design and development skills was calculated to be 56.68%. Moreover, the assessment results for mobile application design and development skills using the Glide Platform were higher than the minimum criteria of 70% with statistical significance.**

***Index Terms*—Participatory learning, mobile applications, glide platform**

I. Introduction

The evolution of technology today is undeniable. It is involved in the daily life of human beings, whether it is communication between people, receiving news from multiple platforms, transportation of goods and food from merchants to buyers, or learning in the classroom or outside the classroom, for example, through online channels, which have become popular in the modern era after the outbreak of COVID-19. In the past, teachers often imparted knowledge to students, but there is now a different form of learning in the present era, where learners can learn independently from anywhere [1], not just from a teacher who is an instructor alone. Therefore, learning management design should consider the context, environment, and differences in learners' basic knowledge by observing the learner's previous experience and understanding of the subject in the classroom. This leads to the transformation of skills in the 21st-century world [2], aiming to provide learners with Learning and Innovation Skills, Life and Career Skills, and Information Technology Skills.

Based on the researcher's teaching experience in the design and development of mobile apps, which is a form of media that requires the use of both user experience design (UX) and user interface design (UI) skills [3], students often need help in creating concepts and conveying their thoughts in a concrete form. Many students also struggle with communicating their ideas through UI design work, and they require better leadership skills, which can lead to teamwork problems with their classmates. However, teamwork is essential in the design and development of mobile apps since humans cannot perform difficult and complex tasks alone. The opportunity for people to interact and work together is considered to meet the basic needs of humans. To train students in the work process step by step and help them understand the division of work and roles within the group, collaborative skills, such as brainstorming activities, listening and speaking, summarizing, and presenting the results, are necessary [4]. These skills are also considered essential for the new future under learning in the 21st century [5].

This study aims to develop participatory learning to enhance mobile app development skills using the Glide Platform, which enables the development of mobile apps without requiring extensive coding skills. The goal is to increase second-year students' ability to create multimedia in the Multimedia Design and Development course. The course focuses on providing students with skills in designing and developing modern multimedia. Additionally, the study aims to find the effectiveness of the participatory learning process, which allows students to express their creativity without any distinctions within the scope of the course content and team [6]. The participatory learning model emphasizes the exchange of ideas among learners and accepts differences. The interaction between learners and instructors is also essential for leading a team to success through technology or platforms where students can work together [7]. The principle of participatory learning has two foundations: experiential learning and group process learning [8]. Participatory learning is derived from the source of learning and the desired skills in the learning process. There are four elements of participatory learning. First, the concept experience draws on the learning experiences that the learners have had in various aspects to participate in the development of mobile apps with the Glide platform [9]. Second, reflective observation is used to understand the meaning of experience or knowledge, and doubts can be addressed through questioning during class hours. Third, abstract conceptualization is for students to summarize their knowledge and understandings with the team. Fourth, active experimentation introduces knowledge from the previous steps to test validity and present it to other groups [10]. With all four elements, students can work together through the Glide Platform to enhance their design and development skills. Through the process of working as a team and

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exchanging ideas, the ideas that have been summarized into concepts and the group's design ideas can be presented.

II. Research Objectives

1) To study the results of participatory learning with the Glide Platform to enhance skills in designing and developing mobile applications.
2) To determine the effectiveness index of participatory learning in enhancing skills in designing and developing mobile applications using the Glide Platform for second-year digital communication students.
3) To develop the mobile application design and development skills of second-year digital communication students to meet the 70% criteria.

III. Research Conceptual Framework

The researcher has established a conceptual framework for research by taking participatory learning as a guideline for enhancing learning outcomes as a skill for designing and developing mobile applications with the Glide Platform for second-year digital communications students. The researcher uses participatory-driven learning to create learning activities [11] and utilizes the Glide Platform as a learning tool to enable students to apply their skills in designing and developing mobile applications and create learning outcomes through participatory learning activities. (See Fig. 1).

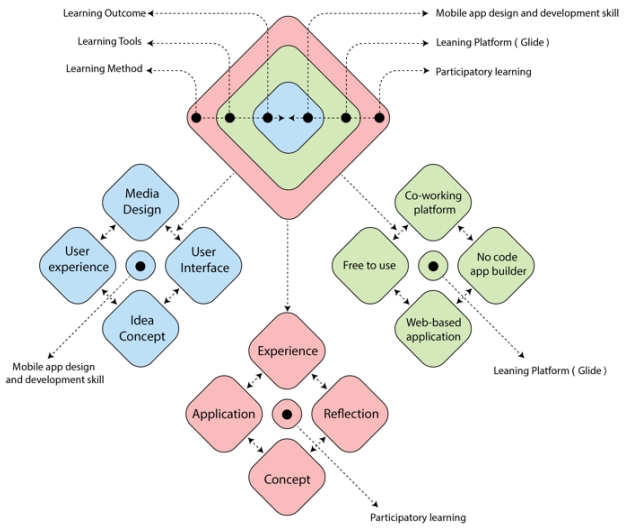

Fig. 1. A conceptual research framework for using participatory learning to enhance the design and development of mobile applications with glide platform.

IV. Scope of the Research

A. Population

The total number of undergraduate students studying Digital Communication Arts at the Institute of Digital Arts and Science, Suranaree University of Technology is 421.

B. Samples

Forty second-year undergraduate students studying Digital Communication Arts at the Institute of Digital Arts and Science, Suranaree University of Technology were selected for the study using random cluster sampling. The students are currently in their first semester of the academic year 2022.

V. Research Methods

The researcher employed participatory learning to enhance the design and development skills of mobile applications using the Glide Platform among second-year digital communications students with an experimental research model (Experimental Research). The data collection process can be classified as follows:

1) The researcher informs students about the learning objectives, work methods, and methods of measuring learning outcomes, as well as the basics of using the preliminary program before the next class.
2) The researcher administered a 30-question multiple-choice pre-test with four answer options to the entire group of students, including the sample group.
3) The researcher divided the students into groups to work together, with each group consisting of eight members. There were a total of five groups.
4) The researcher conducted participatory learning using four components of participatory learning in each hour of the learning management process. According to the learning management plan, the course spanned 12 weeks with four hours of class per week, totaling 48 hours. The learning management process consisted of the following steps:

   Introduction to the lesson: The researcher clarified the content in the question-and-answer hours between learners and teachers to bring into the lesson.

   Action steps: Instructors brought the content to life by teaching primary usages, such as tools in use and various screen display formats. It was a lecture and a demonstration of how to use the program.

   Measurement and evaluation steps: Each group summarized the content for each hour and took a test at the end of the activity.
5) The researcher administered a mobile application design and development skills assessment form to evaluate the design skills of the sample group during the presentation of the mobile application development. The assessment had four aspects, each with a total score of 25 points.
6) The researcher administered a post-test consisting of 30 multiple-choice questions with four options to the entire group of students. In addition, the researcher collected scores from the Mobile Application Design and Development Skills Assessment and a learning assessment test for second-year students to further analyze the statistical data.

VI. Research Tools

In this research, the researcher created the following tools and inspected them to determine the quality of the tools used as follows.

1) A participatory learning plan was created for the Multimedia Design and Development course, where

students study for four hours per week over a period of 12 weeks. The learning model plan was evaluated by four experts using a 5-level rating scale (Rating Score) [11] to assess the consistency of participatory learning with the content of the course. It was found that the quality of the participatory learning plan, with an average rating between 4.20 and 4.40, was appropriate.

2) A skills assessment form for mobile application design and development was created and assessed in four aspects: ability to conceptualize design and development, ability to design and develop UI, ability to design and develop UX, and capabilities or performance of mobile applications. Each area has a total score of 25, with the validity of the content assessed through the Design Skills Assessment Questionnaire. The questionnaire uses an index of conformity (IOC) where experts determine, based on questions, whether they are consistent with the behaviors that indicate the identified design skills. The assessment form had IOC values ranging from 0.50 to 1.00, indicating that it met the applicable criteria. The mobile application design skills assessment questionnaire had average scores ranging from 0.50 to 0.75 [12]. After testing it on 40 students who were not in the sample group, it was found that the discriminant power was between 0.20 and 0.80, and the difficulty was between 0.40 and 0.80. Questions in each aspect were selected for analysis, and the confidence level was 0.83.
3) To conduct a learning assessment test, the researcher analyzed the contents of the multimedia design and development course, considering the Course Specification (TQF.3), course description, measurement, and evaluation. They created a quiz that covered the content and learning objectives, consisting of two tests - one pre-examination and one post-study test - each with four multiple-choice questions and a total of 45 items. Four experts evaluated the accuracy of the indicators with the learning assessment test. A pre- and post-test with an IOC value of 0.50–1.00 is considered a valid measure of learning outcomes [13]. With a value between 0.25–1.00, the test is still considered valid. The learning assessment test was administered to 45 non-sample students to identify areas for improvement. The scores were analyzed for difficulty (P) and discriminating power (r). The pre-learning assessment test had difficulty values ranging from 0.68–0.84, while the post-learning assessment test had a difficulty between 0.21–0.78. The researcher then selected a 30-question test to determine the reliability of the multiple-choice test using the Kuder Richardson method KR-20 [14]. The pre-learning assessment test yielded a reliability score of 0.81, and the test's confidence was 0.87.

VII. Research Results

The results of the data analysis, respectively, are as follows:

Part 1: Results of participatory learning to enhance mobile applications design and development skills with the Glide Platform of 2nd-year digital communication arts students

TABLE I: Post-test Score of Mobile Applications Design and Developing Skills with Glide Platform 70% Criteria

Learning outcomes	number (people)	Total score	$\overline{X}$	S.D.	T	Sig
Post-test	40	30	21.25	2.84	-6.35	0.000*

*Statistical significance level ≤ 0.05

From Table I, it was found that the students had a mean score ($\overline{X}$) of 21.25 points and a standard deviation (S.D) of 2.84 for measuring their skills in designing and developing mobile applications using the Glide Platform. Based on the data analysis, it can be concluded that the students' skills in designing mobile applications with Glide Platform were 70% higher than the required criteria, with a statistical significance of 0.05.

Part 2: Determination of the effectiveness index of participatory learning for enhancing mobile application design and development skills with Glide Platform of students.

TABLE II: Demonstrates the Effectiveness Index of Participatory Learning in Enhancing Mobile Application Design and Development Skills with the Glide Platform.

Exam	number (people)	Total score	$\overline{X}$	S.D.	E.I.
Pre-test	40	30	9.80	2.82	0.5668
Post-test	40	30	21.25	2.84	

From Table II, it was found that the students had a mean Pre-test score ($\overline{X}$) of 9.80 and a standard deviation (S.D) of 2.82. Their mean Post-test score ($\overline{X}$) was 21.25 points, with a standard deviation (S.D) of 2.84. The effectiveness index was 0.5668. Based on the data analysis, it can be concluded that the second-year digital communications students made a learning progress of 56.68% by using participatory learning to enhance their mobile application design and development skills with Glide Platform, compared to their performance before the study.

Part 3: Measurement results of mobile applications design and development skills with Glide Platform of second-year digital communication arts students

TABLE III: Presents the Standard Deviation of the Effectiveness of Participatory Learning in Building Mobile Application Design and Development Skills with the Glide Platform, Compared to the 70% Criteria

Design and Development Skills	number (people)	Total score	$\overline{X}$	S.D.	T	Sig
1. Conceptualize the design and development of Mobile Applications.	40	25	18.78	3.25	2.38	0.01*
2. Design and develop UI	40	25	17.33	4.13		
3. Design and develop UX	40	25	19.24	3.03		
4. Capabilities or Performance of Mobile Applications	40	25	19.64	4.00		
Total	40	100	74.98	13.24		

*Statistical significance level ≤ 0.05

From Table III, it was found that the students had a mean score ($\overline{X}$) of 74.98 points and a standard deviation (S.D) of

13.24 for their mobile application design and development skills with the Glide Platform. Based on the analysis of the summary data, it can be concluded that the second-year digital communications students have mobile application design and development skills with the Glide Platform that are higher than the 70% criteria, with a statistical significance of 0.05.

VIII. Conclusion and Discuss

from research results regarding participatory learning to enhance design and development skills of mobile applications with Glide Platform of second-year digital communications students, the researchers discussed the results as follows:

1) The study found that utilizing participatory learning to enhance mobile application design and development skills using the Glide Platform resulted in statistically significant post-test scores at a 0.05 significance level, which were 70% higher than the predetermined criteria. The research involved 40 students who underwent pre-study testing and were then subjected to participatory learning methods for four hours per week over the course of 12 weeks. This included quizzes, group activities, and assessments of behavior and task performance during class. The results indicated that student skills in designing and developing mobile applications increased significantly with the implementation of participatory learning methods, allowing them to share their opinions and ideas.

   The four components of participatory learning utilized by the teachers were:

   Concept Experience: This involves instructing students to search for information on mobile applications that they have used and had a positive experience with in terms of user interface (UI) and user experience (UX). The aim is to encourage students to find experiences for themselves.

   Reflective Observation: This component allows students to analyze the structure and internal details of mobile applications they have studied to understand how the UI design and functionality impact user experience.

   Abstract Conceptualization: The process of designing mobile applications that need to be developed is done collaboratively, with the team using the Glide Platform to set design and development boundaries.

   Active Experimentation: Team members are given a preliminary trial of the designed mobile applications and then present their work to classmates to test them out.

2) The study's results indicated that participatory learning effectively enhanced the design and development skills of second-year digital communications students in Mobile Applications using the Glide Platform, with an effectiveness index of 56.68%. The researchers employed participatory learning to improve students' abilities in designing and developing mobile applications using the Glide Platform, resulting in a learning progression index of 60.34%, which further increased to 64.28%.

   Participatory learning is a process that empowers students to take control of their learning. The collaborative group model, focused on creating learning outcomes based on mobile application design and development, enhances the learning effectiveness by enabling students to design their learning alongside their peers.

3) The study revealed that second-year digital communications students could effectively design and develop mobile applications with the Glide Platform, showing a significant difference of 0.05 in the post-test scores, which exceeded the predetermined criteria and led to improved post-school achievement. This outcome was achieved by utilizing the four components of participatory learning, which include the ability to conceptualize the design and development of mobile applications, design and develop user interfaces (UI), design and develop user experience (UX), and the capabilities or performance of mobile applications. With an effectiveness index of 0.5668, these students showed significant improvement in their learning progress.

   Additionally, the participatory learning model allowed students to work in groups, practice their skills, and develop their ability to invent, plan, and find solutions independently, resulting in the students exhibiting excellent learning behavior during each study hour.

IX. Future Study

Future research on technology-based participatory learning should consider implementing group work activities [15] through appropriate media or technology that support learning management. Since participatory learning requires students to work in teams or groups [16], teachers should guide them to work effectively together. Dividing the workload or content in a way that allows for equal distribution of responsibilities among the learners [17] is also essential for successful participatory learning.

Using the Glide Platform in participatory learning offers several advantages, such as enabling engaging online learning that transcends the constraints of time and place [18]. However, the platform alone may not be enough to complete participatory learning, and teachers need to create learning activities that encourage participation to ensure the effectiveness of this type of learning [19].

This research is useful for educators, teachers, professors, and researchers who wish to study appropriate environments for participatory or group learning. Future research can explore qualitative methods, such as observation and interviews, to determine the effectiveness and satisfaction of participatory learning management.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Ekkaluck Saengduenchay is responsible for designing student participation in learning activities to test the effectiveness of participatory learning in the Multimedia Design and Development subject, using the Glide Platform with second-year undergraduate students in Digital Communication Arts at the Institute of Digital Arts and Science, Suranaree University of Technology. Kitiyakorn

Noenthaisong observes the learning activities and measures the learning outcomes statistically for educational research purposes. The two authors reviewed the literature, exchanged opinions, and compiled their findings into a research paper.

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