Students’s acceptance toward the use of mobile learning in fractions

I N Rochmah¹, W-Y Hwang², and Priyanto¹

¹Graduate School of Electronics and Informatics Engineering Education, Universitas Negeri Yogyakarta, Indonesia.
²Graduate Institute of Network Learning Technology, National Central University, Taiwan.

Email: irmanuur.2018@student.uny.ac.id

Abstract. Most of the fifth-grade students have been familiar with mobile technology and commonly use it to play games. Accordingly, the school do not allow fifth-grade students to bring or operate mobile technology while they are at school in order to keep students’ attention on learning. However, during the pandemic COVID-19 condition, the government demands students to learn from home. Thus, one solution is using mobile technology to maintain communication and interaction between students and teachers during teaching and learning activities from home. The present study developed a mobile application, called U-Fraction, to assist students in the mobile learning process. The developed application was associated with authentic learning so that students could have stronger understanding of the real-world problems. Students’ perception toward the mobile learning supported by U-Fraction were measured using TAM with partial least square analysis. The result shows that students tended to use this mobile application for mobile learning. Students also believed that the use of U-Fraction for mobile learning could help their learning process.

1. Introduction

Students usually use mobile phones for playing games [1]. Yet not many students use them for learning. The school did not allow students to bring or operate mobile phone for elementary school students while they learn at school. School forbid this in order to keep students’ attention on learning. However, pandemic COVID-19 condition, the government demands students to learn from home [2]. Consequently, students need media for learning from home because they cannot have face-to-face in the class. Students who were previously not allowed to hold mobile phone are now required to use them when studying at home. The teacher would share learning material or tasks by an application that has been agreed upon by the teacher and parents. Thus, mobile requirements for learning in this condition are a good way to help students and teachers during teaching and learning activities from home [3].

Mobile learning is a learning model that uses a mobile phone for learning [4]. Mobile learning can make learning easier, encourage students’ motivations, and encourage students to be active [5]. Mobile learning offers several benefits: (1) internet access, (2) can be taken anywhere, (3) can share information with others, and (4) attract attention through visualization learning [4]. Therefore, mobile learning gives more benefits to learning, especially in this condition.

Based on an interview with two teachers in Krapyak Wetan Elementary School, Jogja, a teacher uses an online chat application to give assignments. Assignments given by the teacher are reading the material
in the book and practicing questions in the book. After that, students send their practice questions to the teacher through an online chat application.

Furthermore, researchers develop a mobile learning application based on mobile. This application will be used to assist students in learning. This mobile application are not only for providing learning material but also to give students a challenge for their learning process. The subject for learning material in this mobile learning is fractions. Based on an interview with teachers, the teachers mentioned that student has low grade in fractions [6] [7]. On average, students have not reached the school’s minimum value standard. Fractions are important for students as subject of learning in the class and in their daily lives [8]. Thus, the developed mobile learning with authentic learning would be expected to make students understand real-world problems [9] [10]. Learning that is related to the real-world has more meaningful learning [11] [12]. In this study, the students’ acceptance toward using mobile learning U-Fraction to help students learn fractions was measured. TAM was used to assess the students’ acceptance [13]. Students’ acceptance is used to know whether or not technology can be accepted by the user. Partial Least Square was used to analyze TAM. Partial Least Square is structural equation modeling in small or limited participants [14].

2. Research Method

Participants of this study were twenty-one fifth-grade elementary school students. In the first step, researchers analyze students’ requirements for fractions learning. The second step was designing the learning material. Having finished designing the learning material, researchers developed a mobile application for mobile learning, named U-Fraction Having finished developing a mobile learning application, the next step was to implement the mobile application in fraction learning and do an evaluation. The research flow is shown in Figure 1.

![Figure 1. Research Flow.](image)

Researchers used TAM to evaluate the students’ perceptions of accepting this mobile app for their mobile learning. TAM consists of four dimensions: Perceived Usefulness (PU), Perceived Ease of Use (PEU), Attitude Toward Using (ATU), and Intention of Use (IU). In this study, TAM also uses an external variable: Perceived Playfulness (PP). Cronbach’s alpha, frequencies, composite reliability, Average Variance Extracted (AVE), R-Square, and path analysis between variables in TAM were analyzed using PLS with SmartPLS. PLS was measure the outer model, inner model, and path analysis. Outer model using composite reliability and AVE measurement. Inner model was analyzed using R-Square measurement. Then, path analysis was performed by using T-statistics and P-values.
3. Result and Discussion

3.1. Students Submission
In this study, students did three activities. In the first activity, students changed fractions symbol to fraction representation using pictures. Students’ submission in the first activity is shown in Figure 2. Figure 2 shows that a student made several representations of a fraction by taking several pictures in his surrounding. He took several pictures of the floor. Then in the second activity, students did fraction operation: addition and subtraction. In the last activity, students did fraction operation in word problems.

![Figure 2](image)

Figure 2. Students Submission in The First Activity.

3.2. Cronbach’s Alpha and Frequencies
In this study, Cronbach’s alpha analysis was used to know TAM reliability. The measurement is shown in Table 1. The result shows that the TAM showed a valid value. A variable can be stated valid value when the answer toward questions always have consistency and have Cronbach’s alpha value more than 0.60. The Cronbach’s alpha result for ATU is 0.844, IU is 0.804, PEU is 0.863, PU is 0.878, and PP is 0.796. All of the dimensions have Cronbach’s alpha value of more than 0.60. It indicates that all dimensions were reliable.

| Dimension | Cronbach’s Alpha | N  | Mean | Std. Deviation |
|-----------|------------------|----|------|----------------|
| ATU       | .844             | 4  | 4.337| .598           |
| IU        | .804             | 4  | 4.426| .578           |
| PEU       | .863             | 4  | 4.326| .576           |
| PU        | .878             | 4  | 4.420| .553           |
| PP        | .796             | 4  | 4.391| .537           |

3.3. PLS Model
Researchers analyzed the outer model and the inner model. Outer model uses composite reliability and AVE measurement. Inner model uses R-Square measurement. In this study, the research model used can be observed in Figure 3. The latent variables are PP, PEU, PU, ATU, IU, and Acceptance. Each latent...
variable has four indicators, except for Acceptance which has twenty indicators. Each latent variable influences other latent variables as indicated by the arrows.

Figure 3. Research Model.

3.3.1. Outer Model. In this section, the researchers analyzed the outer model of PLS. In the outer model, researchers used composite reliability and AVE. The AVE result for ATU is 0.858, IU is 0.856, PEU is 0.709, PU is 0.733, and PP is 0.866. AVE’s value of more than 0.50 states that it could be a good AVE. AVE’s result indicates that latent variables can explain the average of more than half the variance of the indicators. All indicators in TAM dimensions showed reliable value because it has composite reliability more than 0.70. The composite reliability result for ATU is 0.897, IU is 0.873, PEU is 0.907, PU is 0.916, and PP is 0.624. It indicates that all indicators each dimension has consistency.

3.3.2. Inner Model. R-Square results for ATU are 0.860, IU is 0.896, PEU is 0.747, PU is 0.691, and Acceptance 0.942. It indicates that each dimension has a high impact on students’ perceptions of accepting this mobile app. Mobile learning impacts r-square 94.2%, with residual 5.8% affected by other outer from this study. After analyzing the inner model, then analyze the path coefficients.

3.3.3. Path Coefficients Result Analysis. Table 2 shows the path coefficients analysis. The T-statistics result for PEU to ATU is 1.216 (p>.05), PU to IU is 2.272 (p<.05), ATU to IU is 2.309 (p<.05), PU to ATU is 5.068 (p<.05), PU to IU is 12.572 (p<.05), PP to PEU is 17.845 (p<.05), and IU to Acceptance is 126.850 (p<.05). The result indicates that PU to IU, ATU to IU, PU to ATU, PEU to PU, PP to PEU, and IU to Acceptance are accepted. However, PEU to ATU result is not accepted because it has t-statistics values 1.216 with p-values more than 0.05. Based on the result of path analysis, students’ PP influences students’ PEU. Therefore, students’ PEU influences students’ PU. Then, students’ PU influences students’ IU and students’ ATU. After that, students’ ATU can influences students’ IU ‘U-Fraction’ for learning. Moreover, students IU influences students’ Acceptance toward using ‘U-Fraction’ for mobile learning.
Table 2. Result of Path Analysis

|          | Original Sample Mean | Sample Mean | Standard Deviation | T-Statistics | P-Values |
|----------|----------------------|-------------|--------------------|--------------|----------|
| PEU -> ATU | .206                 | .192        | .169               | 1.216        | .224     |
| PU -> IU  | .478                 | .464        | .211               | 2.272        | .023     |
| ATU       | .488                 | .507        | .211               | 2.309        | .021     |
| PU ->     | .749                 | .762        | .148               | 5.068        | .000     |
| ATU       | PEU -> PU            | .831        | .833               | 12.572       | .000     |
| PP -> PEU | .864                 | .871        | .048               | 17.845       | .000     |
| IU ->     | .971                 | .976        | .008               | 126.850      | .000     |

Acceptance

4. Conclusion
It can be concluded that students tend to use this mobile app for mobile learning. Students had never used this kind of application for learning before. Usually, the teacher would teach in front of the class using a whiteboard, paper, or cards. When researchers provided learning using mobile applications for learning, school and students were very enthusiastic. The teacher was very supportive and hoped that this kind of development could be used in the classroom for student learning. Researchers asked students several questions about this mobile learning after using this mobile app in fraction learning. Based on the result, students believe that U-Fraction for mobile learning could improve their learning process. Students could accept the new technology and felt that this mobile app for fractions learning was easy to use. Students’ perceptions influence students’ acceptance of using ‘U-Fraction’ for mobile learning in every dimension. The students’ perceived ease of use influences students’ perceived usefulness. Students’ perceived usefulness influences students’ intention to use and students’ attitudes toward using this mobile app for learning. After that, students’ attitudes can influence students’ intention to use this mobile app for learning fractions. Therefore, students’ intention to use influences students’ acceptance of this mobile app for mobile learning. Thus, by using U-Fraction for mobile learning could help students to learn fractions easier and playfulness. U-Fraction could also help teachers to make learning more related to real life, more fun, and more memorable. So that this paper can be a reference for researchers or developers to provide innovations in learning.

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