

Interactive Mobile Technologies on Civic Education Learning in Higher Education

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Abstract—This study aims to describe the process of developing mobile learning in civic education in higher education. Data collection was carried out using the research and development (R&D) through the A.D.D.I.E. model. Based on the material and media expert's judgment, the feasibility level of 91.33% and 91.67%, respectively, reflect the application was very feasible to use. In the small and field group trials, the application score was between 4.29 and 4.06, meaning that the application was well developed and feasible for civic education learning in higher education.

Keywords—Mobile learning, civic education, social tolerance, higher education

1 Introduction

Technology in the global era is currently developing very quickly in civic education learning [1]. One of the positive impacts of the emergence of technologies is to help civic education students advance awareness of their rights and obligations as citizens. In addition to that, the development of civic education learning and technology shows increasing students' active participation through video games[2]. So, learning based on information technology can be connected with higher education pedagogy to advancing civic education learning [3]. According to Fagan [4], educational institutions are required to be adaptive to the changing paradigm of education from traditional to conventional, which is a demand of global society using I.C.T. (Information Communication and Technology) [5]. Based on Chiu et al. [6], students must find information sources, process, and build their knowledge when the lecture gives an illustration. Therefore, students need technology to get information. In Russia, civic education becomes an essential part of changing the cultural image and awareness of students' attitudes towards their political attitudes through social media[7]. Instead, the development

of technology in Israel increased civic empowerment in the educational environment through civic education learning[8]. Meanwhile, In England, civic education learning used smartphones and became a new cultural ecology in the learning process[9]. The operating system that is widely used today in smartphones is Android-based because it is open source. Android helped developers create applications for various kinds of smartphones[10]. Consequently, android has many applications that can help higher education students' in the learning process.

In the digital era, civic education is essential to encourage students to be democratic people [11]. Based on Barber [12], learning democracy can be done through civic education learning amidst inequality to understand students in the middle of globalization. Therefore, in order for civic education to keep up with technology advances, it is necessary to develop an android-based mobile application into an innovative learning process [13]. So, Learning media is needed to deliver learning messages concerning multiculturalism and social tolerance [14]. Likewise, British Columbia and Canada also promote human rights, multiculturalism, and national identity through civic education [15]. As we know, multiculturalism provides awareness to students that diversity makes them more tolerance in society [16]. Bangwayo-Skeete dan Zikhali [17] also shows that social tolerance can reduce the possibility of conflict between communities such as in Latin America and the Caribbean. However, the United States tried to develop social capital measures against social bonds in social tolerance without seeing any significant results [18]. Consequently, Flew and Iosifidis[19] shows that social tolerance can be done by introducing cultural values from local wisdom. In the technology era, civic education uses mobile application learning media to learn by themselves [20] [21].

The concept of learning by Ugbaje [22] towards a pedagogical and sociotechnical integration using mobile learning provides many benefits for lecturers and students. On the other side, Kalogiannakis and Papadakis[23] showed how technology affected educators' increasing pedagogical training. However, the mobile application must always be developed to minimize existing limitations such as device performance, display screens, and storage capacity[24]. Smartphones also encourage students to reach their learning goals[25], mainly through interactive mobile technologies[26]. This research aims to prepare students to instill social tolerance to accept diversity and minimize discrimination on religion, race, and ethnicity through interactive mobile technologies on civic education learning.

2 Literature Review

2.1 Mobile technologies for civic education learning

Mobile learning is developed through an android application [27] in the form of a learning media product that can be downloaded via an Android-based smartphone. The use of smartphones as learning media also provides new experiences for students and makes it easier for students to learn because of its simple shape[5]. Nickerson, Rapanta, and Goby [28] explained that mobile learning as a learning medium is not only assessed on one side. Using mobile learning should motivate and stimulate students to remember

what they have learned and provide learning stimulation [29]. Thus, the use of an application as a learning medium must fulfill several criteria such as ease of navigation, contains cognition, knowledge, and presentation of information. Also, mobile learning has media integration criteria to attract learners[30]. There is a function as a whole, meaning that the program being developed must provide the learner's learning desired. Therefore, the mobile application can improve the quality of civic education learning[31]. Mobile learning is related to learning through mobile wireless technology. Students have the right to access learning materials and information to improve their quality of life regardless of where they live, their status, and their culture[29]. The development of mobile learning is motivated by the high-speed penetration of mobile devices. According to Kalogiannakis and Papadakis [32], mobile devices can be used as learning media. The use of mobile learning in teaching and learning activities spurs students to understand the material by improving their cognitive domains and increasing the affective domain and interactive power in the psychomotor domain [33].

Mobile learning developed through an android-based application helps students understand how to implement social tolerance in civic education[34]. Civic education students conduct analyses related to ethnic diversity. Developing mobile learning is long-life learning; students can be more active in the learning process [35]. In civic education there is the concept of tolerance also implies an attitude not to be insulting, not condemning, not blaspheming, not feeling self-righteous, and not wanting to win alone in living together with other components that are different from our existence[36]. Because living a tolerance can build togetherness. Civic education taught students how to be Tolerance and respect diversity [37]. In some instances, it connotes the attitude of passiveness towards something dislike, and often it means putting up with or enduring something disliked [38]. Tolerance can also mean terms of socio-cultural and religious contexts, which means attitudes and actions that prohibit discrimination against different groups or are not acceptable to the majority in a society [39]. Therefore, innovative learning media are needed to introduce cultural diversity to prospective civic education learning in higher education[40]. Students need to have the character of mutual respect through social tolerance in civic education learning. According to Lee and Park [41], mobile technologies can facilitate students' civic education engagement, and learning innovation arises from a change in the learning paradigm [42]. Civic education can make students aware of the diversity and local culture of all ethnic groups. Thus, mobile learning to introduce civic education through local culture can provide direction for students to implement social tolerance in their life.

Meanwhile, students can become the next generation of the nation with a high tolerance for different customs and cultures. Therefore, this research focused on interactive mobile technologies on civic education learning in higher education. Based on Ingrams [43], civic behavior is transformed through mobile information and connectivity. So, mobile learning makes students more civically engaged[44].

3 Method

3.1 Research design

This study is an educational research and development (R & D) study that aims to develop mobile technologies in learning resources for social tolerance based on android in learning and learning theory courses [45]. Educational development research includes the development process, product validation, and product testing. Researchers are trying to develop a product effectively used in preparing civic education teachers who have social tolerance through development research. This study is an Android-based mobile application as a learning resource for social tolerance education to improve pre-service civic education teachers' learning innovation and provide learning media. The A.D.D.I.E. development model developed by Dick and Carry in this study in the Analysis, Design, Development, Implementation, and Evaluation stages.[46].

3.2 Research setting and data collection

This research was conducted at the Civic Education Study Program, Universitas Negeri Jakarta. The university is one of the Educational Personnel Teaching Institutions in Jakarta, Indonesia. This research started in March 2020. Data collection was carried out using interview techniques and questionnaires. In this study, we have collaborated with Civic Education lectures and students for interviews. The results of the interview are used as material for consideration in the learning media development process. Also, the questionnaire is intended for instructional media experts and material experts. The validity is here to test the developed learning media's appropriateness and test its suitability with the material. The lecturers' results and students' responses gave a positive response, which was shown by the questionnaire's results. The data obtained from the results of the response questionnaire of lecturers and students are then analyzed using quantitative data to test the practicality of the product developed. [47].

3.3 Data analysis

The research data were analyzed qualitatively and quantitatively. Quantitative data analysis is used to analyze data collected from questionnaires. Quantitative data were obtained at the research stage of design validation and use trials. The value obtained for each of these steps can be obtained by using a questionnaire of data analysis of expert validity (expert lecturers of learning media and expert lecturers of civic education) and questionnaires for analyzing lecturers and students' responses to the use of mobile learning media. The validity is here to test the developed learning media's feasibility and test its suitability with the material. Answers to expert validation questionnaires use a Likert scale; the measured variables are translated into variable indicators. The questionnaire test for the validation of learning media experts can be done by comparing the number of respondents' scores (\sum) with the total ideal score (N).

$$P = \frac{\sum R}{N} \times 100\%$$

The validation criteria used in the validity of media research are presented in the table.

Table 1. The Percentage of Media Feasibility

| No | Achievement Level | Qualification |
|----|-------------------|---------------------|
| 1 | 81-100% | Highly Feasible |
| 2 | 61-80% | Feasible |
| 3 | 41-60% | Moderately Feasible |
| 4 | 21-40% | Less Feasible |
| 5 | <20% | Unfeasible |

Meanwhile, qualitative descriptive analysis is used to process interviews, data from critical questionnaires, and suggestions by instructional media experts and material experts. Data analysis techniques are used to classify information from qualitative data in responses, criticism, and suggestions for improvements and revisions of mobile learning products.

3.4 Data collection techniques

We were collecting data in this study using interview techniques, questionnaires, and tests. In this study, researchers interviewed lecturers in civic education courses using interview guidelines that contained several aspects, including learning media, learning methods, student characteristics, and learning facilities. The interviews' results were then considered in the media development process following students' and lecturers' needs. Besides, the questionnaire is aimed at media and material experts. Researchers work with educational technology lecturers to review the media. Also, the test is divided into two, namely, pre-test and post-test. The pre-test is given to students to determine their initial ability in learning material about the diversity of cultures around before they are taught using learning media. Simultaneously, the post-test is carried out to determine student learning outcomes after they get material using learning media.

4 Results and Discussion

4.1 Mobile learning design

Before carrying out the learning media design process, researchers observed the learning process of civic education courses. The interview was conducted with lecturers in civic education courses and class 2017 at the civic education study program, Universitas Negeri Jakarta. The analysis includes several aspects such as curriculum, understanding of social tolerance, prospective teachers' needs, the media used by lecturers,

and teaching materials. Based on these data, civic education's learning process utilizes the lecture and discussion method with PowerPoint tools.

In the civic education learning process, I usually divide the groups of 5 people each. Then, they will make papers and PowerPoint. After that, present it in class. Then it will be followed by a discussion. As a lecturer in civic education, ease of learning is needed. However, the lack of facilities makes it difficult to develop learning innovations (Lecture, 2020). As a student, I feel that the current learning process is not very innovative.

Moreover, we will deal with students who understand much better-using technology. So that technology in the field of civic education is needed. (Student, 2020).

The results of interviews conducted with students and lecturers showed that there was no thorough preparation in an innovative learning process. Research data also shows that civic education students doubt their ability to develop innovative learning media. It is because tolerance is considered a valuable asset for any community to create an open and humane society [48]. Based on the results of the analysis collected by researchers, lecturers need learning media that can help students understand civic education learning in cultural diversity material to implement it in an attitude of social tolerance. Besides, mobile application increases learning motivation in civic education learning. The use of smartphones as an effort for the learning process at universities can increase student involvement in the classroom[33], [49]. The learning media developed in this study is an Android-based application called "T.O.L.E.R.A.N." and can be downloaded via the Google Play Store. This application can improve the quality of students learning and is useful for improving civic education learning outcomes[29], [50], [51]. An android-based application has been developed to help civic education lectures introduce S.T.E.M. activities in the classroom and prepare them to teach digital literacy [32],[52].

In the next stage, the researcher conducted an application design. In this process, the layout was designed using CorelDRAW X8 and Canva's features. Meanwhile, the application features were developed by Atoz Createapps, a web-based mobile application maker. The design process consists of developing the assessment instrument and designing the "T.O.L.E.R.A.N." application. Described as follows:

a. Developing an Assessment Instrument for the "T.O.L.E.R.A.N." Application:

The "T.O.L.E.R.A.N." application assessment instrument is formulated in the form of a questionnaire to check the application's appropriateness. This instrument aims to collect data from material experts, media experts, and students. This instrument uses a Likert scale reference that includes 4 categories: Very Good, Good, Bad, and Very Bad.

b. "T.O.L.E.R.A.N." Application Design:

This application consists of several essential menus. On the Main Menu, the features are displayed under a definite theme. The "search for journals" menu provides a reference for students to make it easier to analyze various research results related to civic education. When students click, search for journals, they are immediately directed to the Scientific Journal of the Democracy Forum belonging to the Citizenship Education Study Program, Universitas Negeri Jakarta. This journal publishes the latest research results on citizenship and tolerance. The menu "Tolerance Education"

includes learning models that instill social tolerance and interesting learning concepts for students in civic education learning. On the "Web Tolerance" menu, students can analyze the problems of intolerance in Indonesia. The cultural and tolerant living conditions in each area. The "Tolerance Gallery" menu is provided to make it easier for readers to see Indonesia's cultures. Also, carrying out traditional ceremonies in several areas is carried out in collaboration with each other even though they are of different religious backgrounds. The "menu of tolerance videos" offers users more interactive, equipped with animations and videos of implementing tolerance in cultural diversity. Detailed learning materials about social tolerance and cultural diversity can be found by collecting interesting animated videos to watch and learn. The video can be accessed on the Video Tolerance menu. In short, the design of the "T.O.L.E.R.A.N." application above has considered several essential aspects, such as the use of exciting animation/photos to attract students' interest, provide complete information sources, and offer interactive use. This is relevant to the research results where the application developed is expected to increase social tolerance learning.

4.2 Validation of application

Material experts and media experts carry out the "T.O.L.E.R.A.N." application validation. They are the lecturers at the Educational Technology and Civic Education, Universitas Negeri Jakarta. Material experts assess the quality of content and social tolerance learning objectives based on the material developed in the application and input their responses to the questionnaire designed using a 5-point scale. Also, they are encouraged to provide suggestions and comments to improve the application. The following are the results of the material expert's validation.

Table 2. Results of Material Expert Validation

| No | Aspect | Percentage |
|----|-----------------------------|------------|
| 1 | Content Quality and Purpose | 90,21% |
| 2 | Application Program | 89,90% |
| 3 | Relevance of Material | 93,90% |

Table 2 shows that it is highly feasible for students and lecturers of civic education from the quality of the content and objectives. Also, the application program is considered highly feasible. According to the results of the material expert's comments explained:

- The material provided by the "T.O.L.E.R.A.N." application is very interactive, then the animation contained in the learning video is easy to understand. Layout in the form of right-left alignment, understanding, process, and tolerance implementation is exciting and neat. Some of the cultures raised are very attractive to users. (material experts, 2020).

Besides, the researcher validated media experts with the following results.

Table 3. Results of Media Expert Validation

| No | Aspect | Percentage |
|----|-----------------------------|------------|
| 1 | Content Quality and Purpose | 89,21% |
| 2 | Application Program | 93,90% |
| 3 | Relevance of Material | 91,90% |

Table 3 shows the media validation from these three aspects is highly feasible as a learning medium. Thus, based on material experts and the "T.O.L.E.R.A.N." application, lecturers and students are suitable for learning civic education in class. The advancement of information technology presents its challenges for pre-service teachers in the learning process to utilize technology in inadequate education [4]. Besides, mobile learning's effective use can improve interactive learning and encourage an efficient learning process [53], [54]. After validating, the next researcher implemented the "T.O.L.E.R.A.N." application. To measure the effectiveness of this development's results, researchers did not only measure learning outcomes through questionnaires at the small group trial stage and field test. Each question asked refers to the same indicator. The following are the implementation results.

Table 4. Validation Results of Small Group and Field Group

| No | Indicator | Small-Group | | Field Group | |
|----|---|-------------|------------|-------------|------------|
| | | Scores | Categories | Scores | Categories |
| 1 | Describe the structure and sequence of teaching tolerance | 4,44 | Good | 4,03 | Good |
| 2 | The learning process is varied | 4,42 | Good | 4,11 | Good |
| 3 | Ease of Use | 4,5 | Good | 4,03 | Good |
| 4 | Understand the diversity of Indonesian culture | 4,08 | Good | 3,71 | Moderate |
| 5 | The effectiveness of navigation in the application | 4,22 | Good | 3,44 | Moderate |
| 6 | Provide motivation and attract attention to learn tolerance | 4,11 | Good | 4,72 | Good |
| 7 | Attractive and innovative learning media | 4,29 | Good | 4,42 | Good |

The "T.O.L.E.R.A.N." material and media aspects presented in Table 4 prove that this application is feasible, as indicated by a score ranging between 4.29 and 4.06.

5 Evaluation of Application

At the evaluation stage, a final product revision ("T.O.L.E.R.A.N.") is carried out based on suggestions and input from students involved in large group trials.

- I find learning through the "T.O.L.E.R.A.N." application very good. Because using a mobile application can add to my insight into how to teach correctly in class. (Students 2, 2020). I am very interested and happy to use the "T.O.L.E.R.A.N." application as a medium for learning tolerance in the classroom. Easy to use, the material is easy to understand to learn to manage situations in the classroom through the mobile application (Student 4, 2020).

Besides, students suggested that improvements need to be made to make the "T.O.L.E.R.A.N." device more attractive. Besides that, the animation, video, and material in "T.O.L.E.R.A.N." are following basic competencies' objectives. Based on student validation and responses, "T.O.L.E.R.A.N." provides an Android-based learning media that is very feasible for civic education. Through its development, this research confirms that learning activities that utilize technology can be carried out anywhere and anytime. In line with Chamorro et al.[55] a mobile application can be a recommendation on social context such as civic education learning. Besides that, the purpose of using application-based learning media can support collaboration in the learning process. Therefore, the potential for integrating technology and learning media is used to solve problems that arise due to a lack of facilities in learning activities. Meanwhile, this study's findings are relevant for increasing interactive learning and encouraging an efficient learning process. [4], [53], [54].

6 Conclusion

"T.O.L.E.R.A.N." is an application based on mobile technologies that are used as a learning medium through a five-stage development process (A.D.D.I.E.)—namely, analyzing an early stage to see the needs of lecturers and students. Furthermore, design refers to making research instruments, designing "T.O.L.E.R.A.N." products, and uploading them to the Google Play Store. Then, in the development process related to application development, conducting expert assessments, and revising. After making the revisions, the small and field group trials were carried out to process the "T.O.L.E.R.A.N." application due diligence. This development's final stage is an evaluation that compares the testing phase results and concludes its feasibility. According to material and media experts, the feasibility level of 91.33% and 91.67% reflects high feasibility. "T.O.L.E.R.A.N." has been the subject of small group and field trials as a learning medium for civic education, and responses are expressed as dimensionless scores in the 4.0-4.6 range, meaning that this application qualifies for further testing on large groups. In the small and field group trials, using "T.O.L.E.R.A.N." obtained a score between 4.29 and 4.06, which confirms its high eligibility for social tolerance learning in civic education.

The application developed in this study focuses on a specific topic of Civics learning, namely, social tolerance. Therefore, this application can be used as a civic education learning model on social tolerance material. Thus, civic education understands the theory related to being a good citizen, but it is also able to identify local wisdom that exists in the students' environment so that they can implement social tolerance in society. Besides, the successful use of mobile applications in learning is influenced by teacher literacy about technology. Thus, future research can investigate this issue. It can be concluded that the Android-based learning media created can be used to improve student learning outcomes. This learning media can help students understand the material through animations available on mobile learning applications. In addition to animation, learning media also provides learning videos and journal searches. Besides, lecturers and students can see the latest information related to social tolerance. This application

also provides practice questions that are directly connected to the Google form to facilitate students. As feedback, students will be shown scores and comments when working on all questions.

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