Development of Augmented Reality Based Wushu Training Module to Improve Basic Movement Ability

Syaipul Ramdhan, Egga Asoka
1,2,3 Global Institute, Tangerang, Indonesia, 15114
E-mail: syaipulramdhan@stmikglobal.ac.id, eggasoka@stmikglobal.ac.id

ABSTRACT

Wushu martial arts is one of the favorite martial arts in Indonesia, with achievements that are routinely obtained at various international events such as the SEA Games and ASIAN Games including the World Championships. During this pandemic, wushu college students practice independently, in fact only a few universities have started practicing together by implementing health protocols. Therefore, the researchers developed a wushu training module using Augmented Reality technology, which will be a fun new tool for Sasana Wushu Salsabila Indonesia students. Interactivity and three-dimensional display are presented in an attractive manner and can be used anywhere and anytime. This training module is an android application. Students can find out in detail the correct movement according to existing standards, namely IWUF (International Wushu Federation). This research method uses the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation).

1. INTRODUCTION

Wushu (武术) means the art of war or martial arts (Martial Art) [1]. In ancient Chinese history it is explained that wushu is the oldest martial art that is the cultural root of martial arts history throughout the world. Wushu is a martial art that emphasizes artistic aspects and effective defense [2] The world wushu federation makes wushu a martial art that is included in world championships such as the ASIAN GAMES or the Olympics. Wushu is now easier to learn and understand by various groups, because the broad technical dimensions can be enjoyed by even children and parents. Its dynamic movements are interesting to watch and witness, so that wushu has become a performing art for various events.

Wushu martial arts is one of the martial arts that has accumulated quite a lot of achievements for Indonesia. Many colleges have now been established to train the martial art of wushu. One of them is Sasana Wushu Salsabila Indonesia. Students at this college find it very difficult to practice during the COVID-19 pandemic. All activities that should be carried out freely like other self-defense cannot be carried out because they must use health protocols. Even the health protocols turned out to be unable to handle the increasing number of COVID-19 cases. So that this college cannot carry out face-to-face classes [3].

Sasana Wushu Salsabila Indonesia students are currently trying to practice independently at home even though it is not optimal. Even the students also use the practice facilities that can be accessed freely on the internet, but it still does not produce maximum results for students. Considering that novice students need a lot of media and facilities to support the training process to match the movement standards [4], because of the lack of meetings during the pandemic which prevents them from practicing better.

The presence of technology can help humans facilitate all their life activities, including in this martial arts training activity. Augmented Reality technology [5] or virtual reality is a technology that presents the perception of virtual reality into the real world in the form of images, audio, video and direct interaction with objects. Objects in Augmented Reality can be rotated, enlarged according to the wishes and needs. Augmented Reality is applied in many educational activities, religion [6], business[7] which helps people learn things faster.

Martial arts training activities during the pandemic require valid media and information related to training materials that can support students learning from home. AR technology equipped with modules will make students more enthusiastic about learning independently at home, so that when face-to-face
exercises are opened, students are more prepared, their bodies will be healthier.

2. THEORITICAL FOUNDATION

2.1. Augmented Reality Based Marker

In its current development, augmented reality is not only visual, but can be applied to all senses, including hearing, touch, and smell. Besides being used in fields such as health, military, manufacturing industry, augmented reality can also be used to translate text in various languages with the addition of OCR that is owned by AR.

The marker method is one of the most widely used in learning media because it has a higher interactivity, where users use printout media designs that are used as guidelines in tracking [8] camera devices.

![Augmented reality application flow](image)

2.2. Wushu Hore Stance

Wushu is the oldest martial art in the world which is currently developing the most rapidly. Has two types of skills, arts and combat. Wushu already exists in international events such as the SEA Games and ASIAN Games including the World Championships. The movement has been standardized by the IWUF (International Wushu Federation). One of the basic forms in wushu training is the stance, this movement becomes a mandatory movement in the beginning of learning wushu martial arts. There are 5 types of obligatory horses that are judged in the race, both empty-hand art and the art of using weapons.

Bow stance (Gong Bu), stance (Ma Bu), empty position (Xu Bu), crouched position (Pu Bu), cross-legged bending (Xie Bu) and sitting cross-legged (Zuo Pan). Each movement has an effect on the strength and energy of the pounding of the other movements; punches, kicks, jumps, poses and twists.

2.3. Modul

From the 2 frameworks above, the technology media and basic movement materials of the horses, the author developed a training module with android and 3D digital technology. Modules are made following the curriculum of IWUF (International Wushu Federation) for the standard movement of horses. The material is made in an attractive and easy-to-use module design. In the android application there is a guide to use the application and scan marker module.

2.4. Previous Work

In the research of PIK Rusmono, et al [9], this study produced a digital module product to display the instructions for wushu movements, which were tested on training students. Jarudin [10], research on making media modules that use hyperlinks to tutorials. In both of these studies, the focus is on digital-based module media for the same topic of wushu martial arts training.

In the research proposed by the researcher using modules as well but the interactivity uses augmented reality technology that displays three-dimensional objects, in this case children prefer, where wushu is a martial art that must be started from the age of the child. This study also uses the ADDIE method to measure product implementation and evaluation results.

3. METHODS

3.1. ADDIE Method

This research method uses the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation). The first step was to analyze the curriculum for IWUF standard wushu material, then interview the trainers and students. Researchers only conducted field trials by taking a sample of only 1 branch as many as 20 people. The second stage is the design of making a module design that is in accordance with the needs analysis. The third stage is development, the process of making modules with Augmented Reality. The fourth stage is implementation to students. And the fifth stage is evaluation.

3.2. Stage of Analysis (Analyze)

Analysis of student problems, analysis of development tools, competency analysis, and instruction are part of this analysis phase. Here is the full description:

3.2.1. Analysis of the problems faced by students in learning basic movements

In making learning media in the form of AR-based modules, of course, it cannot be separated from the background of the problems that students face. To collect information about the student's problems, the researchers used interviews, observations or observations at the centralized training location of the Tangerang City Achievement Park, which became the location for training for city athletes and beginner club students.
3.2.2. Interview

Researchers conducted interviews with trainers at the Salsabila Wushu College by asking questions about training during the pandemic. The results of the interviews found that novice students were given a day off and asked to repeat the basic material that had been given. However, not a few students have difficulty remembering and understanding the Movements taught before the pandemic. Especially the basic movement of the stance is the most difficult movement for students to master and it takes quite a long time.

3.2.3. Observation or observation

Researchers observed training for students who had become athletes at the training location which had been permitted in July with a limited number. Found the difficulty of correct stance movement because the stance movement combines the physical endurance of the legs with the determination of the movement. While novice students are not allowed to practice, so they occasionally do video communication to see student progress. Unfortunately, many students are lazy to practice because they are not directly guided by the instructor and there is no special media for learning.

3.3. Development Tool Analysis

The hardware used by the researchers was an Apple mid 2013 i5 laptop with 8 GB RAM specifications and Mojave OS, Infinixe 8 brand smartphone with Qualcomm SDM450 processor specifications, 4 G RAM and an Advance sketch tablet with Unisoc SC9863A specifications (28 nm) Octa-core CPU (4 x 1.6 GHz Cortex-A55 & 4 x 1.2 GHz Cortex-A55).

3.4. Competency Analysis

The basic competencies taken by researchers in this study are basic competencies in the basic material of the Chinese IWUF Equestrian Movement. This learning material is material that is given to all martial arts students, the difference is that during practice, the longer you practice, the better and correct the horses will be.

Table 1 Basic Competencies of Basic Equestrian Movements

<table>
<thead>
<tr>
<th>Basic competencies</th>
<th>Indikator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easel Standards in International Wushu Regulations (Iwuf)</td>
<td>Gong Bú (Bow Stance) is a Bow Stance with one knee bent 450</td>
</tr>
<tr>
<td>On the Basic Movement of</td>
<td>Ma Bú (Horse Stance) atau disebut kuda kuda dengan kedua</td>
</tr>
<tr>
<td>Wushu/ Taolu,</td>
<td>lutut ditekuk 450 seperti duduk tanpa kursi.</td>
</tr>
<tr>
<td>Xü Bü (Empty Stance)</td>
<td>is an Empty Position with one knee as a support and one leg extended to the floor with the legs attached straight</td>
</tr>
<tr>
<td>Pù Bü (Crouching Stance) or Squat Position with one leg straight and one leg bent sitting without touching the calf</td>
<td></td>
</tr>
<tr>
<td>Xiē Bü (Cross-Legged Crouching Stance) or Cross-legged Bending with one leg tucked between the knees</td>
<td></td>
</tr>
<tr>
<td>Zuò Pán (Cross-Legged Sitting) atau Duduk bersila dengan paha menempel keperut</td>
<td></td>
</tr>
</tbody>
</table>

3.5. Stage Design

Researchers design modules and applications by making product designs first, then proceeding with the preparation of materials and questions and answers, then making logos, backgrounds, images, and buttons which will be used in the media.

3.5.1. Making Media Design (Storyboard)

Making a media design or Storyboard in this case is a depiction of learning media which as a whole will be loaded in the application. The storyboard or media design here has a function as a guide for programmers to create module and application designs.

3.5.2. Determination of Learning Materials

In the learning module that was made, the researcher took the material, namely IWUF Competition Rules. Researchers took this material because this material is because the basic movements are quite difficult for students to master even though they have been practicing for a long time without the correct information students will have difficulties in the future. The horses in the wushu rules appear many times in the race movement, if the horses are wrong and shake the value will be reduced.

3.5.3. Preparation of Practice Questions

The researcher arranged the practice questions according to the selected material, namely the material about the basic wushu movements, namely the horses. Materials, questions and exercises are given in the module as well as the application as an assessment that students have understood the
movement correctly.

3.5.4. Basic Competence

The Basic Competencies used by the researcher are in accordance with the standard curriculum for the rules of the Equestrian Movement in competitions compiled by the International Wushu Federation (IWUF).

4. RESULTS AND DISCUSSION

4.1. Development Phase (Development)

In this stage, the researcher creates an AR-based module, to run the AR, the researcher needs to create an application. The application that has been made by the researcher is named “iWushu Apps” where the researcher targets that in the future this application will continue to be equipped into an integrated wushu martial arts learning package, according to the learning material. The researcher assembled and compiled the assets that had been prepared using the Unity 2019.4.0f3 software with the C# script programming language.

4.1.1. Main Menu

The main menu page contains several features. The menu contains materials, guides, AR scans, evaluations. In the material menu, there are module and marker menu contents, as well as videos as additional information and movement guidance.

4.1.2. Scan AR

Pada halaman scan AR berisi objek-objek 3D Gerakan kuda-kuda yang dilengkapi dengan info tips Gerakan.

4.1.3. Guide Page

The guide page as a guide for using the application, so that users are easy to use.

4.1.4. Evaluation Exercise

The evaluation menu contains questions from the material provided to test students' understanding with the movements being studied.

4.2. Learning Module Making

AR Module iEushu Apps is a learning module for the basic movements of the wushu martial arts stance that supports Augmented Reality applications in the form of displaying 3D objects. The AR Module is designed in a concise manner only for one class meeting which has 6 pages, this is to make it easier to understand and interesting.

4.3. Validation Test

Validation tests by experts are carried out to determine the feasibility level of a product that has been developed. The validation test was carried out by material experts and media experts. The validation test in this research and development involved 2 experts, namely 1 media expert and 1 material expert. The validation results produce an assessment, comments and suggestions, which will later be used by researchers as material for improving the modules that have been made before being tested on end users, namely beginner martial arts students.

4.4. Implementation Phase

The implementation phase of this product was tested on wushu martial arts students at Salsabila College with a total of 20 students. The product trial was carried out 1 time which was carried out online.
4.5. Stage of Evaluation

The evaluation stage, is the stage to determine the effectiveness of the media that has been made by researchers.

5. CONCLUSIONS

Through the research process that has been carried out using the ADDIE method in making the iWushu Apps application game combined with the module, it can improve the experience of wushu martial arts students in practicing independently at home. This learning media is an improvement from the media and previous research which only interacted with modules and links, while in this study it was enhanced with more in-depth interaction, students were able to practice with complete guides and features that support each other. This knowledge is new and interesting to continue to develop its features and interactivity as well as assessment of each material in the standard wushu curriculum. This application was tested on 20 online student respondents and tested on material experts and media experts to determine the quality and perceived benefits of users, the results of the application can run well and bring up three-dimensional objects with movement tips in it.

The developed application has several limitations, namely the basic movements that focus on the horses standardized by IWUF. The features provided can still be developed with more complete materials and assessments that can show the quality of students.

By applying the concept of learning from home through 3D technology and downloadable modules, wushu martial arts students can still practice despite the pandemic. The design of this android-based application is easy to get and use in various gadgets based on the latest android version and supports the appearance of augmented reality by updating it on the google play platform. The application requires a module as a marker to display 3-dimensional objects that help students see in detail the basic movement poses being trained. movement focused on the stance that forms the basis of all movements in martial arts. if the mastery of the horse is good it will fully support the other movements.

The challenge in using this application lies in the size of smartphones which are not all large enough to see the range of objects, gadgets in the form of tablets are recommended because of their larger size. interaction with learning materials is done by playing quiz questions that represent students' understanding. integration of other movement materials and assessments of improving student moves are needed in the future as development, face-to-face conferences are also needed to see directly and have discussions with trainers at the end of the material session, and real-time time will support the learning process to be more effective and efficient.

ACKNOWLOGMENT

We express our gratitude to the Ministry of Research and Technology (Kemenristek)/BRIN for funding the lecturers research under the program called Penelitian Dosen Pemula (PDP).

REFERENCES