

Designing Immersed Virtual Reality Assessment (IVRA) in Improving Online Social Interaction: A Preliminary Research

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Abstract—This research aims to describe a design process of Immersed Virtual Reality Assessment (IVRA) in improving online social interaction. The urgency of this research is to answer the challenges of learning innovation that is currently closely related to free learning as an element of novelty in education and is expected to be a forum for social interaction needs in the current COVID pandemic era. This research used the ADDIE development model, which consists of five stages, namely analysis, design, development, implementation, and evaluation. Based on the result, there is a number of activities have been carried out in the design step. First, making a storyboard and then validating it by using a focus group discussion. The second, video-making process. Third, storing all data recorded (audio and video). Fourth making the app user interface. Lastly, combining the files and developing the app. However, there are limitations to this study. This study is preliminary research which is the early stage of the development research process. Further research needs to go to the next steps, such as validation with the judges and go for product trial.

Keywords—*immersed virtual reality assessment, online learning, social interaction*

I. INTRODUCTION

The learning process in the current era is even more so when the COVID pandemic inevitably forces all educational institutions to change direction from those that have not utilized technology to fully utilize technology. One of the uses of technology is to use online learning massively. It also has an impact on the challenges of universities related to assessment issues.

The paradigm shift from a traditional to alternative assessment becomes a hot issue. Some studies show that social engagement in online learning that views lack social interaction becomes a hot issue in online learning due to the lack of interaction of teachers and students or students and students [1]. Moreover, in the assessment process for learning, how to improve social interaction is more real is more difficult than interaction when face to face.

One of the efforts that can be done to increase interaction is to use the virtual reality (VR) mode. With the use of real-world context, social interaction that does not seem to feel will be more able to be a solution to the process of student interaction in online lectures. Early studies show that there is a gap point related to the lack of VR exploration in the world of education [2]. Specifically, it can be further initiated related to the type of immersive-based VR.

Immersed virtual reality (IVR) is a form of technological innovation that enables it to be tremendous potential for education. IVR specifically uses a real-world human environment that provides an opportunity for users to explore all directions like walking in the real world by using mobile phones and VR glasses. The use of IVR significantly indicates a positive impact associated with students' academic achievement [3].

Based on preliminary studies on the implementation of online lectures in 2020 and preliminary studies in PGSD study programs. Preliminary study results show that the online learning readiness category of PGSD

students is at a high category [4]. What's more, the results also showed that students showed the ability to complete tasks related to the assessment criteria indicated earlier (assessment for learning). Related to this, unfortunately, online interaction can not be fully optimized, and the tendency of students to only complete discussion tasks only. What's more, no device can help students feel real social interaction situations as part of the learning process.

Based on the analysis of facts in the field, there are gaps related to the need for an immersive virtual reality (IVRA) based assessment instrument for learning so as to improve and support social interaction. This research aims to develop an immersive virtual reality assessment (IVRA) as a support for students' social interaction in online lectures. The urgency of this research is to answer the challenges of learning innovation that is currently closely related to free learning as an element of novelty in education and is expected to be a forum for social interaction needs in the current COVID pandemic era.

II. LITERATURE REVIEW

A. Immersed Virtual Reality Assessment (IVRA)

Virtual reality can be defined as a simulation of the real form of a real situation. VR itself is defined as a medium that can encourage individuals to feel experiences and environments as if they were real. There are several terms related to VR, including engagement, attendance, interactive, movement, simulation, and animation. VR has stolen attention in many fields because it can present the real world in digital forms, such as, for example, in the process of driving or even shopping[7], [8]. However, some specialized domains are associated with immersive virtual reality (IVR), such as education, entertainment, health, and marketing[9]. Several studies show significant results from the use of VR [3], [10].

In particular, the word immersed/immersive is related to the use of VR assisted by a Head Mounted Display (HMD), which is assisted by sound, motion, or other reverse sensors to give a taste and appearance like the real world[11], although other forms of VR use the desktop version [10]. Studies have also shown that the brain more easily adapts to visual representations of the body in the form of IVR[12]. IVR used as an assessment aid in several studies showed significant results [13]. Studies have also shown that using IVR can lower stress levels in test-takers [14]. Other studies have also demonstrated that the use of VR in assessment activities provides significant results, including not giving cybersickness because it gives a pleasant exam experience [15].

B. Research Roadmap

The implementation of disruptive learning innovation research of this type of development is in line with the vision of the elementary school teacher

education study program, Universitas Negeri Malang mission and also in line with the Merdeka Campus, Merdeka Belajar program launched in 2020. IVRA development research has previously been preceded by research related to assessment in 2020, which is related to the instrument Learning Oriented Assessment (LOA) in online lectures of elementary school teacher education students. The chosen field was taken as the basis that the use of online learning is becoming an urgent thing to do now and will continue to grow given the challenges of the industrial revolution 5.0. Here is the research roadmap presented in Figure 1.

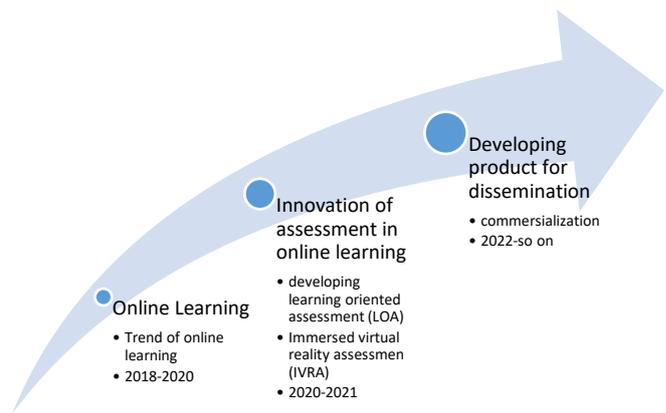


Fig. 1. Research map

III. METHOD

A. Research Context and Procedure

Based on the research aims to describe a design process of Immersed Virtual Reality Assessment (IVRA) in improving online social interaction, this research employs a research and development model. This research uses the ADDIE development model, which consists of five stages, namely analysis, design, development, implementation, and evaluation. Here is the presentation of the research stage using ADDIE. This study only presents until the design stage only. The flowchart of research development is presented in Figure 2.

First is the analysis stage. At this stage, an initial analysis of audience characteristics is carried out related to online learning readiness. The analysis stage will also be carried out related to the analysis of learning delivery, analysis of pedagogical considerations including the SIPEJAR UM system, and analysis of the time of research implementation.

The design phase is related to determining and documenting learning strategies, using strategies to develop storyboards, designing user interfaces and user experiences, designing IVRA prototypes, including designing and determining assessment contracts at the beginning of lectures.

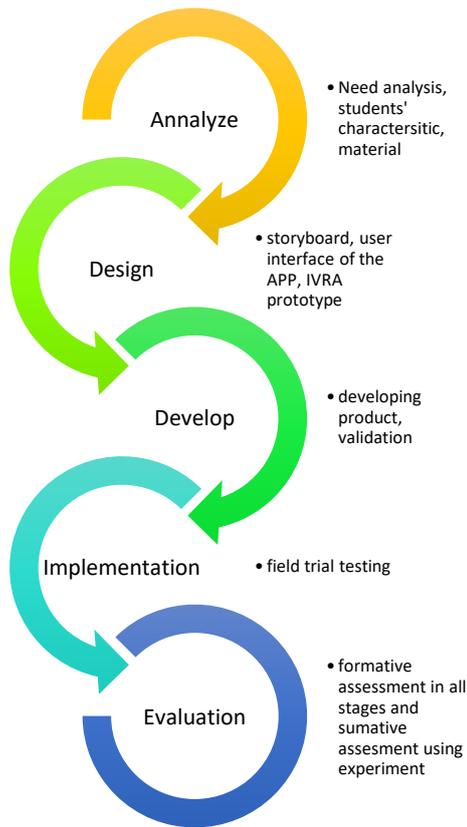


Fig. 2. Research model design

Third, the development stage includes the development of IVRA adapted to the previous design stage. In this stage will be asked for advice from media experts, learning experts. Then the advice from experts will be calculated the agreeable index using the interrater agreement (IRA) similarity using the Kappa coefficient.

The implementation stage is the implementation stage that is part of the trial phase. In this stage, an implementation analysis will be carried out related to the preparation of assessments at the beginning to the implementation of assessments in learning using IVR.

Lastly, the evaluation stage consists of two stages, namely the formative stage and the summative stage. The formative stage lies at each stage and is a process of improvement for the quality of the product. The summative evaluation stage is related to the small-scale trial phase using quantitative methods of different tests of two test groups.

The research instruments used in this study consist of the SORL questionnaire [16], expert test questionnaire (validity), social presence questionnaire, and documentation. The instrument used refers to the adaptation of social presence questionnaires in online learning.

IV. RESULT AND DISCUSSION

In the early stages, what is done in this research is the design of the storyboard after conducting a needs analysis. Story board is designed according to the analysis of the elements of interaction expected to be involved in the study. The interaction that may arise in online-based learning is answered by simulating the situation of conditions where learners feel they are in the middle of the learning area. This is done to answer the lack of interaction in online learning, which is often the main point [1].

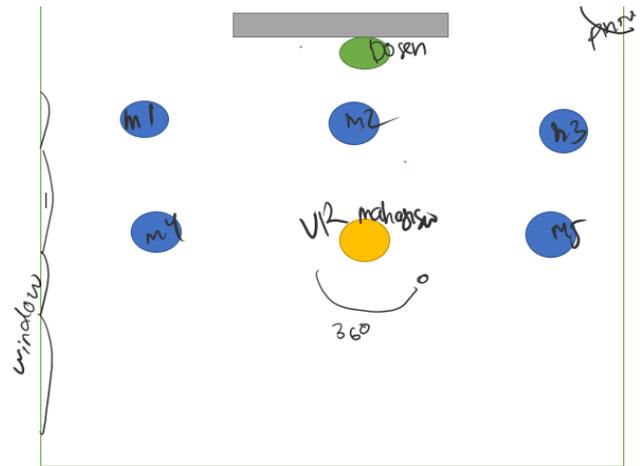


Fig. 3. Storyboard design

Figure 3 presents the floor plan design of the shooting for the IVRA application. The placement of VR objects in the middle of learning is assumed to increase rich interaction and add to space-related perceptions. This is in line with studies related to the construction of knowledge awakened through the use of VR in learning [17].

After doing the validation stage of the storyboard, team members proceed to the next stage, which is the shooting stage. Based on Figure 2, it can be seen that, from the storyboard designed, it is then applied to a real class. The use of the 360 camera is done in this image. In the process of shooting, pinned several stages of interaction with VR objects are carried out. The interaction was also done as an effort to dig up information from VR objects included in the learning assessment. It is based on the IVR being used as an assessment aid showing significant results[13].

In the next stage, the process of data storage. In this case, all the results of data retrieval will be collected in Google Drive for compilation. The results of the compilation of video recordings are presented in Figure 5. At this stage, audio recordings that are also taken during shooting are collected and analyzed to be adjusted and sorted. The audio mixing process is presented in Figure 6.



Fig. 4. The proces of making the 360 video

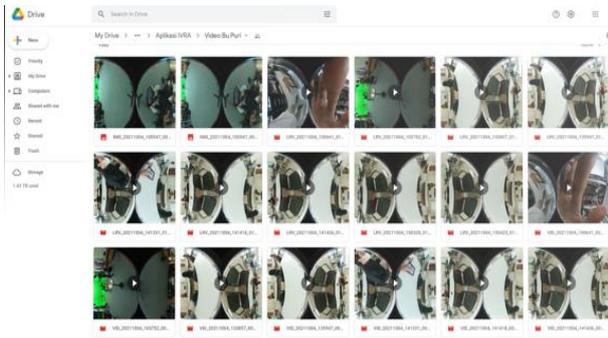


Fig. 5. Video recorded files in Google Drive storage

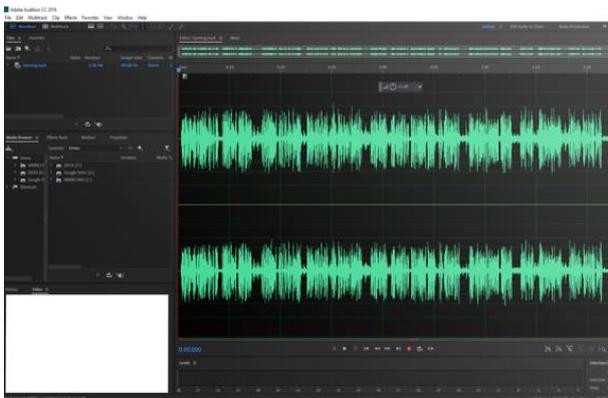


Fig. 6. Mixing the audio files into the app

The next stage is the initial design of the IVRA application. Figure 7 presents the display design of the IVRA application. This design uses elements tailored to the characteristics of current students. In this image, it also appears that using the IVRA application will be better if using HMD. This is in line with the opinion that the Head Mounted Display (HMD), aided by sound, motion, or other reverse sensors, can give it a real-world feel and look[11], although there is also a desktop display available[10]. The development of IVRA is carried out so that students can feel more learning in situations such as the real world. Studies have also shown that the brain more easily adapts to visual representations of the body's IVR objects [12].

In the last design stage, the mixing files. In the process of mixing files, as presented in Figure 8, several videos and apps have been combined. The display in terms of VR objects will appear as presented in Figure 8. The atmosphere and sound of activities that take place in the video will be felt directly by the VR object through the application it uses.



Fig. 7. Front page of IVRA app

Some of the information that emerged from this application was attributed to the Right /Wrong response after being given a statement by the lecturer. In this activity, the interaction of VR objects with participants in the video appears to be live because there is a VR object process to respond to the statement given. This is in line with studies showing that the involvement of a medium can improve multimodal displays[18].

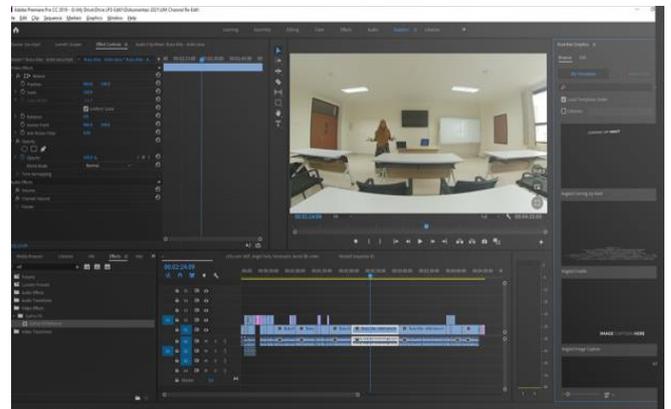


Fig. 8. Processing the files (mixing audio and video files)

Based on these stages, the design stages of this IVRA application have shown that this application is ready to proceed to the development stage, namely the design and material validation stage. In the next stage, the involvement of trial participants, students becomes important because as the main data to be able to see the release of media that have been developed.

IV. CONCLUSION

The urgency of this research is to answer the challenges of learning innovation that is currently closely related to free learning as an element of novelty

in education and is expected to be a forum for social interaction needs in the current COVID pandemic era. This research uses the ADDIE development model, which consists of five stages, namely analysis, design, development, implementation, and evaluation. This study presents until the design stage only.

Based on the result, several activities have been carried out in the design step. First, making a storyboard and then validating it by using a focus group discussion. Second, video the making process. Third, storing all data recorded (audio and video). Fourth making the app user interface. Lastly, combining the files and developing the app.

However, there are limitations to this study. This study is preliminary research which is the early stage of the development research process. For further study, there is needed to go to the following steps, such as validation with the judges and go for product trial.

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