

Integration of Trivia Game Within the Metaverse Mall for Public Services in the City of Semarang

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Abstract— The lack of education regarding the metaverse mall application for public services has left the public confused when engaging in public service activities within it. To address this issue, a trivia game titled "MPP Quiz" was created with the aim of understanding user responses to the implementation of an educational trivia game packaged with *metaverse* technology. The chosen research method is the *waterfall* model because its stages are well-suited for application in this study. The data collection method employed quantitative techniques by distributing questionnaires to respondents who had previously played the *MPP Quiz* game. After collecting the data, it was processed using the *SPSS* application to determine the level of validity, reliability, and correlation between the tested variables. Based on the conducted tests, it can be concluded that the *MPP quiz* game qualifies as an educational medium and introduction to the public service system in Semarang city, as the values of variables tested for validity, reliability, and correlation exceed the set standards.

Keywords— *metaverse*, *MPP quiz*, trivia.

I. INTRODUCTION

In its history, the *metaverse* was merely a concept within a novel that described interactions among avatars in a *3D virtual world*[1]. The *metaverse* concept was officially introduced in 2006 when the *ASF* organization announced the *metaverse*

roadmap, and this announcement led to increased awareness of the *metaverse* among the general public[2]. Games are suitable for integration into this design because one of the functions of Games includes educational elements[3]. The implementation of the *MPP quiz* game into the *Meta MPP* application is expected to enhance public education on public services[4], thereby improving government and public institution approaches to the community, including efforts to increase the future use of the *Meta MPP* application[5]. Several games that have adopted the *metaverse* concept include *Roblox* and *Pokemon GO*[6].

The *Oculus Quest 2* is one type of *VR headset* produced by the *Oculus* company[7] and can incorporate *metaverse* technology within it. The integration of games into the *metaverse* is evidence of rapid development in the world of technology. There are various types of games available today, such as *FPS games*, *RTS games*, *MOBA games*, *trivia games*, and many more[8]. The *MPP quiz* game is a trivia genre game, which is a type of game designed to test knowledge in a specific field presented in either essay or multiple-choice form[9]. The *MPP quiz* game is designed using the *Unity 3D* application. *Unity 3D* emerged in 2005 and has since become a popular engine in the game industry[10]. *Unity* is favored by developers for its advantages, including a comprehensive framework, unrestricted publishing, free application downloads, the

ability to build games for various platforms, and the ability to process various types of data, both 2D and 3D[11]. *Unity 3D* is chosen in this design because it is one of the game engines with a foundation in 3D data processing[12]. The programming language used by *Unity* is *C#*[13], [14]. *C#* is a flexible programming language that can be transmitted to both *PC* and *web* platforms[14], and it is one of the languages that runs on *.Net* and has *syntax* similar to the *C* language[15].

II. METHOD

2.1 Development Method

The development method for the *MPP quiz* game utilizes the *waterfall method*. This method is deemed suitable because the future development of the game will be based on the questionnaire results from respondents. The *waterfall method* is divided into five stages. The first stage is the requirement stage, where various analyses are conducted before the game is created, and preparations for devices such as *Oculus*, computers, and laptops are made. The second stage is the design stage, where developers begin preparing various 2D and 3D *assets*. The next stage is the implementation stage, where the arrangement of game *assets* and the creation of various *source code functions* are done to realize the functionality of each button and interaction between objects. The following stage is the verification stage, where testing is initiated by distributing questionnaires to respondents who have played the *MPP quiz game*. The last stage is maintenance, involving a review of the questionnaires, and if there are still issues, developers will promptly improve the game to make it more perfect.

2.2 Data Sources and Data Collection Techniques

The data source for this study comes from the population of students at Soegijapranata Catholic University who may not yet understand the various services

available in the *metaverse* mall for public services application and who have not experienced using *Oculus* devices before. The sample used consists of 30 students from Soegijapranata Catholic University. The data collection method employs quantitative techniques by distributing questionnaires to respondents who have previously played the *MPP quiz* game.

2.3 Game Testing Method

Game testing employs a quantitative method involving the observation of questionnaires distributed earlier. There are several stages in this testing process. The first stage is creating questionnaires, with the note that the game is ready for testing. The second stage is distributing questionnaires to respondents who have previously tested the game. The next stage is data processing using *SPSS*, and the final stage involves assessing the game's feasibility based on validity, reliability, and correlation tests conducted earlier.

III. RESULTS AND DISCUSSION

3.1 Game Concept and Gameplay

The *MPP quiz game* is a trivia game that encompasses topics related to public services in the city of Semarang. Aspects covered in this game include public service locations, required documents for specific public services, and steps involved in carrying out public service activities. The game is structured into three levels: the first level covers locations, the second level focuses on required documents, and the third level addresses the steps involved. There are thirty questions in the game, with ten questions allocated per level. The player's task is to complete all thirty questions before the specified time runs out, with the condition that the maximum allowable mistakes in answering is seven times. If this condition is met, the player receives a notification of victory. If unsuccessful, the player is considered to have failed and must restart the game from the first level. Each correct answer adds ten points to the score, and there is no score

deduction for incorrect answers, but the limit on the number of mistakes is recorded.

3.2 Game Design

The initial phase of creating this game involves setting up a dedicated game stand. When the checkpoint on this stand comes into contact with *XR Origin* (Player), the player will automatically enter the designated gaming area that has been prepared beforehand.



Figure 4.1 Special Stand for MetaMPP Application Game

Inside the gaming area, there are also checkpoints designed to reset the *XR Origin's* position to the previous scene. The game scene consists of both 2D and 3D assets combined to create a space resembling a studio. In the front, there is a screen accompanied by several posters displayed on the right and left walls. Behind, there is a door and a checkpoint used by the player to teleport to the previous scene.



Figure 4.2 MPP Quiz Game Playing

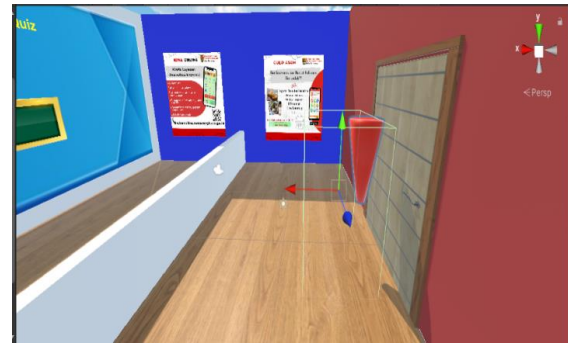


Figure 4.3 Posters and Checkpoint to Return to MPP Scene

The 3D assets used are a combination of *Unity's 3D assets*, specifically cubes and planes, to create a room resembling a studio. At the front, there is a screen containing questions, answer choices, a timer, the number of incorrect answers, and the score. After organizing 2D and 3D assets neatly, the next step is to display several questions, answers, timer, score, and the number of incorrect answers on the screen so that players are aware of what is presented in the *MPP quiz* game. Therefore, *source code* is needed, containing commands to execute specific actions, such as displaying various *panels, buttons*, and assigning functions to the *buttons* on the screen so that the *buttons* can interact with the *controller* on the *Oculus* device. Additionally, scripts are required to automatically change levels after every ten answered questions.



Figure 4.4 Screen in the MPP Quiz Game Scene

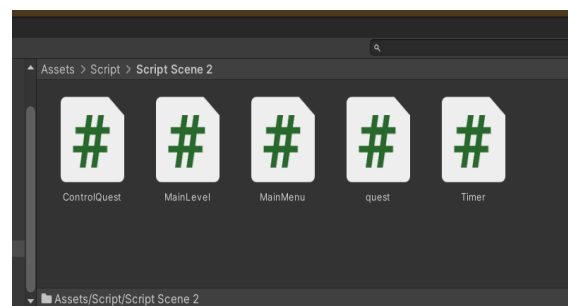


Figure 4.5 MPP Quiz Game Script

3.3 Validity Testing Results

Table 4.6 Summary of Validity Testing Results

Variable	r_{hitung}	r_{tabel}	Notes
PE1	0.860	0.329	Valid
PE2	0.793	0.329	Valid
PE3	0.705	0.329	Valid
EE1	0.620	0.329	Valid
EE2	0.531	0.329	Valid
EE3	0.531	0.329	Valid
HM1	0.818	0.329	Valid
HM2	0.649	0.329	Valid
HM3	0.665	0.329	Valid
BI1	0.394	0.329	Valid
BI2	0.684	0.329	Valid
BI3	0.747	0.329	Valid

The validity testing results indicate that the tested variables are valid, as the calculated value (r -value) is greater than the critical value (t -value). The critical value (t -value) is determined by subtracting the number of respondents (N), which is 36, by 2, resulting in 34. According to the critical value (t -value) at position 34 in the table with a significance level of 5%, the distribution value of the critical value (t -value) is 0.329. The validity testing results show that the tested variables are valid because the calculated value (r -value) is greater than the critical value (t -value). The critical value (t -value) is determined by subtracting the number of respondents (N), which is 36, by 2, resulting in 34. According to the critical value (t -value) at position 34 in the table with a significance level of 5%, the distribution value of the critical value (t -value) is 0.329.

3.4 Reliability Testing Results

Table 4.2 presents the results of the reliability test for the *MPP quiz game*, indicating that the tested variables are reliable/consistent. Data is considered consistent when the *Cronbach's Alpha* value is greater than 0.6. In the table, it can be observed that the *Cronbach's Alpha* value is 0.862, confirming the reliability of the variables.

Table 4.7 Conclusion of Reliability Testing

Reliability Statistics	
Cronbach's Alpha	N of Items
.862	12

3.5 Correlation Testing Results

From the conducted correlation test, it can be concluded that all variables in this study are correlated, as the significance values are below 0.01, and all of them have two asterisks indicating high significance.

Table 4.8 Correlation Testing Results

		Correlations			
		PER	EER	HMR	BIR
PER	Pearson Correlation	1	.600**	.699**	.672**
	Sig. (2-tailed)		<.001	<.001	<.001
	N	36	36	36	36
EER	Pearson Correlation	.600**	1	.583**	.542**
	Sig. (2-tailed)	<.001		<.001	<.001
	N	36	36	36	36
HMR	Pearson Correlation	.699**	.583**	1	.476**
	Sig. (2-tailed)	<.001	<.001		.003
	N	36	36	36	36
BIR	Pearson Correlation	.672**	.542**	.476**	1
	Sig. (2-tailed)	<.001	<.001	.003	
	N	36	36	36	36

** Correlation is significant at the 0.01 level (2-tailed).

IV. CONCLUSION & SUGGESTION

4.1 Conclusion

The *MPP quiz game* is a trivia game designed using the *Unity engine* and incorporates metaverse elements. The game is developed using the waterfall method, and its testing employs quantitative methods by distributing questionnaires to respondents who have played the game before. The *MPP quiz game* serves as a medium for introducing and educating users about the public service system. According to the results of various tests, including validity, reliability, and correlation using the *SPSS* application, data collected from 36 respondents who played the *MPP quiz game*, it can be concluded that the data in this testing is valid and consistent. This is evident from the calculated values (r -values) being higher than the critical values (t -values), and the data is also considered consistent because the *Cronbach's Alpha* value exceeds 0.60. The variables within

the game are interrelated, as indicated by the significant values of each variable being below 0.01, all denoted by two asterisks. In summary, the *MPP quiz game* proves to be an effective tool for introducing and educating users about the public service system within the metaverse, as validated through various testing methods.

4.2 Suggestion

More promotion is needed to make the game more widely known among all segments of society, and an upgrade to the *user interface (UI)* is necessary, along with expanding the playing area to provide players with more space to move. In addition, the addition of other games in the multiplayer scene is needed to make the *MPP quiz game* even more attractive.

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