

## CHAPTER FOUR

### RESULTS

#### 4.1 Introduction

This chapter presents the quantitative and qualitative results by obtained from the sample. The first part of the chapter presents findings from the quantitative data, while the second part from the qualitative data. The third part integrates both sets of results to produce more robust conclusions.

#### 4.2 Quantitative Findings

This section presents the quantitative findings. To facilitate understanding, the findings are organized according to the research questions. The research questions are reiterated below:

**Research question 1:**

How do students perceive using interactive multimedia to learn PAI?

**Research question 2:**

Does student perception towards using interactive multimedia device significantly differ by grade level, gender, and school origin?

**Research question 3:**

Does interactive multimedia influence student competencies?

**Research question 4:**

Does interactive multimedia influence student perception?

**Research question 5:**

Does interactive multimedia influence students' participation?

**Research question 6:**

Does students' perceptions on interactive multimedia influence student participation?

**Research question 7:**

Does students' perception mediate the relationships of interactive multimedia on students' participation?

**4.2.1 Description of Student Participants**

Through a questionnaire survey, the participants were asked to provide basic information about their demographics, such as gender, age, school, grade, and parental support (Table 4.1). The results showed that 49.3 percent of participants (= 101 students) were males, while only 50.7 percent (= 104 students) were females. More than one-third of the students (37.1%) were 13 years old, while the others were 14 years old (26.8%), 15 years old (19%), and 12 years old (17.1%). Most students (73.7%) went to Al-Azhar 1 Junior High School (SMP) Jakarta while the others to Al-Azhar 37 Junior High School (SMP) Pekanbaru. Table 4.1 summarizes the profile of the students.

**Table 4.1 Profile of the Participants**

Attribute	Classification	<i>f</i>	%
Gender	Male	101	49,3
	Female	104	50,7
Age	12 years old	35	17,1
	13 years old	76	37,1
	14 years old	55	26,8
	15 years old	39	19

School Origin		
SMP Al-Azhar 37	54	26,3
SMP A- Azhar 1	151	73,7

#### 4.2.2 Results for Research Question 1a

How do students perceive using interactive multimedia to learn PAI?

To answer Research Question 1, an instrument was developed to collect qualitative and quantitative data. Qualitative data were collected through interviews, while quantitative data were collected using a questionnaire. Quantitative data were used to assess the students' perceptions towards using interactive multimedia device. The quantitative instrument is a questionnaire that uses a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). To make the results easier to understand and clearer, the five Likert scale was divided into two categories. Strongly disagree (1) and disagree (2) were grouped into the first category, negative perception, while neutral (3), agree (4), and strongly agree (5) were grouped into the positive perception category. Table 4.2 summarizes the students' perceptions for each dimension.

**Table 4.2. Positive and Negative Perception in Learning PAI Using Interactive Multimedia**

Dimensions	N	Perception		Mean	SD
		Positive	Negative		
Ease of use	205	98.21%	1.79%	4.02	3.59
Usefulness	205	97.56%	2.44%	4.04	3.38
Attitude towards Interactive Multimedia	205	98.44%	1.56%	4.00	3.49
Intention to Use Interactive Multimedia	205	97.44%	2.56%	3.96	2.79

Table 4.2 above shows the students' perceptions based on four dimensions, namely ease of use, usefulness, attitude towards interactive multimedia, and

intention to use interactive multimedia. The mean student perception was above 3.96. The lowest score was the intention to use interactive multimedia,  $M = 3.96$ , while the highest score was usefulness,  $M = 4.04$ . The two other dimensions, namely ease of use and attitude towards interactive multimedia, each get mean score of 4.00 for attitude toward interactive multimedia and 4.02 for ease of use. The table also shows the percentage of positive and negative perceptions of the students. The findings showed that most students (97.44%) had a positive perception, while less than 3 percent had a negative perception. This shows that the students had an overwhelmingly positive perception towards the use of interactive multimedia to learn PAI across all four dimensions. These four dimensions are further elaborated below.

### 1. Dimension 1: Ease of Use (EU)

The first dimension of the students' perception was about how easy it was for them to use the device to learn PAI. There were six items under this dimension, as shown in Table 4.3 below.

**Table 4.3. Ease of Use Dimension**

No	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean
1	EU1	24.9%	46.8%	25.4%	2.9%	-	3.94
2	EU2	30.2%	49.3%	19.5%	1.0%	-	4.09
3	EU3	24.9%	46.3%	25.9%	2.9%	-	3.93
4	EU4	22.0%	45.4%	30.2%	2.4%	-	3.87
5	EU5	41.5%	40.0%	17.6%	1.0%	-	4.22
6	EU6	31.2%	46.3%	22.0%	0.5%	-	4.08

Table 4.3 presents the students' perceptions towards the ease of using interactive multimedia to learn PAI. In general, all items had high mean scores and agreement from the participants. EU5 ("I find it easy to access,

read, and understand PAI material using interactive multimedia”) had the highest mean,  $M = 4.22$ . EU4 (“I find it easy to learn the Fiqh material of PAI using interactive multimedia”) had the lowest mean score,  $M = 3.87$ . The means of other items were between 3.87 and 4.22. It was also found that more than 40 percent of the students agreed with EU5 and none disagreed with the item. More than 45 percent of students also agreed with other ease of use items, and only a few disagreed with them. These results suggest that using interactive multimedia makes it easier for students to access and understand PAI materials.

## 2. Dimension 2: Usefulness (Us)

The second dimension of students’ perception towards using interactive multimedia was usefulness (Us). The study investigated the students’ perception towards the usefulness of interactive multimedia. There were five items under this dimension (Table 4.4).

**Table 4.4 Usefulness Dimension**

No	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean
1	Us1	24.9%	42.4%	27.8%	4.4%	0.5%	3.87
2	Us2	44.9%	33.2%	19.5%	2.0%	0.5%	4.20
3	Us3	25.9%	35.1%	35.1%	3.4%	0.5%	3.82
4	Us4	43.9%	30.7%	24.4%	-	1.0%	4.17
5	Us5	31.2%	49.8%	19.0%	-	-	4.12

Table 4.4 above shows the students’ perception towards the usefulness of using interactive multimedia to learn PAI. In general, the findings showed that the students found that using interactive multimedia helped them to learn PAI. Us2 ( $M = 4.20$ ) and Us4 ( $M = 4.17$ ) had the highest

mean scores. Us2 is "Learning PAI with interactive multimedia applications allows me to complete tasks faster". The lowest was Us3,  $M = 3.82$ . The mean scores of the other items (Us1, Us4, and Us5) were between those of Us2 and Us3. Around 44 percent of the participants strongly agreed with Us2; 30.7 percent agreed with Us4; 49.8 percent agreed with Us5; 42.4 percent agreed with Us1; and 35.1 percent were neutral towards Us3. Only a few of the participants disagreed with the items. The lowest percentage of disagreement was 2.0 percent while the highest was 4.4 percent. Meanwhile, 0.5 percent of students strongly disagreed with Us1, Us2, and Us3, and 1 percent with Us4. Only Us5 did not receive any negative perception. These findings indicate that using interactive multimedia is very useful to aid the students to learn PAI.

### 3. Dimension 3: Attitude towards Interactive Multimedia (AM)

The third dimension of students' perception towards using interactive multimedia to learn PAI was attitude towards interactive multimedia (AM). In this dimension, students were asked to score five statements about their attitude towards using interactive multimedia (Table 4.5).

**Table 4.5. Attitude towards Interactive Multimedia (AM) Dimension**

No	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean
1	AM1	28.8%	42.0%	27.8%	1.5%	-	3.98
2	AM2	29.8%	37.6%	31.2%	1.5%	-	3.96
3	AM3	29.3%	37.6%	31.2%	2.0%	-	3.94
4	AM4	34.1%	45.4%	20.0%	0.5%	-	4.13
5	AM5	35.1%	33.2%	29.3%	2.0%	0.5%	4.00

Table 4.5 shows the students' attitude towards interactive multimedia.

Overall, it was found that the students liked using interactive multimedia to

learn PAI. They agreed that learning using interactive multimedia can increase their knowledge and insight. The highest mean scores were AM4 ("I feel that learning PAI using interactive multimedia application can add wider and deeper knowledge and insight") ( $M = 4.13$ ) and AM5 ("I like learning PAI using interactive multimedia") ( $M = 4.00$ ). Meanwhile, the lowest mean score was AM3,  $M = 3.94$ . The mean scores of AM1 ( $M = 3.98$ ) and AM2 ( $M = 3.96$ ) were above AM3. The findings can also be understood from the level of agreement of the students with each item. The highest agreement was AM4, with which 45.4 percent of students agreed and 34.1 percent strongly agreed. It was followed by AM5, which 35.1 percent of students strongly agreed with. Meanwhile, the lowest percentage of positive answers were AM1 and AM2 with 28.1 percent. These findings suggest that the students liked and had a positive attitude towards using interactive multimedia to learn PAI.

#### 4. Dimension 4: Intention to Use Interactive Multimedia (IM)

The last dimension of the students' perception towards using interactive multimedia was intention to use interactive multimedia (IM). This dimension shows the students' intention to use interactive multimedia to learn PAI. The results are summarized in Table 4.6.

**Table 4.6. Intention to use Interactive Multimedia (IM) Dimension**

No	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean
1	IM1	25.9%	36.6%	32.2%	4.9%	0.5%	3.82
2	IM2	29.8%	39.0%	27.3%	3.9%	-	3.95
3	IM3	37.6%	39.0%	23.4%	-	-	4.14
4	IM4	30.2%	34.6%	34.1%	1.0%	-	3.94

Table 4.6 shows the students' intention to use interactive multimedia to learn PAI. In general, students have the intention to use interactive multimedia to learn PAI for the purpose of doing assignments and carry out learning activities, not only in class but also outside of school. IM3 ("As much as possible, I would use interactive multimedia, whether for doing school assignments or non-school assignments") had the highest mean score ( $M = 4.14$ ). The lowest mean was IM1,  $M = 3.82$ . Meanwhile, the mean scores of IM2 ( $M = 3.95$ ) and IM4 ( $M = 3.94$ ) were moderate. The findings also showed the percentage of agreement for each item. The participants showed strong agreement with IM3, as 39 percent agreed, and 37.6 percent strongly agreed with it. It was followed by IM2 ("I will learn PAI using interactive multimedia not only in class"), with which 39.0 percent agreed and 29.8 percent strongly agreed. IM1 and IM4 had the percentage of agreement, 34 percent. Around 30.1 percent of the participants strongly agreed with IM4 and 25.9 percent strongly agreed with IM1.

#### 4.2.3 Result for Research Question 1.b.

Does students' perception towards using interactive multimedia significantly differ by grade level, gender, and school origin?

Ha: There are significant differences in students' perception towards using interactive multimedia by gender, age, and school origin.

Ho: There are no significant differences in students' perception towards using interactive multimedia by gender, age, and school origin.

This research question was answered using the ANOVA test. This analysis was conducted to examine the difference between male and female students in

their perception towards the use of interactive multimedia to learn PAI. Before the ANOVA test was carried out, it is necessary to test for the normality and homogeneity of the data (Fricker, 2001). The results of the normality test are shown in Table 4.7.

**Table 4.7. Normality Test**

		Standardized Residual for Perception
N		205
Normal Parameters <sup>a,b</sup>	Mean	.0000000
	Std. Deviation	.96508
Most Extreme Differences	Absolute	.051
	Positive	.047
	Negative	-.051
Kolmogorov-Smirnov Z		.733
Asymp. Sig. (2-tailed)		.655
a. Test distribution is Normal.		
b. Calculated from data.		

Table 4.7 shows that the significance of the normality test was 0.655. A  $p$  value of  $> 0.05$  means that the data is normally distributed (Gamst, Meyers and Guarino, 2008). Because the  $p$  value is 0.655, which is larger than 0.05, the data were normally distributed.

The next assumption for ANOVA was homogeneity. The results of the homogeneity test are shown in Table 4.8.

**Table 4.8. Homogeneity Test**

F	df1	df2	Sig.
1.380	14	190	.166

Table 4.8 shows that the  $p$  value was 0.166. The data are considered homogenous if  $p > 0.05$  (Gamst, Meyers and Guarino, 2008). In this case, the  $p$  value was 0.166, which is larger than 0.05, and so the data were homogeneous.

Because the data were normally distributed and homogeneous, it is possible to test the hypothesis using ANOVA. Before testing the hypothesis, the descriptive statistics of each label/category were first summarized in Table 4.9.

**Table 4.9. Descriptive Statistics**

Label	Values	Mean	Std. Error	95% confidence interval	
				Lower Bound	Upper Bound
Gender	Boys	78.345	1.366	75.651	81.039
	Girls	83.121 <sup>a</sup>	1.457	80.247	85.994
Age	12 Years Old	79.214	2.522	74.238	84.189
	13 Years Old	83.564	1.627	80.354	86.773
	14 Years Old	77.555	1.663	74.273	80.836
	15 Years Old	82.426 <sup>a</sup>	1.969	78.542	86.310
School	Al-Azhar	82.009 <sup>a</sup>	1.794	78.469	85.548
	Pekanbaru				
	Al-Azhar Jakarta	79.318	1.012	77.321	81.314

a. Based on modified population marginal mean

Table 4.9 shows the descriptive statistics for each label/category. Gender consists of two values (male and female); age consists of four values (12 years, 13 years, 14 years, and 15 years); and school origin consists of two values (Al-Azhar Pekanbaru and Al-Azhar Jakarta). It was found that the mean perception of female students was 83.121, which was higher than male students ( $M = 78.345$ ). This indicates that female students had a better perception towards interactive multimedia compared to male students. Meanwhile, in the age category, 13-year-old students had a higher mean score ( $M = 83.56$ ) than those of lower ages. The lowest mean score in this category was 14 years old ( $M = 77.55$ ), and above it was 12 years old ( $M = 79.21$ ) and 15 years old ( $M = 82.43$ ). These findings suggest the perception of students do not tend to improve as they get older.

Finally, based on school, students from Al-Azhar Pekanbaru had a higher mean score ( $M = 82.009$ ) compared to students from Al-Azhar Jakarta ( $M =$

79.318). This indicates that students from the branch school had a better perception than those from the main school. In general, there were significant differences in perception towards interactive multimedia in each of the three categories. Table 4.10 shows the results of the hypothesis test using ANOVA.

**Table 4.10. Test of Between-subjects Effects**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4450.709 <sup>a</sup>	14	317.908	2.277	.007
Intercept	843153.235	1	843153.235	6040.014	.000
Gender	914.150	1	914.150	6.549	.011
Age	563.186	1	563.186	4.034	.046
School origin	1325.144	3	441.715	3.164	.026
gender * age	25.284	1	25.284	.181	.671
gender * school origin	791.687	3	263.896	1.890	.133
usia * school origin	50.054	3	16.685	.120	.949
gender * age * school origin	312.102	2	156.051	1.118	.329
Error	26522.970	190	139.595		
Total	1348740.000	205			
Corrected Total	30973.678	204			

a. R Squared = .144 (Adjusted R Squared = .081)

Table 4.10 shows the ANOVA results for the three categorical independent variables, namely gender, age, and school, on the students' perceptions towards the use of interactive multimedia to learn PAI. The null hypothesis was "there is a significant difference in students' perceptions towards using interactive multimedia by age, gender, and school". The hypothesis is accepted if  $p < 0.05$  and rejected if  $p > 0.05$  (Barrett and Morgan, 2005). Based on the results, the null hypothesis was rejected for all three factors as their  $p$  values were  $< 0.05$ : gender ( $p = 0.011$ ), age ( $p = 0.046$ ), and school ( $p = 0.026$ ). These findings

suggest that there were significant differences in students' perceptions towards using interactive multimedia to learn PAI by age, gender, and school.

#### 4.2.4 Result for Research Question 2

Does using interactive multimedia affect student competence?

This research question was answered using regression analysis. Before analyzing the effect of using interactive multimedia on student competence, the normality, multicollinearity, and heteroscedasticity tests were first carried out (Barrett and Morgan, 2005). The research hypothesis tested in the second research question was:

Ha: Using interactive multimedia has a significant effect on student competence.

Ho: Using interactive multimedia has no significant effect on student competence.

The results of normality, multicollinearity, heteroscedasticity, and hypothesis tests are presented below.

##### 1. Normality Test

Table 4.11 shows the results of the normality test using the one-sample Kolmogorov-Smirnov test run on SPSS.

**Table.4.11 Results of One-Sample Kolmogorov-Smirnov Test**

		Unstandardized Residual
N		205
Normal Parameters <sup>a,b</sup>	Mean	.0000000
	Std. Deviation	7.91819517
Most Extreme Differences	Absolute	.093
	Positive	.051
	Negative	-.093

Kolmogorov-Smirnov Z	1.335
Asymp. Sig. (2-tailed)	.057
a. Test distribution is Normal.	
b. Calculated from data.	

Based on the table above, the  $p$  value was 0.057. The data are normal if  $p > 0.05$  (Ahad *et al.*, 2011). Normality can also be verified using plots. Figure 4.1 shows the normality plot.

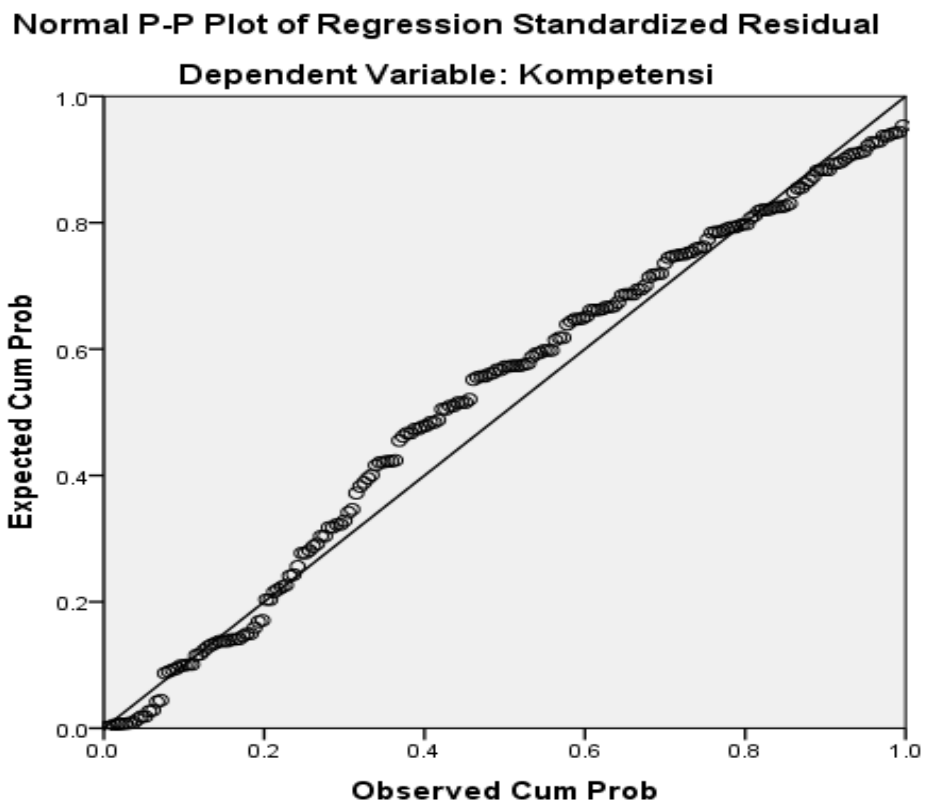


Figure 4.1 Linearity of data

By examining the normality plot, it was concluded that the residuals remained on the line or did not deviate far from it. Therefore, the data were normal.

## 2. Multicollinearity Test

The multicollinearity test was carried out by looking at the VIF and tolerance value. The values are shown in Table 4.12.

**Table. 4.12. VIF and Tolerance**  
Coefficients<sup>a</sup>

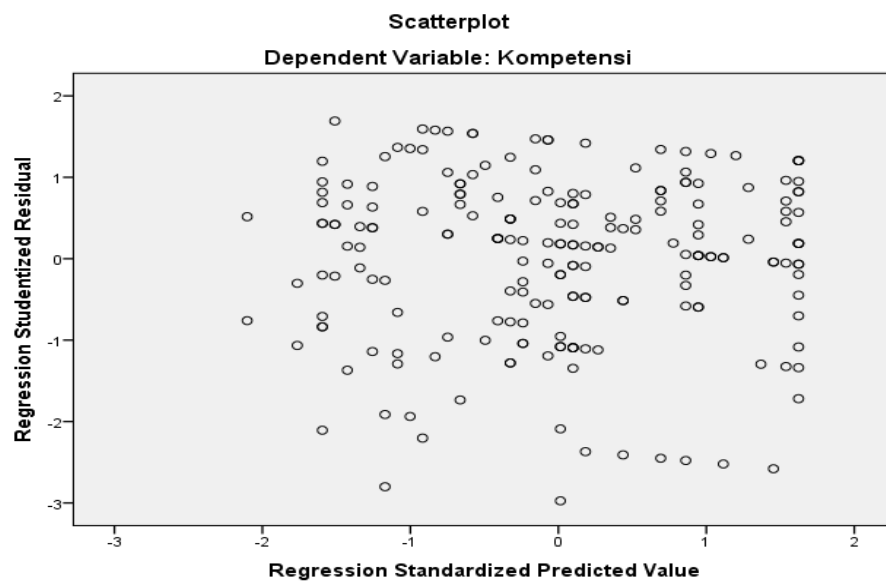
Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Multimedia	1.000	1.000

a. Dependent Variable: Competence

The tolerance and VIF values were 1.000. A tolerance value of  $> 0.100$  and VIF of  $< 5.00$  means that the absence of multicollinearity in the data (Shrestha, 2020).

## 3. Heteroscedasticity Test

Heteroscedasticity test was conducted by analyzing the scatterplot. Figure 4.2 shows the scatterplot generated by SPSS.



*Figure 4.2 Scatterplot*

The scatterplot shows that the data points were scattered, which means that the data met the homoscedasticity requirement (Barrett and Morgan, 2005).

### Hypothesis Testing

**Table 4.13 Results of Regression Analysis, IM to Comp**

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
(Constant)	80.663	3.612		22.333	.000
Multimedia	.104	.047	.153	2.206	.029

Table 4.13 shows the  $p$  and  $t$  values computed using SPSS. A  $p$  value of  $< 0.05$  means that there is a significant effect and vice versa. It was found that  $p = 0.029$ , which means that using interactive multimedia had significant effect on competence. Hypothesis testing can also be done by comparing the computed  $t$  value with the critical  $t$  value. The critical  $t$  value at the 5 percent significance level is 1.97810. If the  $t$  value  $>$  critical  $t$  value,  $H_a$  is accepted and  $H_o$  is rejected. As the table above shows, the computed  $t$  was 2.206, which is higher than the critical  $t$  value. Therefore, using interactive multimedia had a significant effect on student competence.

#### 4.2.5 Result for Research Question 3

Does students' perception mediate the relationship between interactive multimedia and student participation?

To answer this research question, a path diagram model was developed (Figure 4.3).

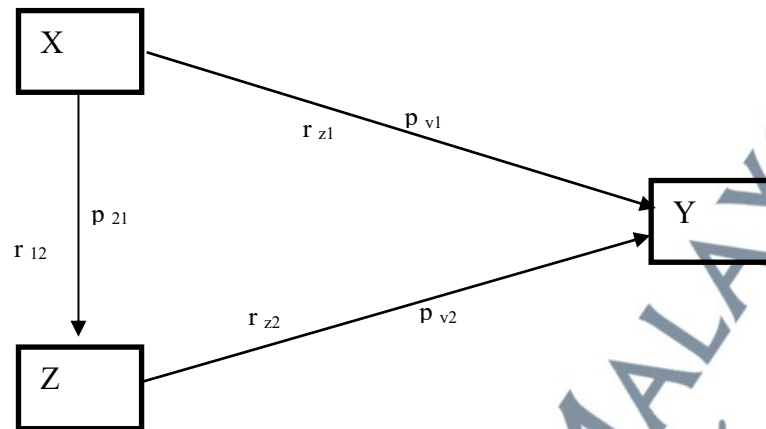


Figure 4.3. Path Model Analysis

- X** : Interactive Multimedia
- Z** : Student's perception
- Y** : Student participation

Based on the figure above, the research sub-questions and hypotheses were formulated as follows:

**Sub Question 3.a.**

3.a. Does interactive multimedia affect students' perception?

Ha: Interactive multimedia has a significant effect on students' perception.

Ho: Interactive multimedia has no significant effect on students' perception.

**Sub Question 3.b.**

3.b. Does interactive multimedia affect student participation?

Ha: Interactive multimedia has a significant effect on student participation.

Ho: Interactive multimedia has no significant effect on student participation.

### **Sub Question 3.c.**

3.c. Does students' perception towards interactive multimedia affect student participation?

Ha: Students' perception towards interactive multimedia has a significant effect on student participation.

Ho: Students' perception towards interactive multimedia has no significant effect on student participation.

### **Sub Question 3.d.**

3.d. Does students' perception mediate the effect of interactive multimedia on student participation?

Ha: Students' perception mediates the effect of interactive multimedia on student participation.

Ho: Students' perception does not mediate the effect of interactive multimedia on student participation.

### **Preliminary Test**

The model in this study was analyzed using Smart PLS 3.0 program. The model was used to analyze the mediating effect of student perception on the relationship between interactive multimedia and student participation. There are several steps and processes that must be carried out before conducting the test through bootstrapping and blindfolding (Anderson and Gerbing, 1988; Vinzi *et al.*, 2010; Hair *et al.*, 2017). The processes prior to bootstrapping and blindfolding are termed preliminary tests. They are discussed below.

### CFA Measurement Model

This stage verifies whether the variables or indicators describe or represent only a single factor (Hair *et al.*, 2017). In CFA, factors are also called constructs. This process was carried out by calculating the PLS algorithm against a predetermined model (Figure 4.4).

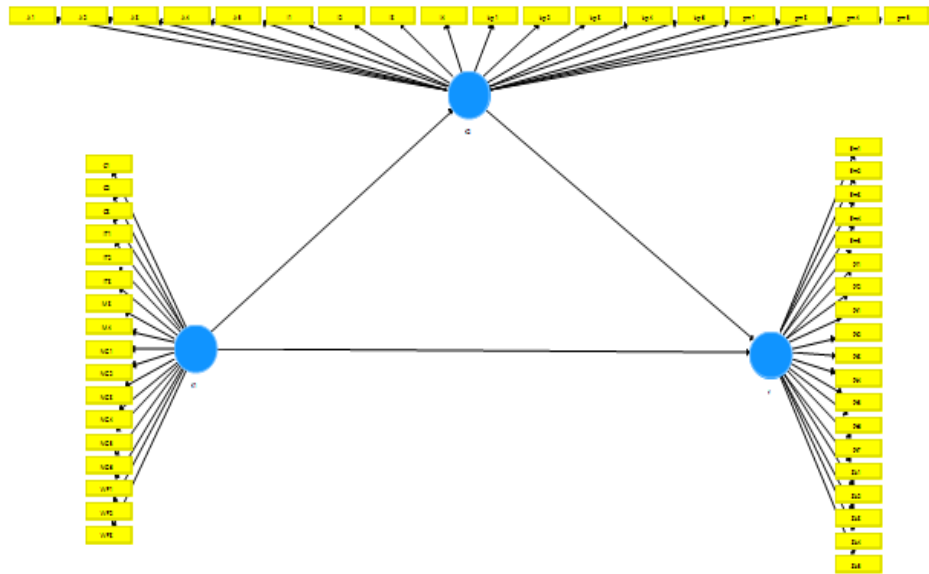


Figure 4.4. Model with all latent constructs

The figure above illustrates the model before the analysis was carried out with Smart PLS 3.0. The exogenous (independent) variable, interactive multimedia, was labelled X; the mediating variable, student perception, was labelled Z; and the endogenous (dependent) variable, student participation, was labelled Y. After running the PLS algorithm, the outer loading of each indicator was computed (Figure 4.5).

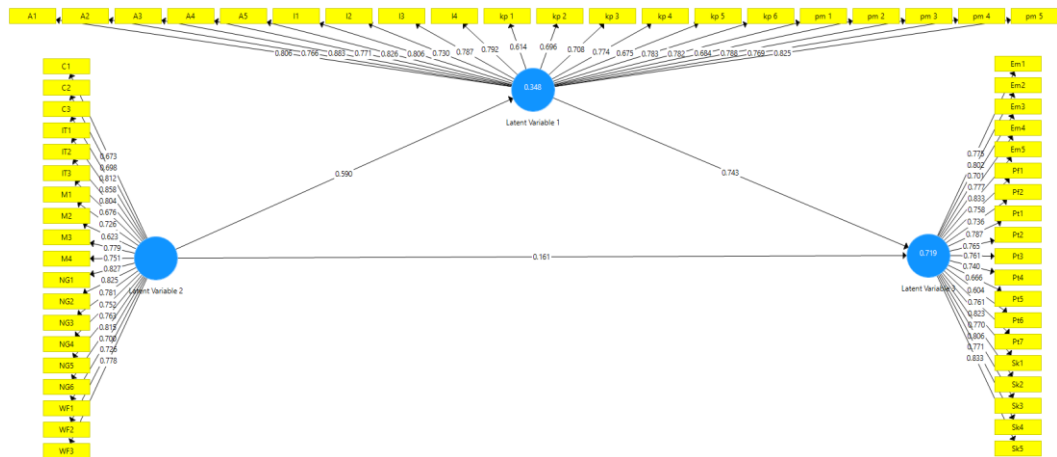


Figure 4.5. Model with outer loadings for each indicator

The figure above shows the outer loadings of the indicators. Based on the loadings, it is possible to determine the validity of the items. The criterion for a valid indicator is a minimum outer loading of  $> 0.7$ . If an item has a loading of  $> 0.7$ , it is considered valid. It is very possible that one indicator may have a high and significant score while another has a low score. If the indicator is not significant (outer loading  $< 0.7$ ), it should be removed from the model. Still, it is reasonable to maintain a non-significant indicator if it is the only indicator for a theoretically significant dimension (Garson, 2016). Based on the considerations above, the model was further improved by deleting some items (Figure 4.6).

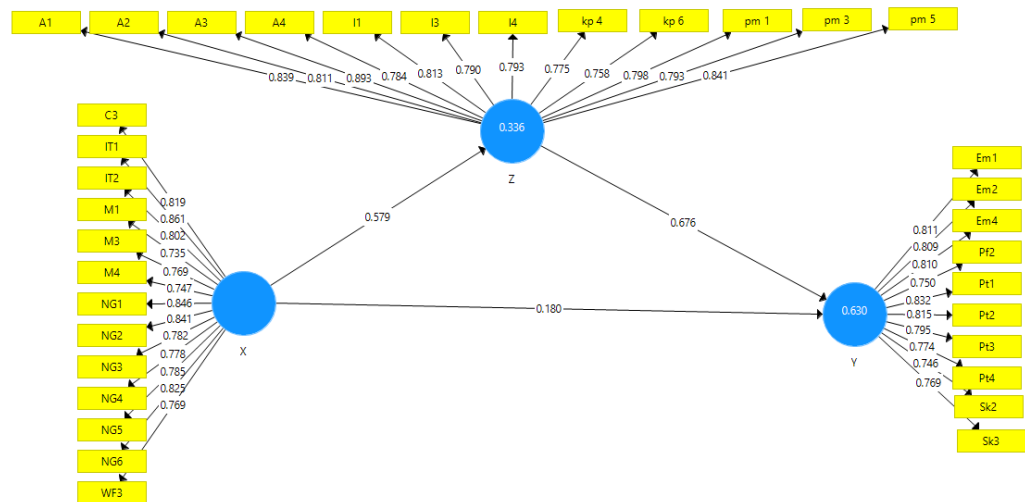


Figure 4.6. Improved Model

### Construct Validity and Reliability

After running the PLS algorithm, the construct validity and reliability values were computed. They are shown in Table 4.14.

Table 4.14. Construct Validity and Reliability

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
X	0.952	0.953	0.958	0.636
Y	0.934	0.935	0.944	0.626
Z	0.951	0.953	0.958	0.653

The validity and reliability of the constructs are evaluated using the average variance extracted (AVE) and its reliability is assessed using composite reliability (CR). Ideally, the AVE to establish construct validity is  $> 0.50$ . This means that 50 percent or more of the variance must be taken into account (Vinzi *et al.*, 2010). In addition to validity, the scale must also be reliable. To establish reliability, the criterion for CR is  $> 0.60$  (Vinzi *et al.*, 2010).

Table 4.14 above shows the AVE for each variable. The AVE of variable X was 0.636, which is greater than 0.5, thus the variable was valid. The AVE of

variable Y was 0.626, which is greater than 0.5, thus the variable was valid. The AVE value of variable Z was 0.653, which is greater than 0.5, thus the variable was valid.

The table also shows the CR for each variable. The CR of the X variable was 0.958, which is higher than 0.60, thus the variable was reliable. The CR value for the Y variable was 0.944, which is higher than 0.60, so the Y variable was reliable. The CR value for the Z variable was 0.958, thus the Z variable was reliable. In summary, all research variables were valid and reliable.

### **Discriminant Validity**

This step was carried out to determine the discriminant validity of the indicators. Discriminant validity shows the extent to which the items of a construct are distinct from other latent constructs (Vinzi *et al.*, 2010). The basic criterion for discriminant validity is if the square root value of the AVE is higher than the correlation with other latent variables (Garson, 2016). Indicators whose square root value of AVE is smaller than the intercorrelation between the latent variables may be deleted.

In addition, discriminant validity can be assessed using the heterotrait-monotrait (HTMT) ratio. Based on the results of the construct and discriminant validity tests, invalid indicators can be removed (Vinzi *et al.*, 2010; Garson, 2016). Table 4.15 shows the discriminant validity results based on the Fornell-Larcker test.

**Table. 4.15 Fornell-Larcker Test Results**

	<b>X</b>	<b>Y</b>	<b>Z</b>
<b>X</b>	0.798		
<b>Y</b>	0.572	0.791	
<b>Z</b>	0.579	0.780	0.808

The second method of determining discriminant validity is by comparing the square root value of AVE and cross-loadings on other latent variables (Table 4.16).

**Table 4.16. AVE and Cross-loadings**

	<b>X</b>	<b>Y</b>	<b>Z</b>
<b>A1</b>	0.488	0.686	0.839
<b>A2</b>	0.481	0.666	0.811
<b>A3</b>	0.549	0.698	0.893
<b>A4</b>	0.441	0.605	0.784
<b>C3</b>	0.819	0.468	0.485
<b>Em1</b>	0.441	0.811	0.576
<b>Em2</b>	0.476	0.809	0.685
<b>Em4</b>	0.438	0.810	0.629
<b>I1</b>	0.532	0.632	0.813
<b>I3</b>	0.429	0.595	0.790
<b>I4</b>	0.494	0.664	0.793
<b>IT1</b>	0.861	0.452	0.447
<b>IT2</b>	0.802	0.493	0.522
<b>M1</b>	0.735	0.446	0.508
<b>M3</b>	0.769	0.443	0.452
<b>M4</b>	0.747	0.408	0.453
<b>NG1</b>	0.846	0.445	0.433
<b>NG2</b>	0.841	0.491	0.506
<b>NG3</b>	0.782	0.490	0.393
<b>NG4</b>	0.778	0.426	0.414
<b>NG5</b>	0.785	0.453	0.433
<b>Pf2</b>	0.450	0.750	0.586
<b>Pt1</b>	0.447	0.832	0.560
<b>Pt2</b>	0.420	0.815	0.560
<b>Pt3</b>	0.403	0.795	0.548
<b>Pt4</b>	0.433	0.774	0.554
<b>Sk2</b>	0.483	0.746	0.718
<b>Sk3</b>	0.501	0.769	0.689

<b>WF3</b>	<b>0.769</b>	0.450	0.458
<b>kp 4</b>	0.416	0.586	<b>0.775</b>
<b>kp 6</b>	0.402	0.542	<b>0.758</b>
<b>pm 1</b>	0.434	0.580	<b>0.798</b>
<b>pm 3</b>	0.462	0.686	<b>0.793</b>
<b>pm 5</b>	0.461	0.594	<b>0.841</b>

The above table shows that the square root value of the AVE of each construct was greater than the intercorrelation value. Thus, the requirement for discriminant validity was met because all square root values of AVE (highlighted) were greater than the values of other latent variables or greater than their correlation values.

In addition, discriminant validity was also determined using the heterotrait - monotrait ratio (Table 4.17).

**Table 4.17. Heterotrait-Monotrait (HTMT) Ratio**

	<b>X</b>	<b>Y</b>	<b>Z</b>
<b>X</b>			
<b>Y</b>	<b>0.601</b>		
<b>Z</b>	<b>0.604</b>	<b>0.815</b>	

The table above shows that the heterotrait values were below 0.9. A variable has discriminant validity if the HTMT value is  $< 0.9$  (Sarstedt, Ringle and Hair, 2017). Some experts also recommended other criteria, e.g.,  $< 1$  or  $< 0.85$  (Garson, 2016). Because the HTMT value was  $< 0.9$ , the items had discriminant validity.

### **Model Fit Measurement**

The next step was to test the model fit using the standardized root mean residual (SRMR). SRMR is an approximate measure of the fit of the research model. It measures the difference between the observed correlation matrix and the

estimated model. SRMR reflects the average size of the difference. The lower the SRMR, the better the fit of the model (Garson, 2016). Table 4.18 shows the SRMR values.

**Table 4.18 SRMR**

	<b>Saturated Model</b>	<b>Estimated Model</b>
<b>SRMR</b>	0.060	0.060
<b>d_ULS</b>	2.277	2.277
<b>d_G</b>	1.459	1.459
<b>Chi-Square</b>	1490.384	1490.384
<b>NFI</b>	0.777	0.777

The table above shows that the SRMR for this research model was 0.060. An SRMR of  $< 0.08$  indicates the fit of a model; the smaller the SRMR, the better the model fit (Garson, 2016). Comparing the computed SRMR with the criterion indicated that the model fit was good ( $0.060 < 0.08$ ).

The requirements to carry out bootstrapping and blindfolding thus have been fulfilled. These two processes were carried out to test the research hypotheses and answer the second research question. The results of the hypotheses test are presented below.

### **Hypothesis Testing**

After ensuring that the indicators and constructs have met all requirements, the next step was to test the hypotheses. This was carried out by computing the bootstrapped path coefficients in the Smart PLS program. The results of this process provided answers to each formulated hypothesis. The findings are presented according to the research questions and hypotheses.

### Hypothesis 3.a

Hypothesis 3.1 was formulated to answer the research question “Does interactive multimedia affect students’ perception?”. The formulated hypothesis was:

Ha: Interactive multimedia has a significant effect on students’ perception.

Ho: Interactive multimedia has no significant effect on students’ perception.

Table 4.19 shows the results of the bootstrapped  $t$  and  $p$  values.

**Table 4.19 Hypothesis Result of the Effect of Interactive Multimedia on Students’ Perception**

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ( O/STDEV)	P Value
X -> Z	0.579	0.580	0.057	10.089	<b>0.000</b>

Table 4.19 above shows the computed  $t$  and  $p$  values to determine the effect of variable X variable on Z. The hypothesis is accepted if the computed  $t >$  critical  $t$  value and if  $p < 0.05$ . The critical  $t$  value at the 5 percent significance level is 1.96 (Garson, 2016). The table shows that  $t = 10.089$  ( $t > 1.96$ ) and  $p = 0.000$  ( $p < 0.05$ ), both of which satisfied the set criteria. Therefore, Ha was accepted and Ho was rejected. This means that using interactive multimedia had a positive and significant effect on students’ perception,  $B = 0.580$ . In other words, using interactive multimedia had a significant direct positive effect of 58 percent on students’ perception.

### Hypothesis 3.b

The findings answered the second question “Does interactive multimedia affect student participation?”. The formulated hypothesis was:

Ha: Interactive multimedia has a significant effect on student participation.

Ho: Interactive multimedia has no significant effect on student participation.

**Table 4.20 Hypothesis Results of the Effect of Interactive Multimedia on Student Participation**

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Value
X -> Y	0.180	0.182	0.065	2.783	<b>0.006</b>

Table 4.20 shows the results of the bootstrapped path analysis. It shows the  $t$  and  $p$  values of the effect of variable X on Y. The hypothesis is accepted if the computed  $t >$  critical  $t$  value and if  $p < 0.05$  (Garson, 2016). The table shows that the  $t$  value was 2.783 ( $t > 1.96$ ) and the  $p$  value was 0.006 ( $p < 0.05$ ). Therefore, Ha was accepted and Ho was rejected, which means that interactive multimedia positively influenced student participation,  $B = 0.182$ . In other words, using interactive multimedia device had a significant direct positive effect of 18.2 percent on student participation.

### Hypothesis 3.c

This finding answered the question “Does students’ perception towards interactive multimedia affect student participation?” The formulated hypothesis was:

Ha: Students’ perception towards interactive multimedia has a significant effect on student participation.

Ho: Students’ perception towards interactive multimedia has no significant effect on student participation.

**Table 4.21 Hypothesis Results of Students' Perception towards Participation**

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ((O/STDEV))	P Value
Z-> Y	0.676	0.676	0.055	12.390	<b>0.000</b>

Table 4.21 above shows the  $t$  and  $p$  values of the effect of variable Z (students' perception) on Y (student participation). The hypothesis is accepted if the computed  $t >$  critical  $t$  value and if  $p < 0.05$ . The critical  $t$  value at the 5 percent significance level is 1.96 (Garson, 2016). The  $t$  value was 12.390 ( $t > 1.96$ ) and the  $p$  value was 0.000 ( $p < 0.05$ ). Therefore,  $H_a$  was accepted and  $H_o$  was rejected. This means that students' perception towards using interactive multimedia had a positive and significant effect on student participation,  $B = 0.67$ . In other words, the perception of students towards using interactive multimedia device had a significant direct positive effect of 67.6 percent on student participation.

### Hypothesis 3.d

The fourth hypothesis answered the research question "Does students' perception mediate the effect of interactive multimedia device on student participation?". The formulated hypothesis was:

$H_a$ : Students' perception mediates the effect of interactive multimedia on student participation.

$H_o$ : Students' perception does not mediate the effect of interactive multimedia on student participation.

**Table 4.22. Hypothesis Results of the Mediating Effect of Students' Perception on the Relationship between Interactive Multimedia and Student Participation**

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ( O/STDEV )	P Value
X> Z -> Y	0.392	0.391	0.048	8.235	<b>0.000</b>

Table 4.22 shows the results of the path analysis for the mediating effect of students' perception on the relationship between interactive multimedia and student participation. The computed  $t$  and  $p$  values show the effect of variable X1 on Z through X2. The hypothesis is accepted if the computed  $t >$  critical  $t$  value and if  $p < 0.05$  (Garson, 2016). The computed  $t$  value was 8.236 ( $t > 1.96$ ) and  $p = 0.000$  ( $p < 0.05$ ), therefore  $H_a$  was accepted and  $H_o$  was rejected. This means that students' perception mediated between interactive multimedia and their participation,  $B = 0.391$ . In other words, students' perception had a mediating effect of 39.1 percent on the relationship between interactive multimedia device and their participation.

### 4.3 Qualitative Findings

This section presents the qualitative research findings. Data from the interviews were analyzed thematically. Thematic analysis followed Braun and Clarke's (2006) six steps of thematic analysis. The first step was recognizing data gathered through interviews. The second step was initial coding. At this stage, the researcher coded the interview data using NVivo. Text and word queries were used to help searching for similar words. The third step was generating themes by selecting and compiling codes that might share a common theme. The fourth step

was reviewing the generated themes to find the most accurate themes. The fifth step was naming the themes in accordance with the research objectives. The sixth step was writing a research report. The analysis revealed four significant themes that answered the main research question of students' perceptions towards the use of interactive multimedia to learn PAI. The themes were ease of using to learn PAI, usefulness of using for learning, attitude towards interactive multimedia, and intention to use interactive multimedia. These theme are discussed in detail below.

#### **4.3.1 Theme 1: Ease of Use of Interactive Multimedia to Learn PAI**

The students felt that interactive multimedia was easy to use to learn PAI. The students highlighted their feelings while learning to use the. Based on the findings, there were two sub-themes under ease of use, namely ease of access and ease to learn the PAI materials.

##### **1. Ease of Access**

The clearest advantage of learning with ICT is the ease of students to access the subject matter. The students could easily access the learning materials that are already stored on the interactive multimedia device. They could also look for relevant learning materials by searching on the application. Student 10, when asked about the ease of access during learning, responded, "*It is good, sir*" (Student 10).

A similar response was given by other students when asked whether it was easy to operate the application. Student 8 said, "*It's quite easy, sir.*" Student 7 added, "*To operate the application, it's easy, just tap the application and it will appear immediately.*" This was supported by another student, "*It's easy, sir, because we don't need to go back and forth to look at the page, if it's on paper, we*

*have to go back and forth to look at the page. If on the iPad it is easy to find a page, just click on it"* (Student 2).

Furthermore, the researcher inquired whether the students often experienced any problems during the teaching and learning process. Student 10 said, *"No sir because we all use wifi which is directly connected to the iPad so the network goes all the way"*.

One of the important things in the student's statement is that the school provides adequate facilities and infrastructure to support the use of interactive multimedia. In this case, the school provides wifi within the school environment. Another facility that it has prepared is a generator in case of power outage. This was explained by Student 8, *"Usually it doesn't take long for the light to go out, and even if it goes out, the generator light is turned on immediately"*.

Students could also easily use interactive multimedia to learn both in and outside of class. The system could be accessed outside of class hours because it can be used offline. This was explained by Student 5, *"The system can still be opened even at home."* Student 3 added, *"The book is already downloaded, right?"*.

## **2. Ease to Learn PAI Using Interactive Multimedia**

From the interviews, it was found that most of the students had positive feelings regarding the easiness of using interactive multimedia to learn PAI. They found that using interactive multimedia made learning PAI easier, more fun, simpler, and more interesting. The application was also comfortable to use. Student 10 explained, *"For myself, using the iPad makes it easier for learning. Everything is there, complete, everything can be done."*

Interactivemultimedia is a device that can be used in teaching and learning activities. It provides positive information according to user needs. It enables students to easily search and store various materials to facilitate PAI learning. The research asked the students the following question: "PAI covers four Islamic subjects, namely *fiqh*, *Quran* and *hadith*, *aqidah*, *akhlaq* (ethics), and Islamic history. Do you think it was easy to learn them?" Student 3 answered, *"It's easy, sir, because all the learning systems are already on the iPad, sir, so all you have to do is open the iPad and just look for the material you want to learn."*

Student 5 gave a similar response, *"It's easy. like if someone wants to be found, just open the book, it's easier there because you only see it from the iPad."* Other students gave more or less similar answers to the question. Student 10 explained, *"Same sir. Because you don't need anything, if other schools use books and google, it's a bit complicated, right, because you need to look for more materials, from the iPad everything is already there so nothing is left behind, so for example, even if the material is lost can ask to send from friends again. There, all the materials are already there, so you don't have to worry anymore."*

Another form of convenience when learning using interactive multimedia, as the other students explained, was its light weight. The students did not have to carry a lot of textbooks because all the materials were already on the iPad and they could take notes with it. Student 2 said, *"It's easy, for example looking for a difficult answer, it is easy to find on the iPad, we don't have to go back and forth to look at the page, on paper we have to go back and forth to look at the page. If on the iPad it's easy to find a page, just click on it. In elementary school, we used offline or with books, for example, for example the funeral prayer, so we don't have to look for*

*books like how to pray the corpse, so we can see on YouTube what the funeral prayer looks like. Could it be easier to understand sir. Yes sir, very useful, very useful, easier to read and understand. We find it easier to extract information to know.”*

A similar response was given by Student 5, *“Yes, it's like if there is something you want to find, just open the book, it's easier there because you only see it from the iPad. Easier, more complete too. Everything is there.”*. Student 10 agreed, *“The material is all there. Because in one item, everything is there for learning.”*

Besides making it easier to learn the material, the students were able to easily operate the device, *“It's easy, flexible. In that one, all the books are already there, so you don't need to bring another book, or at least a notebook to take notes. On the iPad there are notes to take notes”* (Student 5).

In the interview excerpts above, it was found that most of the students gave positive responses to the use of interactive multimedia device. Indeed, the students found it easier to learn PAI using the iPad application namely *Buku Digital Interaktif* (BDI). With this interactive multimedia device, students can search and store the materials that they need without the hassle of carrying thick printed books. Therefore, the researcher found that students found it easy to learn PAI using the interactive multimedia. Apart from the ease of access, with the support of facilities provided by the school, the application can also be used offline, so students can study anywhere and anytime. In addition, the device provides a variety of materials for students' learning needs. Therefore, students no longer need to look for additional learning materials.

#### 4.3.2 Theme 2: Usefulness of Interactive Multimedia for Learning PAI

There were two sub-themes related to the benefits or usefulness of using interactive multimedia to learn PAI. The two sub-themes were related to students' learning activities and the benefits that the students gained from using interactive multimedia in learning.

##### 1. Students' Active Participation

In this sub-theme, the researcher found that the students were more productive and active in learning. The students were asked whether they agreed that using interactive multimedia made them more active? A student responded, *"Agreed, because if it was offline, for example in elementary school... I used an iPad, right... so if for example there was a lesson that I didn't understand, I could directly ask the teacher"* (Student 3).

Another student said that using the iPad made him motivated to learn as much as possible. He said, *"It's nice that we are motivated to learn that"* (Student 10). Another student added, *"Because on the iPad there are many applications that facilitate our learning"* (Student 8). Likewise, another student stated that his learning activities improved when using interactive multimedia, *"If I think it's increasing, it's the same as offline anyway"* (Student 7). Offline, here, means learning in normal conditions (Indonesian: *luring*).

During the pandemic, learning moved online, typically referred to as online learning (Indonesian: *daring*). Another student, however, stated that his learning activities were higher during offline learning (before the pandemic), *"In my opinion, it tends to decrease, because if we are offline, we are really*

*guided by the teacher, right, if there is not enough online, the study time is also little" (Student 8).*

The researcher then asked the students, "Which do you think has more activities, using this application or not using it?" Student 5 said using this application. When the researcher asked why, he replied, "*Because everything is there*". The researcher was not satisfied with the short answer and asked again, "What is an example of an activity?" He replied, "*It seems like the books that are used are all books for studying, they are all there, the PAI books, the Al-Qur'an are all there*" (Student 5).

The findings in this sub-theme can also be seen from some of the students' relatively busier activities after school hours. Student 7 said, "*If I have an assignment, for example, I use the iPad again the same way after I use it again a few times, minutes.*" Student 6 had a similar response, "*After school and at night, I study again from 7 to 9 pm.*"

Based on the information given by the students, the students' perception towards the use of interactive multimedia was able to increase their learning activities. These activities were carried out not only in but also outside the classroom.

## **2. Promoting Independence**

The findings also indicated that learning through interactive multimedia can promote independent learning and improve the students' academic integrity. This can be seen from the statements of a student, "*So we are more independent, we also prepare how to understand the material easily, the material in PAI. We are searching or asking the teacher*" (Student 10). This

statement suggests that the students were more independent in learning and trying to understand the materials. They could manage their study time and understand the materials according to their needs and abilities by searching and asking their peers or teachers.

The same response was given by another student, *"It doesn't matter because we want to study privately, so we study alone there, not mixing with others. So if we don't understand, we can search, that's right"* (Student 5). Other students felt a similar benefit. They said that using their device made it easier to find and explore various information.

Student 8 supported the above statements, *"Hmm, you can, because if we don't use the iPad, we need more explanations outside of the teacher, so we can search Google, we can pay attention to videos from people, we can also practice. On the iPad there are many facilities that make it easier for teachers without having to be taught by the teacher, students can learn first with the existing facilities in the iPad. It's the same, sir, because I use the iPad myself, learning by myself is easier to understand."*

The same benefits were felt by other students. Student 11 said, *"When it's time for class, sir, it's the same again, for example, at night after Isha, I study alone."* Likewise, Student 1 said, *"If you don't study online at least at night, read and read."* Student 6 also shared a similar habit, *"When I go to school and at night, I study again from 7 to 9 pm."*

In addition to promoting independence, using interactive multimedia can foster the academic integrity of the students. Student 3 stated, *"Such as honesty or what, for example, in exams, we can't cheat, for example, so if we can, we*

*can pay attention again, monitored by the teacher."* Student 10 supported this statement, *"Yes, it trains our honesty, sir, because it is part of the character."*

Furthermore, it was found that the use of this application had other positive benefits, including students' better understanding of the materials. Nonetheless, the role of the teacher was still necessary. Student 7 said, *"I like it, so I can understand the material deeply. Because there are apps for reading photonotes, then the book can be turned into a pdf like that, the book can be highlighted like that."*

Another student also stated that using interactive multimedia fostered independent learning and made it easier to understand the subject matter. Student 11 said that by using interactive multimedia, it became easier to understand the materials, *"It's the same, sir, because I use the iPad myself, learning by myself is easier to understand (Student 11)."* Likewise, Student 1 said, *"In my opinion, sir, the iPad is easy, more understandable."*

Unlike the three students above, for Student 3, if there was something that he did not understand, he would look it up on Google using the iPad, *"Ooo, if there is something we don't understand, we can look it up on Google."*

This theme suggests that using interactive multimedia can promote independent learning and improve the academic integrity of the students. It also provides other benefits, e.g., it can help students understand the materials better.

### 4.3.3 Theme 3: Attitudes towards Interactive Multimedia

The findings revealed the attitude of students towards using interactive multimedia to learn PAI. Two sub-themes emerging under this theme were students' feelings and interactive multimedia effects.

#### 1. Students' Feelings

The interviews revealed that the students generally had positive feelings towards the use of interactive multimedia, including pleasure, interest, enjoy, and comfort. According to the students, the use of interactive multimedia application was very fun. Student 3 said, *"It's fun because there are games in the material too."* Students felt happy because there were other functions in the learning media.

The iPad can include games in the learning materials, thereby motivating some students. As another student said, apart from being fun, using interactive multimedia to learn also motivated them to learn, *"It's good that we are motivated to learn that way"* (Student 10). There were many positive responses from the students to learning through interactive multimedia. Additionally, most found it to be fun, motivating, and easy to use. Student 11 said, *"It's good, sir, because I want to make notes simpler, can be noted, can be decorated. Fun sir."*

Confirming the above response, Student 3 said, *"The iPad, so it's pretty simple. The lessons are from the iPad. It's not heavy, sir, the bag doesn't carry books."* Another student added that because they could watch or search for some of the materials on YouTube, learning using an iPad was simpler. Student 2 explained, *"It's simpler without books. For example, in elementary school,*

*we used offline or with books, for example, for example the funeral prayer, so we don't have to look for books like how to do the funeral prayer, so we can see on YouTube what the funeral prayer is like."*

The same thing was conveyed by Student 11, *"It's simpler, sir, I like to take notes because it's easier to decorate on the iPad."* Another student said that it was comfortable to use interactive multimedia to learn PAI. Student 7 said, *"iPad is also comfortable to use, then we can also log and activate applications to play games, so we don't keep playing games so we focus on one lesson."*

The students also stated that they liked the teaching and learning process using technology-based learning media such as the iPad. This can be seen from their responses to the researcher's question, "Do you like to study using the iPad?" Student 11 said, *"I like it, sir, because it is nice to learn."* Another student said he liked learning using interactive multimedia iPad, *"I like it, because it can be repeated"* (Student 6).

Another student agreed but for a different reason, *"I like it sir because it can be recorded on the iPad and the book can also be highlighted"* (Student 7). Student 5 mentioned another reason why he liked using the iPad, *"It's easier, more complete too. It's all there."*

The researcher asked whether the students liked the materials on the learning device. Student 10 stated, *"Yes, the material is all there."* There were also other students who said they liked it because it has a quiz application. Student 3 said, *"If at this school after completing one material, there is a katmut or quiz, so if the quiz is a quiz for one class, there will be competition."* Some also found that learning became more interesting, *"Because many*

*facilities are the same, learning is more interesting. Because it can be repeated continuously” (Student 6).*

The students said that the use of iPads made it easier for them because they did not have to carry heavy books. Student 5 explained, *“It's easy, flexible. On the iPad there are notes to take notes because he is offline. For the book itself, he's offline. Often, there's no network on the way from home to school, right, you can still open books. The system can still be opened even at home.”* Student 2 said, *“It's like we want to go to school, right, so we are still on the way, we can also do the exam even though the hours are different.”*

Student 7 agreed, *“It can be carried in a bag, taken anywhere. If it's offline, I just take my iPad with me to school. Yes, there is also wifi at school. If the book is in the form of an e-book on the iPad, it can be used online and offline. Still biased.”* Next, student 1 said, *“Easy to use anywhere. here, there are e-books and notes so they can be opened at any time. If I am no longer studying online, at least at night, I read and read.”*

## **2. Effects of the Interactive Multimedia**

The second sub-theme was the effects of the interactive multimedia. The researcher explored whether the use of this application affected the quality of the students' learning, performance, and achievement. The interviews revealed that there was indeed an effect. Student 8, when asked whether his quality of learning improved when studying with the interactive multimedia iPad, replied, *“It depends on the student, whether there is a will or not”*. The researcher then asked again, *“If there is a will?”* He answered, *“Yes, it can be done.”*

Meanwhile, Student 1 said, *"In my opinion, sir, the iPad is easy, it is more understandable."*

This device also made it easier for students to do their assignments. Student 2 stated, *"It's easy, sir, because we don't have to go back and forth to look at the page, on paper, we have to go back and forth to look at the page. If on the iPad it is easy to find a page, just click on it."* This study also found the effect of using interactive multimedia on student achievement. Student 3 stated, *"Their academic achievement is well above the average sir."*

Another student agreed, *"Thank God it's good, sir. Above average"* (Student 5). Student 2 said, *"Something is above average,"* while Student 9 said, *"Yes sir, because it is more effective and shorter."* Student 4 and 6 added, *"Yes sir, very helpful, very useful, easier to read and understand. We find it easier to dig up information to find out."*

#### **4.3.4 Theme 4: Intention to Use Interactive Multimedia**

In this theme, the researcher inquired what the students would do in the future on their interactive multimedia device. This theme was not divided into sub-themes. The students were asked whether they have any intention of looking for a similar or more advanced school that uses interactive multimedia for learning. The students responded that they have a plan to do so in the future. Student 5 said, *"I really want to, but for a high school in the city of Pekanbaru, I don't think there is anything like that, so it's a bit difficult."* Another student agreed, *"I really want to, but the situation is still in Pekanbaru, so what else?"* Student 2 answered with short answers. He said, *"I want to."*

Some students were found to not only use this interactive multimedia device at school but also outside of it. One student said, *"Sometimes it's like taking an exam in a car, in a private car"* (Student 5). This was also conveyed by another student, *"Quite often, I just want to study, but outside of class hours"* (Student 4). Student 2 added, *"It's like we want to go to school, right, so we are still on the way, we can also do the exam even though the hours are different."*

In addition, the students also agreed that the use of the iPad should be continued and implemented in other schools. Student 8 said, *"It must be continued, because on the iPad there are many facilities that make it easier for teachers without having to be taught by the teacher, students can learn first with the facilities in the iPad."* Another student gave a similar opinion when asked whether the use of this device should be continued at school, *"Yes sir, very useful, very useful, easier to read and understand. We find it easier to extract information to know"* (Student 2). Student 4 agreed, *"Yes sir, continue, because it's already based on iPad if you don't continue, it's a shame."* Another student added, *"In my opinion, if the school is adequate, it is okay"* (Student 4).

#### **4.4 Integrating Quantitative and Qualitative Result**

The researcher has discussed the qualitative and quantitative research findings separately. In this section, both sets of findings are integrated. Attempts to integrate the findings often present various challenges, and in many cases authors typically describe the results separately. Integrating the findings generated in a mixed methods study can reconcile conflicting results and produce more robust conclusions (Wagner *et al.*, 2012). The integration of qualitative and quantitative findings was carried out to answer the first and second research questions.

#### 4.4.1 Research Question 1

Research question 1 was “What are the students' perceptions towards using an interactive multimedia-based application?” To answer this question, the integrated qualitative and quantitative findings were divided into four sections according to the themes revealed previously.

##### a. Ease of Use

The quantitative and qualitative findings revealed that the students perceived the ease of use of interactive multimedia. In general, most students (98.21%) perceived the ease of use of interactive multimedia. Likewise, most of the students (97%) perceived the ease of access of the learning media. The students (98%) also agreed that the media made learning and understanding the PAI materials easier. These findings are supported by qualitative findings. For example, Student 7 said, *"To operate the application it is easy, just tab the application and it appears immediately,"* while Student 10 said, *"No sir because we all use wifi which is directly connected to the iPad so the network is all working."* Qualitatively, the findings on the ease of learning with interactive multimedia device were also stated by the students, *"For myself, using the iPad makes it easier for learning. Everything is there, complete, everything can be done"* (Student 10). Another student said, *"It's easy, sir, because the learning system is already on the iPad, sir, so all you have to do is open the iPad and just look for the material you want to learn"* (Student 3).

From the quantitative and qualitative findings above, it is clear that the use of interactive multimedia makes it easier for students to learn PAI. Its operation is easy and it facilitates learning of the PAI materials.

#### **b. Usefulness of Using Interactive Multimedia for Learning**

The quantitative and qualitative findings revealed that the students perceived interactive multimedia as useful or beneficial for learning PAI. Based on the quantitative findings in Table 4.2, the students generally perceived the use of interactive multimedia to be beneficial for their learning activities. It was also able to increase the students' activities. Based on the quantitative results, most of the students (97.569%) perceived the usefulness and benefits of interactive multimedia for their learning activities. This is supported by the agreement of the students with each item of the usefulness dimension: all of the students considered interactive multimedia useful in their learning, and more than 97 percent of the students positively perceived the other items, e.g., increasing students' learning activities and productivity. The qualitative findings also indicated the positive perception of the students. For example, Student 10 said, *"It's nice that we are motivated to learn that,"* while Student 7 said, *"For example, if I have an assignment, I use the iPad again, just after I use it again for a few minutes."*

Likewise, other students said, *"Such as honesty or what, for example, in exams, we can't cheat, for example, so if we can, we can pay attention again, monitored by the teacher"* (Student 3). This was supported by another student, *"I like it, so I can understand the material deeply. Because there are apps for reading photonotes, then the book can be turned into a pdf like that, the book can be highlighted like that"* (Student 7). Student 11 also said, *"It's the same, sir, because I use the iPad myself, learning by myself is easier to understand."*

From the above findings, it is clear that the use of interactive multimedia is beneficial for students in learning PAI. The perceptions of students of the

benefits of the interactive multimedia came from the increase in learning activities and other perceived benefits.

### c. Attitude towards Interactive Multimedia

The quantitative and qualitative findings revealed the positive attitude of the students towards the use of interactive multimedia. Based on the quantitative findings in Table 4.2, the students generally perceived the use of interactive multimedia as fun, interesting, and comfortable. They also had a favorable attitude towards it as it had a positive impact on their learning activities. Most students (98.44%) had positive feelings or assumptions about the use of interactive multimedia in their learning activities. This was shown from the quantitative findings, where around 97.44 percent of the students liked interactive multimedia device and perceived the positive impact of using interactive multimedia on their learning activities.

Qualitatively, as stated by a student, *"iPad is also comfortable to use, then we can also log and activate applications to play games, so we don't keep playing games so we focus on one lesson"* (Student 7). Another added, *"I like it, sir, because it's nice"* (Student 11). Likewise, another student stated, *"I like it, because it can be repeated,"* (Student 6). Student 7 said, *"I like it sir because it can be recorded on the iPad and the book can also be highlighted."* According to Student 6, *"Because many facilities are the same, learning is more interesting. Because it can be repeated continuously."* Student 11 explained, *"It's good, sir, because I want to make notes simpler, can be noted, can be decorated. Fun sir."* Finally, Student 10 said, *"It's good that we are motivated to learn that way."*

From the findings above, it is clear that the students generally had a positive attitude towards the use of interactive multimedia in their learning activities. The students liked learning using this device due to its various advantages compared to learning using textbooks. Besides that, they also felt happy with learning using interactive media, and they found learning to be interesting. The use of interactive multimedia also increased the enthusiasm of students in learning; they became more motivated to learn. Other positive effects of the learning media were promoting learning independence and facilitating students' learning.

The findings above confirm that the students have a very positive perception of the use of interactive multimedia, thus it is likely that it will improve their achievement.

#### **d. Intention to Use Interactive Multimedia**

Finally, the quantitative and qualitative findings revealed the positive intention of the students to use interactive multimedia in the future. Based on the findings in Table 4.2, most students (97.44%) stated their intention to use interactive multimedia in the future. This shows that in general, the students plan to use interactive multimedia devices in learning. The quantitative results for each item under the dimension of intention to use revealed that the students intended to use interactive multimedia to do assignments and carry out learning activities anywhere and anytime. These tasks can be carried out not only in but also outside of class. This can be seen in the agreement of the students (more than 94%) with the items of the dimension. Quantitatively, the students stated that the interactive multimedia tools should still be implemented in the future

because they can facilitate their learning readiness before the teaching and learning process in class. Student 8 stated, *"It must be continued, because on the iPad there are many facilities that make it easier for teachers without having to be taught by the teacher, students can learn first with the facilities in the iPad."* Another student added, *"Yes sir, continue, because it's already based on iPad if you don't continue, it's a shame. if the school is adequate, you can"* (Student 4). One student has the desire to continue to a high school (SMA) that uses the iPad if there is such a high school in the city, *"I really want to, but for a high school in the city of Pekanbaru, I don't think there is anything like that, so it's a bit difficult"* (Student 5).

From the findings above, it is clear that the students have the desire or plan to continue the use of iPad in their learning activities. The students have the desire to continue their education to a high school that uses iPad in their learning system. In addition, they believe that the use of interactive multimedia should be continued in the future because it can help them to learn and be ready before the teaching and learning in class with the teacher.

#### 4.4.2 Research Question 2

Research question 2 was "Does interactive multimedia affect student competence?"

The results revealed that the use of interactive multimedia had a significant effect on student competence. Based on the quantitative findings in Table 4.13, the  $p$  value was 0.029, smaller than 0.05, and so interactive multimedia had a significant effect on student competence. Hypothesis testing can also be done by comparing the  $t$  value with the critical  $t$  value. The critical  $t$  value at a 5 percent

significant level is 1.9781. If the  $t$  value is greater than the critical  $t$  value,  $H_a$  is accepted and  $H_o$  rejected. In this case, the  $t$  value was 2.206, which is higher than the critical  $t$  value, and so interactive multimedia had a significant effect on student competence. This finding is supported by the qualitative findings. Student 3 said, *"Their academic achievement is well above the average sir"* (Student 3). Another student said the same thing, *"Thank God it's good, sir. Above average"* (Student 5). Student 2 said, *"Sometime is above average."* Another student said, *"Yes sir, because it is more effective and shorter"* (Student 9).

From the findings above, it is clear that using interactive multimedia significantly affected student competence. This can be seen from both quantitative and qualitative findings.

#### 4.5 Conclusion of the Findings

This section summarizes the research findings based on the research questions. Objective 1(a) was to investigate the students' perception towards the use of interactive multimedia device to learn PAI. The quantitative results revealed that the majority of students had a positive perception towards the use of interactive multimedia in learning PAI in all dimensions, namely ease of use, usefulness, attitude, and intention. The percentage of agreement for the dimensions was between 97.44 and 98.44 percent. The highest level of agreement was for the attitude dimension while the lowest for the intention dimension.

The quantitative findings are supported by qualitative findings obtained through interviews. The qualitative part of the study aims to explain the quantitative findings in more depth and reveal any differing perceptions. The qualitative findings supported the quantitative results, that students had a positive perception

towards the use of interactive multimedia device in PAI learning across the four dimensions of easy to use, usefulness, attitude, and intention. The ability of interactive multimedia to search materials and save the entire course materials, in addition to its light weight, makes it easy for students to study anywhere and anytime.

Based on the qualitative findings, the students also felt the usefulness and benefits of using interactive multimedia in their learning activities. They increased their learning activities and understood the materials easier. The students also had positive attitudes towards it and considered it simple, fun, interesting, comfortable, and motivating. They liked using interactive multimedia to learn PAI. Finally, the qualitative findings revealed the hopes and desires of the students for other schools to adopt or use interactive multimedia in their learning system, along with the hope that the device can become more affordable.

Objective 1(b) investigated whether there were differences in student perception by gender, age, and school. The results found significant differences in perception by gender ( $p = 0.011$ ), age ( $p = 0.046$ ), and school ( $p = 0.026$ ). Because the  $p$  values are smaller than 0.05, hypothesis  $H_a$  was accepted and  $H_0$  was rejected. This means that there were significant differences in the students' perceptions towards interactive multimedia device by age, gender, and school origin.

The third objective of this study was to determine the effect of using interactive multimedia on student competence. The results showed that the use of interactive multimedia did not significantly affect student competence. This can be seen from the quantitative findings, where the  $p$  value of acquisition was 0.029 ( $p > 0.05$ ) and its  $t$  value was 2.206 ( $t < 1.9781$ ). However, qualitative data showed that there was an increase in student achievement.

The fourth objective was to investigate the effect of interactive multimedia on students' perceptions. The results showed that  $t = 10.089$  ( $t > 1.96$ ) and  $p = 0.000$  ( $p < 0.05$ ), thus  $H_a$  was accepted. This means that interactive multimedia had a strong positive and significant effect on students' perceptions,  $B = 0.580$ . In other words, using interactive multimedia had a significant direct positive effect of 58.0 percent on students' perception.

The fifth objective was to investigate the effect of interactive multimedia on student participation. This study found that the  $t$  value was 2.783 ( $t > 1.96$ ) and the  $p$  value was 0.006 ( $p < 0.05$ ), thus  $H_a$  was accepted. This means that interactive multimedia had a positive and significant effect on student participation,  $B = 0.182$ . In other words, using interactive multimedia had a significant direct positive effect of 18.2 percent on student participation.

The sixth objective was to investigate the effect of students' perception on student participation. This study found that the  $t$  value was 12.390 ( $t > 1.96$ ) and the  $p$  value was 0.000 ( $p < 0.05$ ), thus  $H_a$  was accepted. This means that student perception had a positive significant effect on student participation,  $B = 0.676$ . In other words, students' perception had significant positive effect of 67.6 percent on student participation.

The seventh objective was to investigate the mediating effect of students' perceptions on the relationship between interactive multimedia and student participation. This study found that the  $t$  value was 8.235 ( $t > 1.96$ ) and  $p$  value was 0.000 ( $p < 0.05$ ), thus  $H_a$  was accepted. This means that students' perception positively mediated the relationship between interactive multimedia and student participation,  $B = 0.391$ . In other words, students' perception had a positive

mediating effect of 39.1 percent on the relationship between interactive multimedia and student participation.

