# CHAPTER IV

# FINDINGS

## 4.1 Introduction

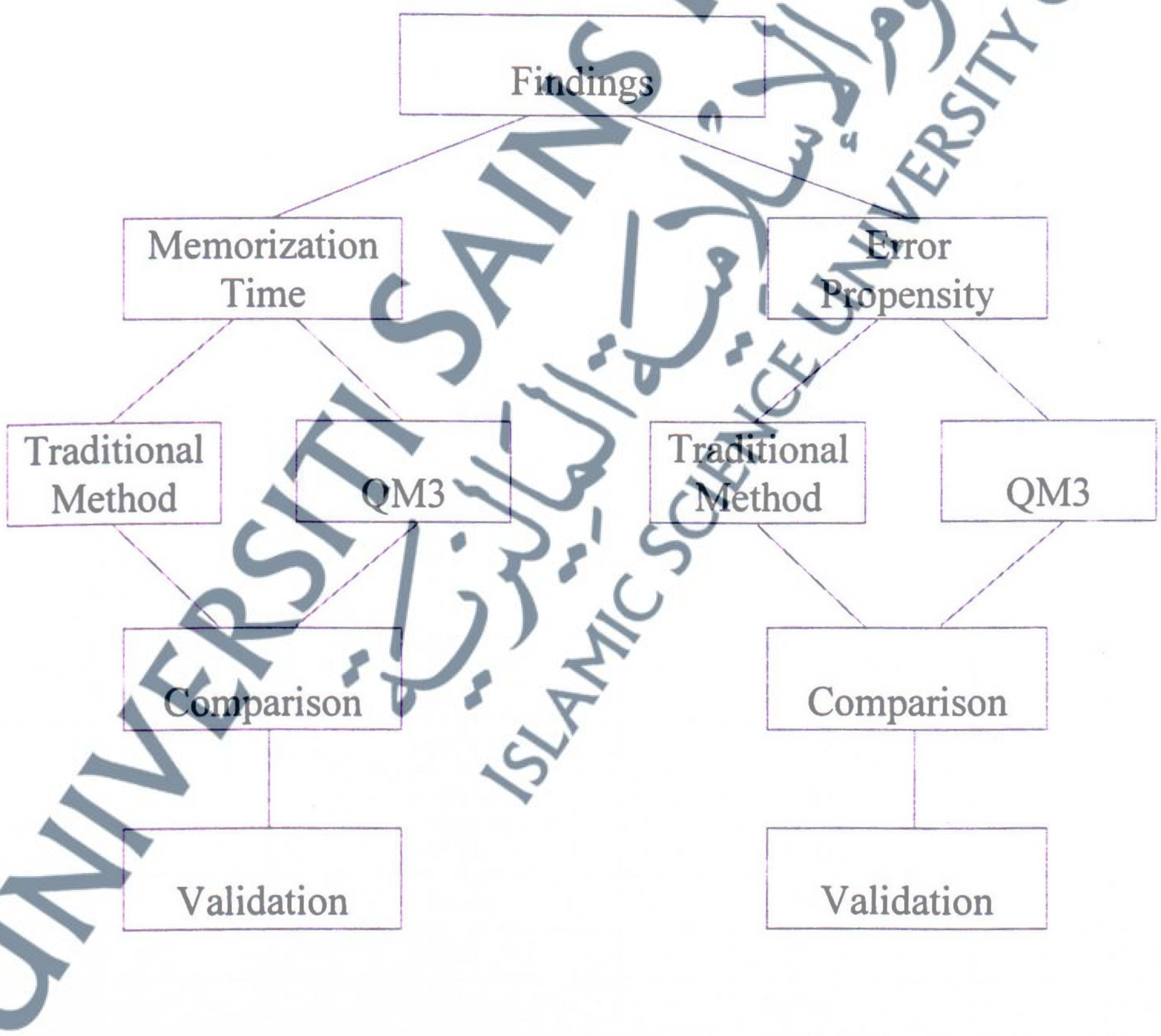
In this study, the goal of experimentation was to determine whether the proposed approach would outperform the traditional approach from the aspect of time and accuracy. This is consistent with the requirement of Quranic memorization. It imposes a strict adherence to content. Students must be able to remember the memorized verses exactly as they are written, without any form of distortion. Transferring the content of the Quran into verbatim memory is therefore paramount for them. However, doing so would often consume quite a lengthy amount of time on the part of the learners. This is true when it is done via the traditional approach. As such, the proposed approach aimed to remedy this issue.

Measuring the accuracy of memory and how much time it took to be successful in memorization were therefore elected as the main focus of the research. Data were gathered from students during pretest and posttest via recording their recitation. Furthermore, the data collected (raw data) from pretest and posttest were processed and handled to get the final data. The results were organized around these two themes with regard to the strategy in question. The discussion of the result was covered afterwards in next chapter. Here, the overall data gathered from the experimentation will be criticized more thoroughly. An intricate examination of the mechanism that underlies the traditional method and QM3 was performed, specifically on how it would impact the performance of both approaches as a whole. This was done by discussing the core weaknesses of the traditional method and how QM3 can provide a realistic solution to them.

## 4.2 Findings

The results in Figure 4.1were gathered based on two measurements. The first measurementwas the memorization time (Mishra, 2011) or the time required for the students to perform the memorization from the traditional technique as compared to the Quranic Multimedia Memory Model (QM3). The second measurementgave emphasis on the error propensity or the possibility that the students would make a mistake in memorizing (Kjellsson, Clarke & Gerdtham, 2014). The results from each measure were then gathered and compared. Finally, the significance of the resultswas validated with ANOVA measurement.

Figure 4.1: Overview of research findings for quran memorization



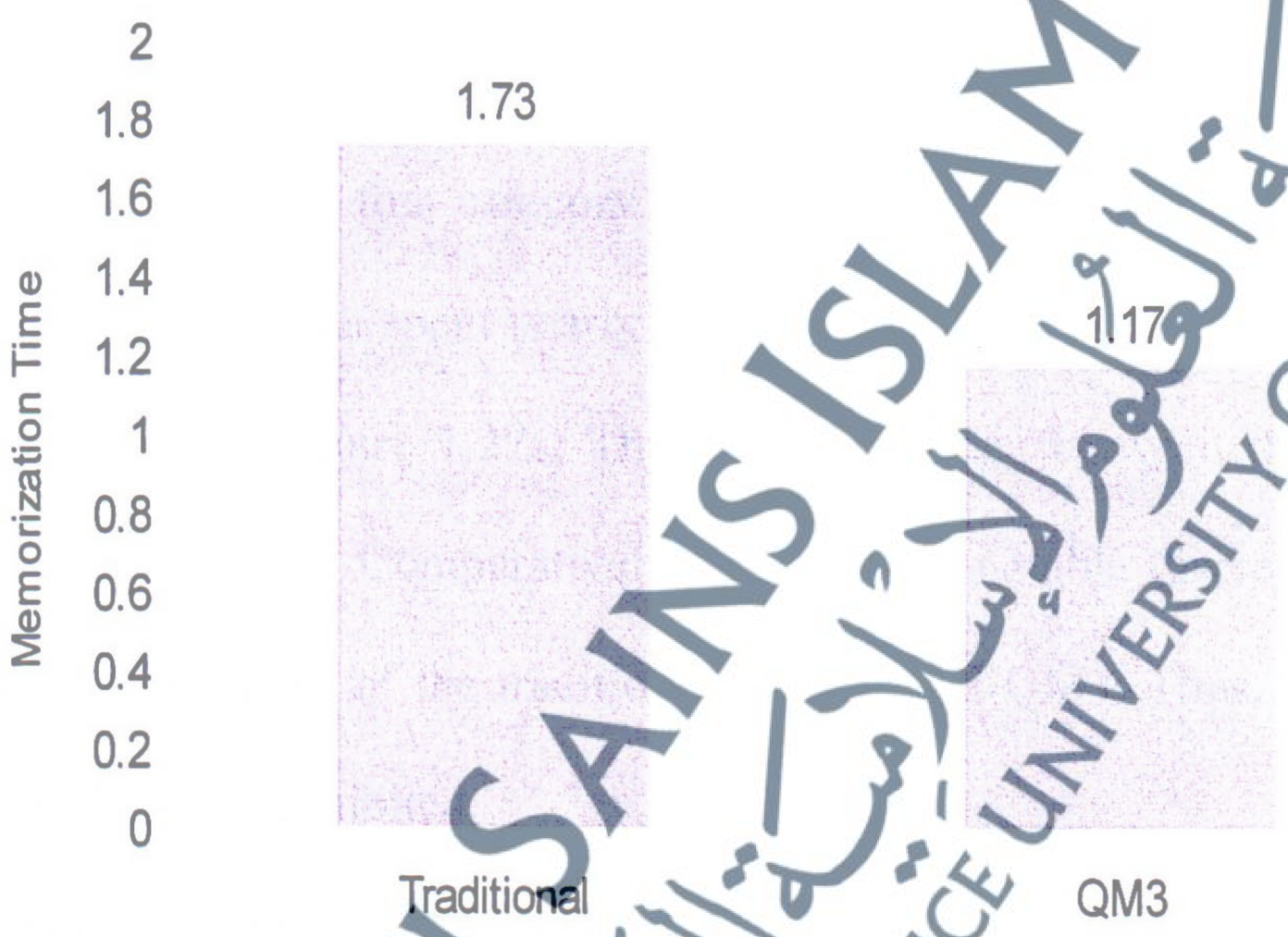
For the memorization time, the complete resultswere presented below (Table 4.1). In addition, reduction was the amount of memorization time reduced by QM3.

Table 4.1: Memorization time for Traditional method and proposed model QM3where Avg obtained for each sample from Appendix (H, J)

| Sample | Memorization Time (5 Ayat) | | Reduction (%) |
|---|---|---|---|
| | Traditional (s) | QM3 (s) | |
| 1 | 1.8493 | 1.1297 | 38.91 % |
| 2 | 1.6666 | 1.1973 | 28.16 % |
| 3 | 1.8493 | 1.1688 | 36.80 % |
| 4 | 1.6071 | 1.1921 | 25.82 % |
| 5 | 1.6514 | 1.2706 | 23.06 % |
| 6 | 1.7940 | 1.1344 | 36.77 % |
| 7 | 1.7088 | 1.1973 | 29.93 % |
| 8 | 1.9217 | 1.1765 | 38.78 % |
| 9 | 1.9780 | 1.2385 | 37.39 % |
| 10 | 1.7881 | 1.1764 | 34.21 % |
| 11 | 1.7940 | 1.1588 | 35.41 % |
| 12 | 1.6363 | 1.1297 | 30.96 % |
| 13 | 1.6463 | 1.1764 | 28.54 % |
| 14 | 1.7252 | 1.1368 | 34.11 % |
| 15 | 1.6061 | 1.2735 | 20.76 % |
| 16 | 1.7822 | 1.1250 | 36.87 % |
| 17 | 1.8305 | 1.1563 | 36.83 % |
| 18 | 1.6265 | 1.1663 | 28.29 % |
| 19 | 1.6413 | 1.1921 | 27.37 % |
| 20 | 1.9494 | 1.2081 | 38.03 % |
| 21 | 1.6822 | 1.1250 | 33.12 % |
| 22 | 1.7532 | 1.1688 | 33.33 % |
| 23 | 1.6666 | 1.1514 | 30.91 % |
| 24 | 1.6666 | 1.1613 | 30.32 % |
| 25 | 1.7705 | 1.2189 | 31.16 % |
| 26 | 1.6216 | 1.1638 | 28.23 % |
| 27 | 1.6874 | 1.1250 | 33.33 % |
| 28 | 1.6071 | 1.1250 | 29.10 % |
| 29 | 1.7035 | 1.1297 | 33.68 % |
| 30 | 1.6071 | 1.1765 | 27.61 % |
| 31 | 1.7822 | 1.1250 | 34.79 % |
| 32 | 1.6216 | 1.1739 | 37.71 % |
| 33 | 1.7252 | 1.1250 | 34.79 % |
| 34 | 1.8060 | 1.1250 | 37.71 % |
| 35 | 1.8121 | 1.1321 | 37.53 % |
| **Average** | **1.7304** | **1.1666** | **32.58 %** |

From the graph (Figure 4.2), it was quite apparent that on average, the traditional approach took approximately 1.73s per letter for memorization while QM3 would only require 1.17s. Comparatively, there was a notable difference between the average memorization of the traditional method and QM3. Here, a total of 32.33 % reduction time was exhibited. In other words, QM3 reduced more than 30% of the temporal requirement for memorization.

Figure 4.2: Memorization time for traditional method and QM3




Reframing the results in another way, QM3 only take approximately 70% of the time that was normally demanded by the traditional method. In accumulation, this can offer a rather promising impact on time saving. For instance, assume that a student usually spends an hour or **60** minutes to memorize a collection of ayat withinQuran. With QM3, it is estimated that only **42** minutes is needed instead. The extra time can be utilized by the students to do a quick review for the sake of memory reinforcement.

The findings for the memorization time were divided into the categories by taking them depend of the reduction percentage (20 to 24), (25 to 29), (30 to 34) and (35 to 39). Results were tabulated asin (Table 4.1, Table 4.2, Table 4.3 and Table 4.4). Reductionwas the amount of memorization time decreased by QM3 in each category.

Table 4.2: Memorization time for traditional method and proposed model QM3 in first percentage group (20 to 24)

| Sample | Memorization Time | | Reduction (%) |
|---|---|---|---|
| | Traditional (s) | QM3 (s) | |
| 1 | 1.6061 | 1.2735 | 20.76 % |
| 2 | 1.6514 | 1.2706 | 23.06 % |
| **Average** | **1.62875** | **1.27205** | **21.91%** |

From the graph of the first category (Figure 4.2), it was fairly clear that on average, the traditional approach spent nearly 1.63s for each letter for memorization; however QM3 would only require 1.27s. Thus, the difference between the two averages is about 0.36s per letter. Comparatively, there was a notable discrepancy between the average memorization of the traditional method and QM3. Thus, a total of 21.91 % reduction time was exhibited.

Figure 4.3: Memorization time for traditional method and QM3 in the first group percentage

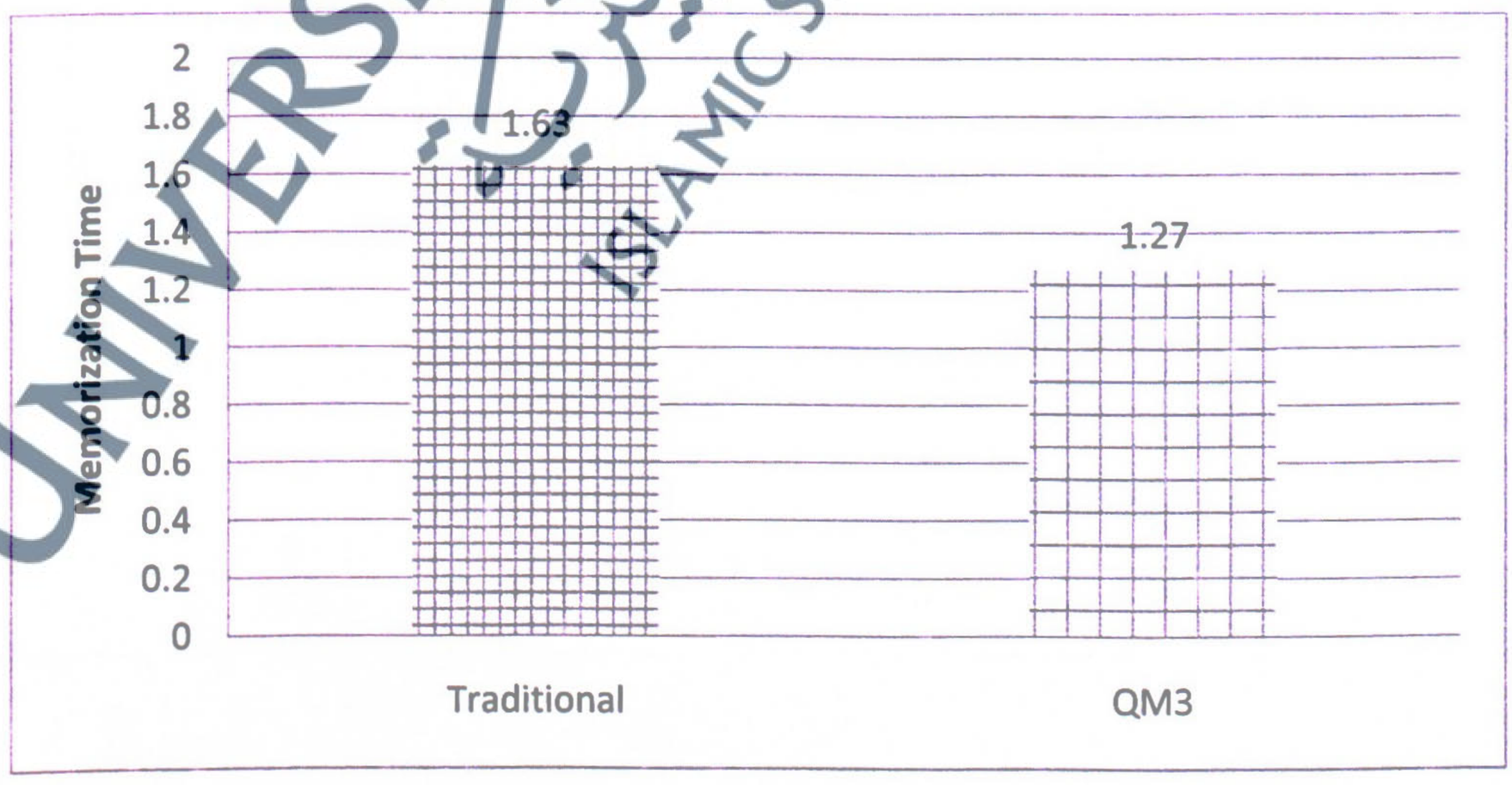


Table 4.3: Memorization time for traditional method and proposed model QM3 in the second percentage group (25 to 29)

| Sample | Memorization Time | | Reduction (%) |
|---|---|---|---|
| | Traditional (s) | QM3 (s) | |
| 1 | 1.6071 | 1.1921 | 25.82 % |
| 2 | 1.6413 | 1.1921 | 27.37 % |
| 3 | 1.6071 | 1.1765 | 27.61 % |
| 4 | 1.6666 | 1.1973 | 28.16 % |
| 5 | 1.6216 | 1.1638 | 28.23 % |
| 6 | 1.6265 | 1.1663 | 28.29 % |
| 7 | 1.6463 | 1.1764 | 28.54 % |
| 8 | 1.6071 | 1.1250 | 29.10 % |
| 9 | 1.7088 | 1.1973 | 29.93 % |
| **Average** | **1.6369333** | **1.1763111** | **28.12%** |

From the graph of the second category (Figure 4.3), it was fairly clear that on average, the traditional approach required almost 1.64s for every letter for memorization,where QM3 would only necessitate 1.18s. Relatively, there was a notable difference between the memorization average of the traditional method and QM3. Therefore, a total of 28.12 % reduction time was exhibited.

Figure 4.4: Memorization time for traditional method and QM3 in the second group percentage

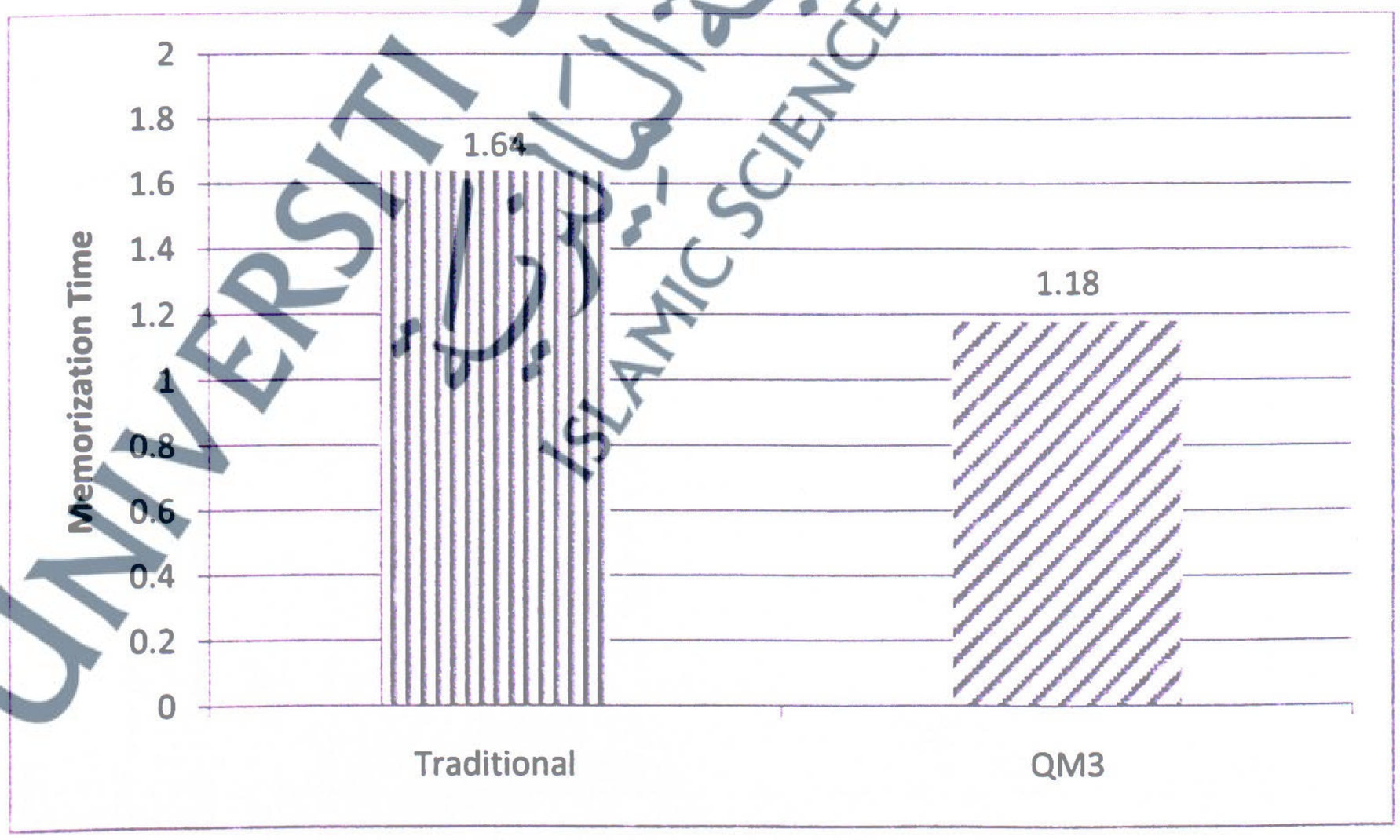


Table 4.4: Memorization time for traditional method and proposed model QM3 in the third percentage group (30 to 34)

| Sample | Memorization Time | | Reduction (%) |
|---|---|---|---|
| | Traditional (s) | QM3 (s) | |
| 1 | 1.6666 | 1.1613 | 30.32 % |
| 2 | 1.6666 | 1.1514 | 30.91 % |
| 3 | 1.6363 | 1.1297 | 30.96 % |
| 4 | 1.7705 | 1.2189 | 31.16 % |
| 5 | 1.6822 | 1.1250 | 33.12 % |
| 6 | 1.7532 | 1.1688 | 33.33 % |
| 7 | 1.6874 | 1.1250 | 33.33 % |
| 8 | 1.7035 | 1.1297 | 33.68 % |
| 9 | 1.7252 | 1.1368 | 34.11 % |
| 10 | 1.7881 | 1.1764 | 34.21 % |
| 11 | 1.7822 | 1.1250 | 34.79 % |
| 12 | 1.7252 | 1.1250 | 34.79 % |
| **Average** | **1.7155833** | **1.14775** | **32.89%** |

The graph (Figure 4.5) it clearly showed that on average in the third group, the traditional method consumed roughly 1.72s to memorize only one letter; nevertheless, the new approach which was QM3 would only presuppose 1.15s. Thus, it was noticeable that there was dissimilarity between the average of memorization time of the traditional method and QM3. Accordingly, a total of 32.89 % reduction time was exhibited.

Figure 4.5: Memorization time for traditional method and QM3 in the third group percentage

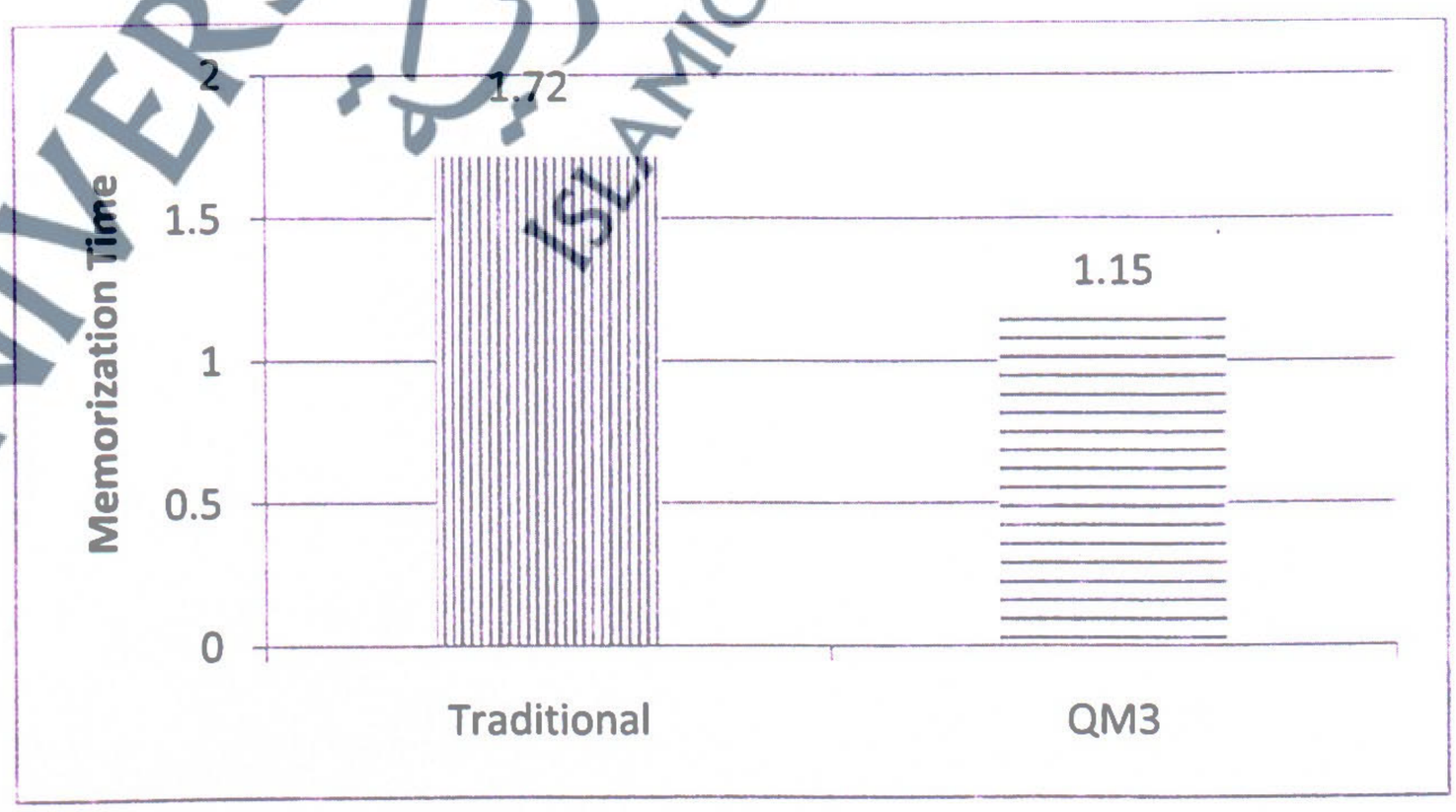
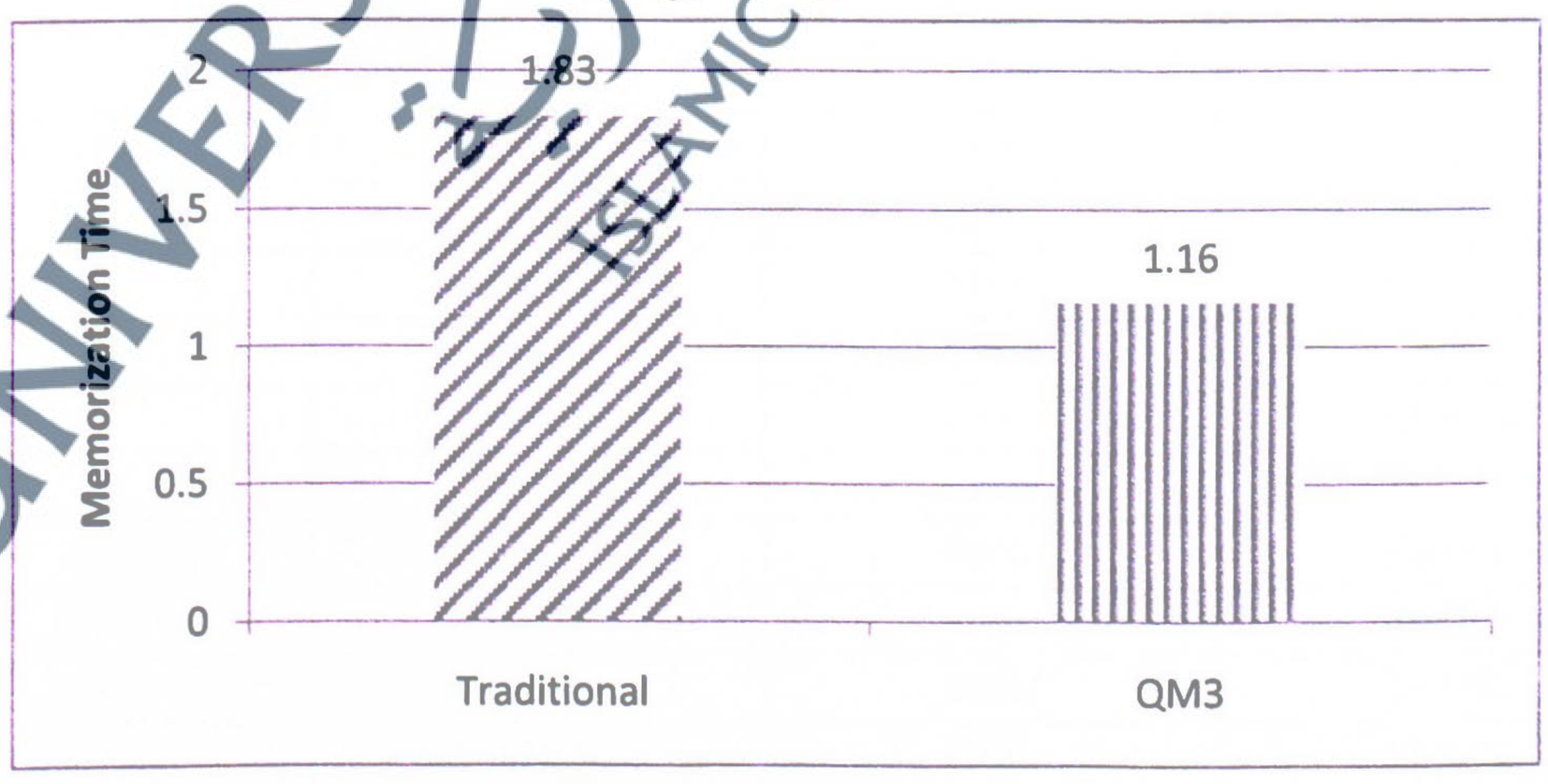


Table 4.5: Memorization time for traditional method and proposed model QM3 in the fourth group percentage (35 to 39)

| Sample | Memorization Time | | Reduction (%) |
|---|---|---|---|
| | Traditional (s) | QM3 (s) | |
| 1 | 1.7940 | 1.1588 | 35.41 % |
| 2 | 1.7940 | 1.1344 | 36.77 % |
| 3 | 1.8493 | 1.1688 | 36.80 % |
| 4 | 1.8305 | 1.1563 | 36.83 % |
| 5 | 1.7822 | 1.1250 | 36.87 % |
| 6 | 1.9780 | 1.2385 | 37.39 % |
| 7 | 1.8121 | 1.1321 | 37.53 % |
| 8 | 1.6216 | 1.1739 | 37.71 % |
| 9 | 1.8060 | 1.1250 | 37.71 % |
| 10 | 1.9494 | 1.2081 | 38.03 % |
| 11 | 1.9217 | 1.1765 | 38.78 % |
| 12 | 1.8493 | 1.1297 | 38.91 % |
| **Average** | **1.8323417** | **1.1605917** | **37.40%** |

Moreover, the graph of the fourth group (Figure 4.6) clearly represented that on average, the traditional method took roughly 1.83s to memorize one letter only; whereas, the new approach which was QM3, only demanded 1.16s. Consequently, it was emphatic that there was a notable inequality between the average of memorization time of the traditional method and the Quranic Multimedia Memory Model (QM3). Hence, a total of 37.40 % reduction time was exhibited.

Figure 4.6: Memorization time for traditional method and proposed model QM3 in the fourth group percentage



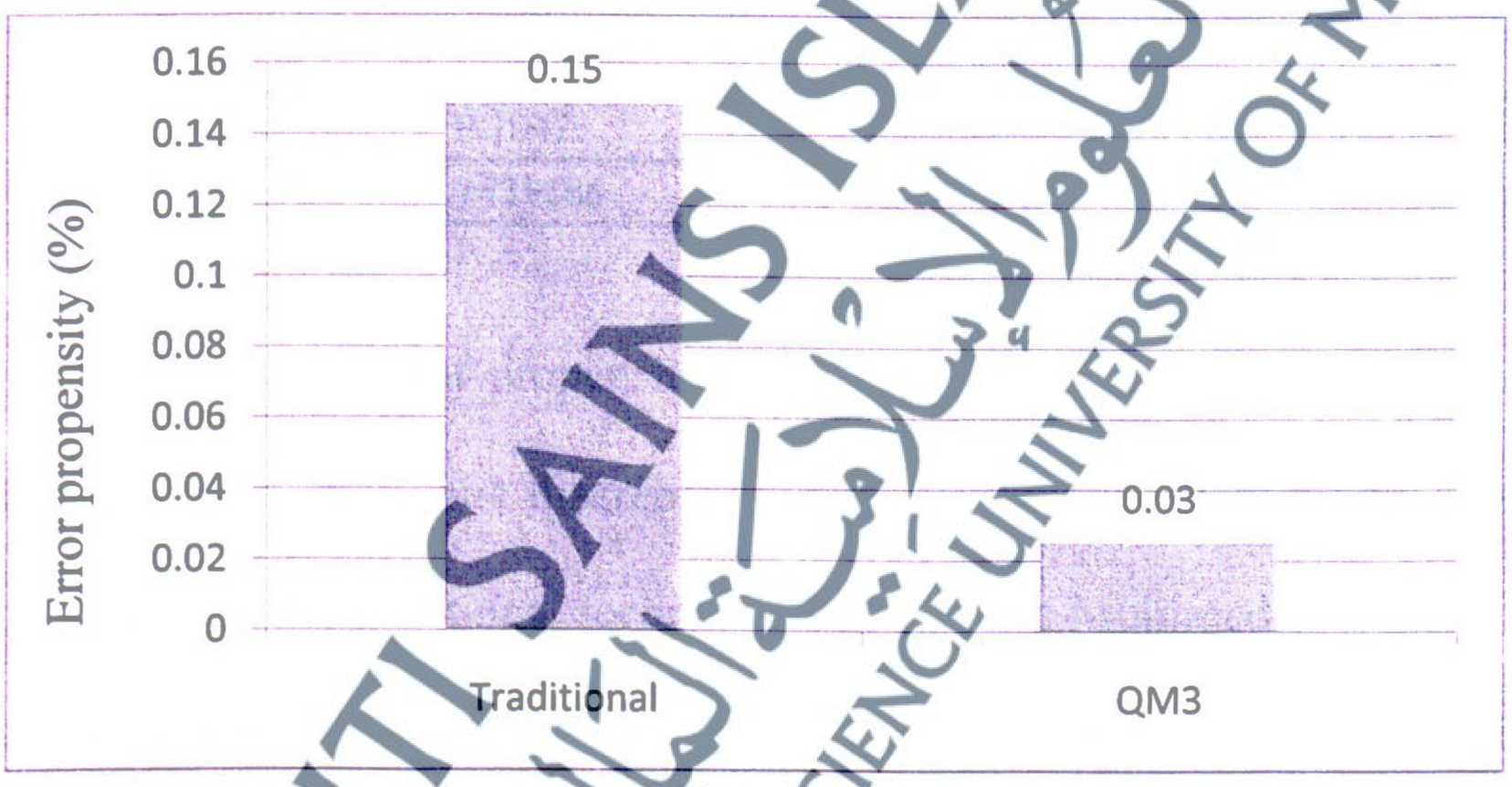
The following result enumerated the error propensity or probability of making an error in memorization, between the traditional method and QM3 (Table 4.6).

Table 4.6: Error propensity between Traditional method and proposed model QM3 where Avg obtained for each sample from Appendix (I, K)

| Sample | Error Propensity | | Reduction (%) |
|---|---|---|---|
| | Traditional | QM3 | |
| 1 | 0.1309 | 0.0041 | 96.87 % |
| 2 | 0.0833 | 0.0021 | 97.48 % |
| 3 | 0.1309 | 0.0375 | 71.36 % |
| 4 | 0.2351 | 0.0563 | 76.05 % |
| 5 | 0.1101 | 0.0000 | 100.00 % |
| 6 | 0.1042 | 0.0083 | 92.03 % |
| 7 | 0.0595 | 0.0104 | 82.52 % |
| 8 | 0.1637 | 0.0437 | 73.30 % |
| 9 | 0.1875 | 0.0354 | 81.12 % |
| 10 | 0.1012 | 0.0437 | 56.81 % |
| 11 | 0.1042 | 0.0292 | 71.98 % |
| 12 | 0.0178 | 0.0041 | 77.04 % |
| 13 | 0.1964 | 0.0395 | 79.89 % |
| 14 | 0.0685 | 0.0104 | 84.82 % |
| 15 | 0.1317 | 0.1166 | 11.47 % |
| 16 | 0.0982 | 0.0000 | 100.00 % |
| 17 | 0.1488 | 0.0271 | 81.79 % |
| 18 | 0.3274 | 0.0417 | 87.26 % |
| 19 | 0.0208 | 0.0000 | 100.00 % |
| 20 | 0.1756 | 0.0687 | 60.88 % |
| 21 | 0.0446 | 0.0000 | 100.00 % |
| 22 | 0.3274 | 0.0375 | 88.55 % |
| 23 | 0.0833 | 0.0229 | 72.51 % |
| 24 | 0.1071 | 0.0313 | 70.77 % |
| 25 | 0.2470 | 0.0771 | 68.79 % |
| 26 | 0.2202 | 0.0333 | 84.88 % |
| 27 | 0.0476 | 0.0000 | 100.00 % |
| 28 | 0.0089 | 0.0000 | 100.00 % |
| 29 | 0.0565 | 0.0041 | 92.74 % |
| 30 | 0.2232 | 0.0438 | 80.40 % |
| 31 | 0.4286 | 0.0000 | 100.00 % |
| 32 | 0.1935 | 0.0417 | 78.45 % |
| 33 | 0.0685 | 0.0000 | 100.00 % |
| 34 | 0.4315 | 0.0000 | 100.00 % |
| 35 | 0.1131 | 0.0063 | 94.43 % |
| **Average** | **0.1485** | **0.0251** | **83.26 %** |

Given the small probability of error in memorization, the graph for error propensity (Figure 4.7) was rounded to the closest two decimal point. A vast difference can be seen between the error propensity of the traditional method and QM3. On average, the traditional method displayed 0.15 (0.1485) possibility of error while QM3exhibited only 0.03 (0.0251). In effect, a staggering total of 83.26% error reduction can be gathered from this result, which also suggested that the proposed approach was capable of reducing error to almost one fifth of the current approach.In fact, error propensity (e.g. after taking an exam and a student get 80/100) the error is only 20 % around 0.2 which is the probability of making an error.

Figure 4.7: Error propensity of traditional method and proposed model QM3




QM3showed a great impact on reducing the possibility of error in memorization when compared to the traditional method. Through approximation, it was discovered that the students employing QM3 would be less inclined in committing a mistake on memorization by about 80%. Eventually, this would contribute to the memorization time as well. This was due to the fact that the Quran must be memorized exactly as it is. Therefore, any symptom of error implied the need of repeating the memorization process until it was properly corrected.

The findings from error propensity were represented into categories from {(11 to 71), (72 to 79), (80 to 84), (87 to 97) and (100)} to simplify them as in (Table 4.7, Table 4.8, Table 4.9,Table 4.10 and Table 4.11). Thus, reduction was the amount of error propensity decreased by QM3 in each category.

Table 4.7: Error propensity between traditional method and proposed model QM3 in the first percentage group (11 to 71)

| Sample | Error Propensity | | Reduction (%) |
|---|---|---|---|
| | Traditional | QM3 | |
| 1 | 0.1317 | 0.1166 | 11.47% |
| 2 | 0.1012 | 0.0437 | 56.81% |
| 3 | 0.1756 | 0.0687 | 60.88% |
| 4 | 0.247 | 0.0771 | 68.79% |
| 5 | 0.1071 | 0.0313 | 70.77% |
| 6 | 0.1309 | 0.0375 | 71.36% |
| 7 | 0.1042 | 0.0292 | 71.98% |
| **Average** | **0.1425286** | **0.0577286** | **58.87%** |

The following graph of error propensity (Figure 4.8) was rounded to the nearest two decimal points. An enormous discrepancy can be seen between the possibility of making an error of the traditional technique and Quranic Multimedia Memory Model (QM3). Averagely, the traditional memorization method stated a 0.14 (0.1425) probability of error while QM3exhibited only 0.06 (0.0577). Besides that, a staggering aggregate of 58.87% error reduction can be collected from the findings in this category.

Figure 4.8: Error propensity of traditional method and proposed model QM3 in the first percentage group

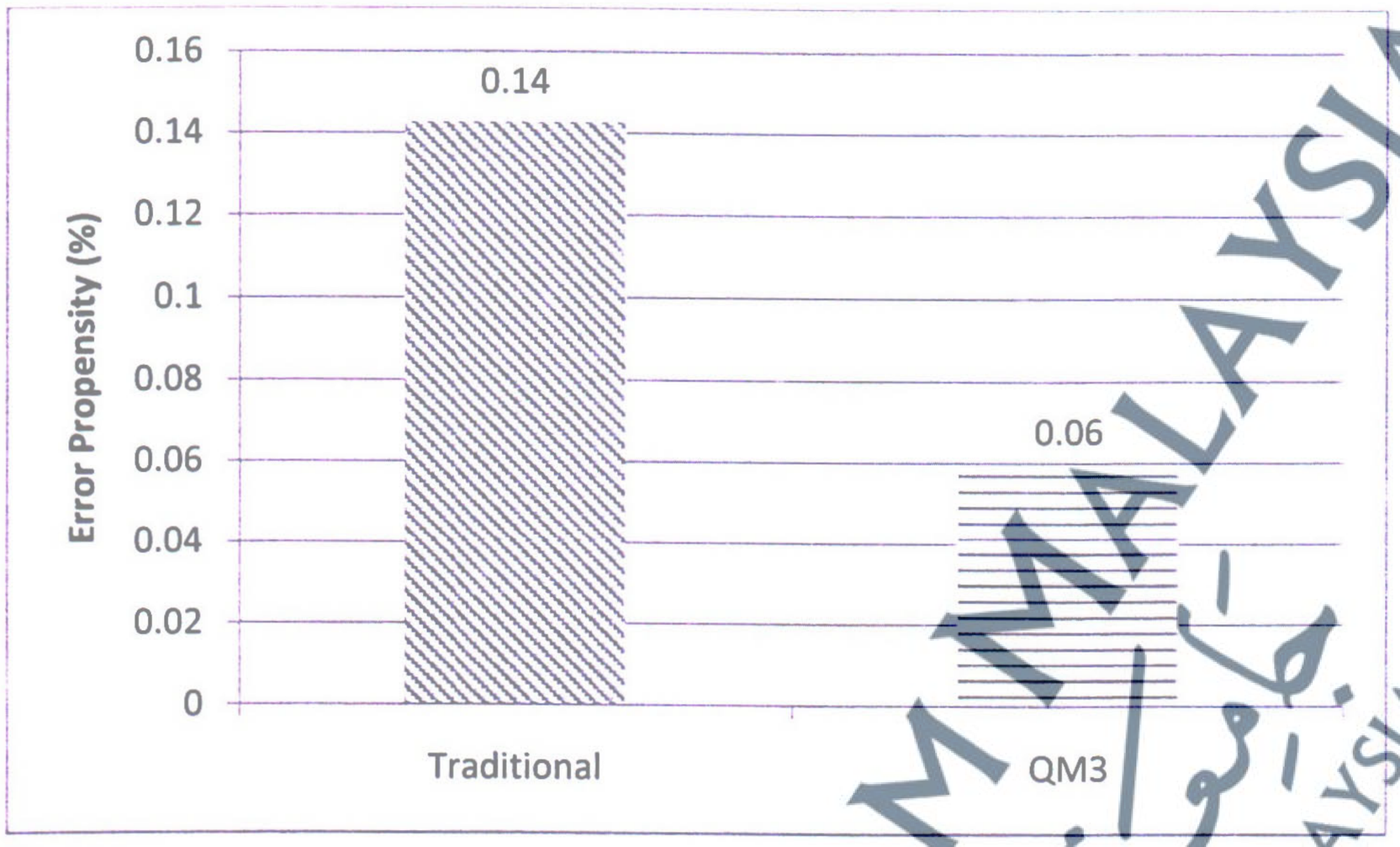



Table 4.8: Error propensity between traditional method and proposed model QM3 in the second percentage group (72 to 79)

| Sample | Error Propensity | | Reduction (%) |
|---|---|---|---|
| | Traditional | QM3 | |
| 1 | 0.0833 | 0.0229 | 72.51% |
| 2 | 0.1637 | 0.0437 | 73.30% |
| 3 | 0.2351 | 0.0563 | 76.05% |
| 4 | 0.0178 | 0.0041 | 77.04% |
| 5 | 0.1935 | 0.0417 | 78.45% |
| 6 | 0.1964 | 0.0395 | 79.89% |
| **Average** | **0.1483** | **0.0347** | **76.21%** |

Given the small possibility of error in memorization, the graph for error propensity (Figure 4.9) was rounded to the nearest two decimal points. An enormous discrepancy can be seen between the possibility of making an error of the traditional technique and the Quranic Multimedia Memory Model (QM3). Averagely, the traditional memorization method stated a 0.15 (0.1483) probability of error while QM3exhibited only 0.03 (0.0347). A staggering total of 76.21% error reduction can be collected from the findings in this category.

Figure 4.9: Error propensity of traditional method and proposed model QM3 in the second percentage group

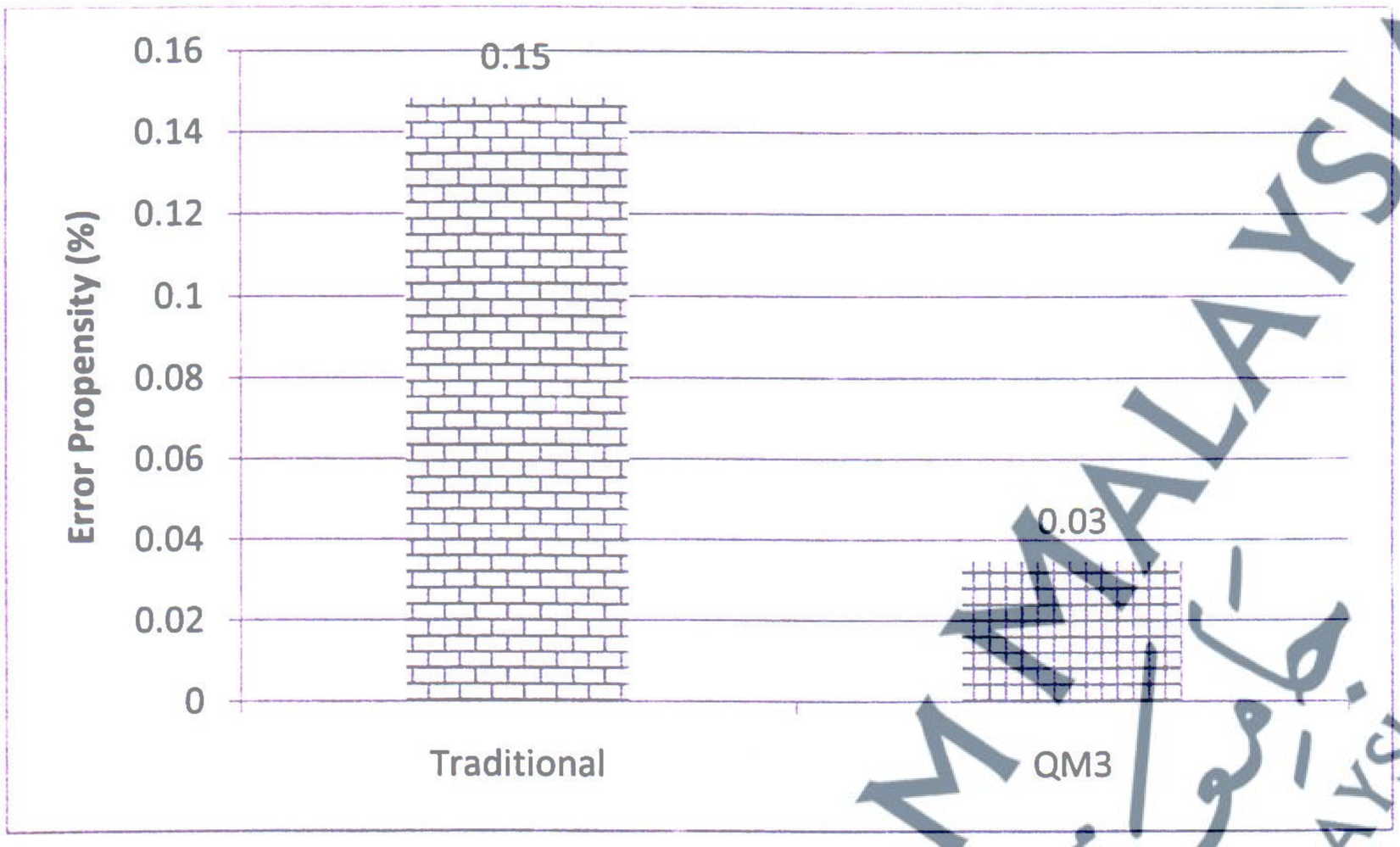



Table 4.9: Error propensity between traditional method and proposed model QM3 in the third percentage group (80 to 84)

| Sample | Error Propensity | | Reduction (%) |
|---|---|---|---|
| | Traditional | QM3 | |
| 1 | 0.2232 | 0.0438 | 80.40% |
| 2 | 0.1875 | 0.0354 | 81.12% |
| 3 | 0.1488 | 0.0271 | 81.79% |
| 4 | 0.0595 | 0.0104 | 82.52% |
| 5 | 0.0685 | 0.0104 | 84.82% |
| 6 | 0.2202 | 0.0333 | 84.88% |
| **Average** | **0.1512833** | **0.0267333** | **82.59%** |

The graph for error propensity (Figure 4.10) was rounded to only two decimal points. A massive discrepancy can be seen between the possibility of making an error of the traditional technique and the Quranic Multimedia Memory Model (QM3). Typically, the traditional memorization method offered a 0.15 (0.1513) probability of error while QM3exhibited only 0.03 (0.0267). Furthermore, a spectacular total of 82.59% error reduction can be collected from the findings in this particular category.

Figure 4.10: Error propensity of traditional method and proposed model QM3 in the third percentage group

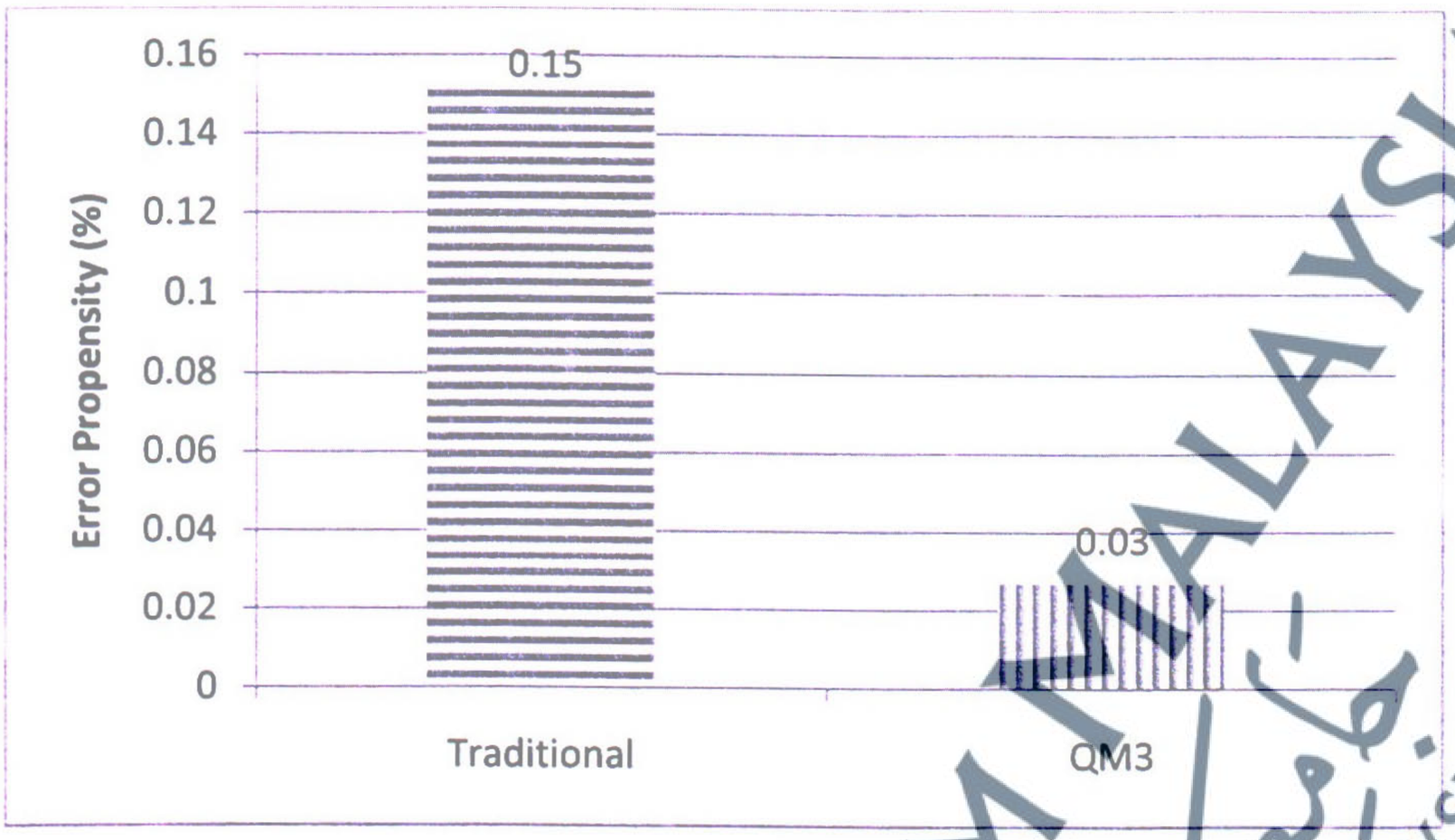



Table 4.10: Error propensity between traditional method and proposed model QM3 in the fourth percentage group (87 to 97)

| Sample | Error Propensity | | |
|---|---|---|---|
| | Traditional | QM3 | Reduction (%) |
| 1 | 0.3274 | 0.0417 | 87.26% |
| 2 | 0.3274 | 0.0375 | 88.55% |
| 3 | 0.1042 | 0.0083 | 92.03% |
| 4 | 0.0565 | 0.0041 | 92.74% |
| 5 | 0.1131 | 0.0063 | 94.43% |
| 6 | 0.1309 | 0.0041 | 96.87% |
| 7 | 0.0833 | 0.0021 | 97.48% |
| **Average** | **0.1632571** | **0.0148714** | **92.77%** |

The graph (Figure 4.11) for error propensity was also rounded to the nearest two decimal points. An enormous divergence can be seen clearly between the probability of doing a mistake of the traditional way and by applying the Quranic Multimedia Memory Model (QM3). Evidently, the traditional memorization method showed a 0.16 (0.1633) probability of error while QM3displayed only 0.01 (0.0149). An incredible total of 92.77% error reduction can be collected from the findings in this category.

Figure 4.11: Error propensity of traditional method and proposed model QM3 in the fourth percentage group

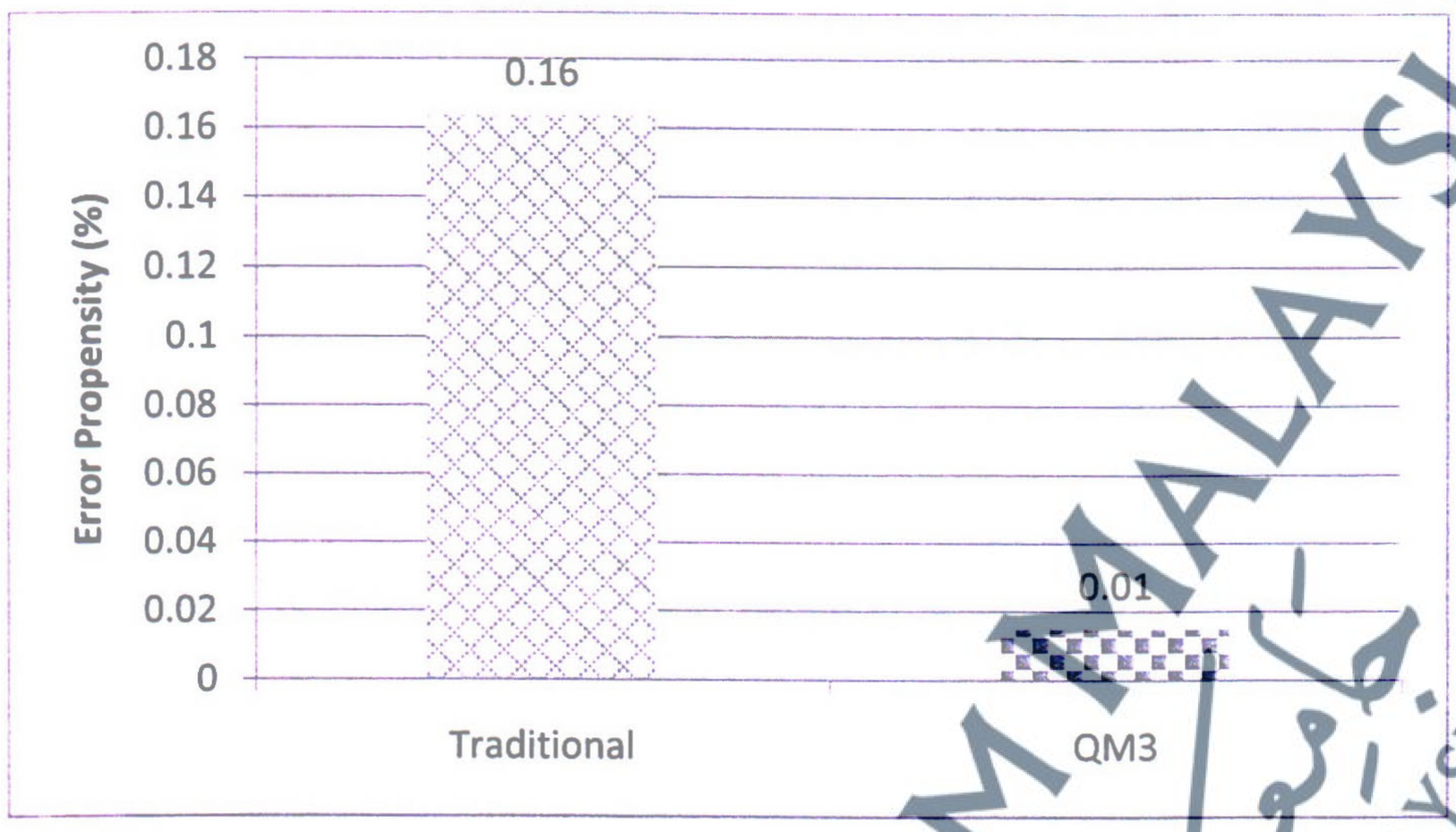
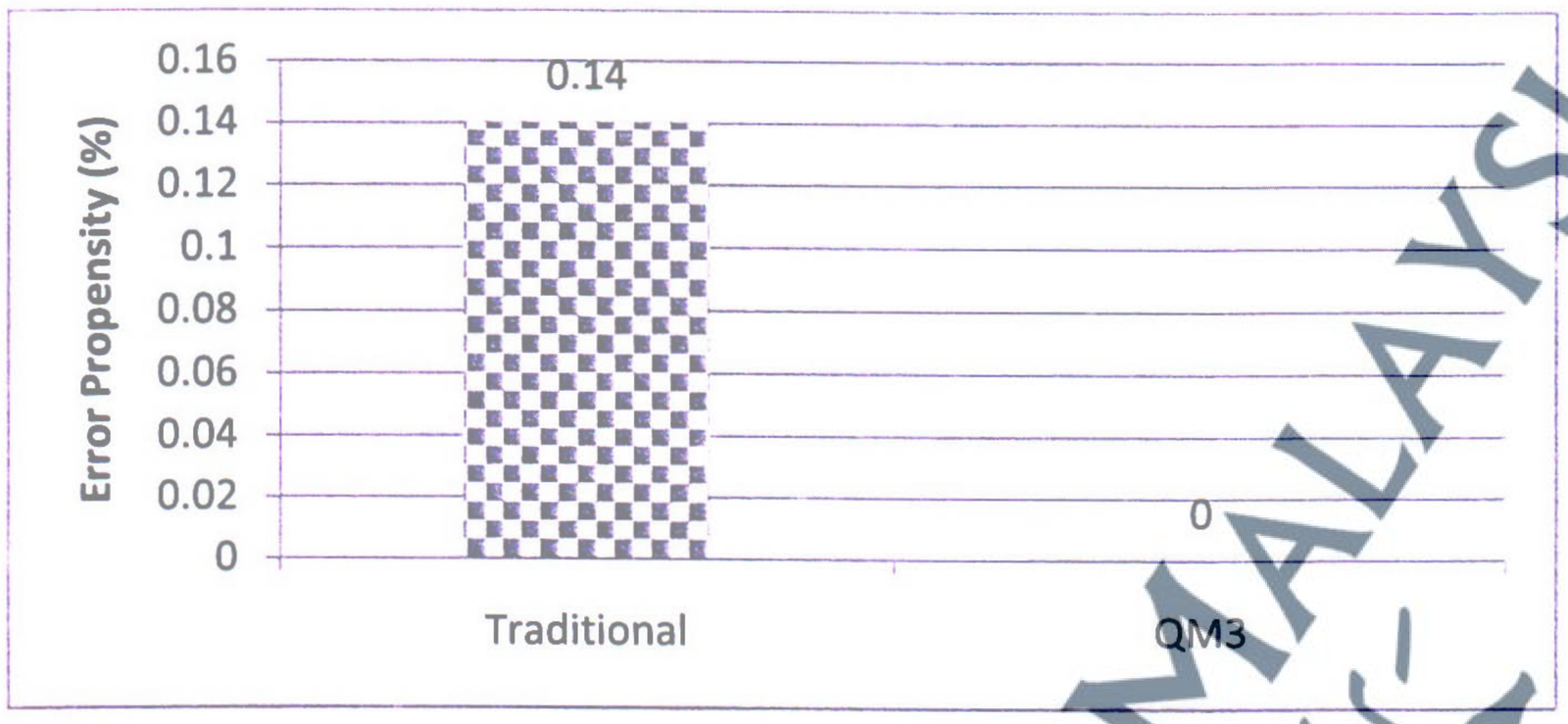



Table 4.11: Error propensity between traditional method and proposed model QM3 in the fifth percentage group (100)

| Sample | Error Propensity | | Reduction (%) |
|---|---|---|---|
| | Traditional | QM3 | |
| 1 | 0.1101 | 0 | 100.00% |
| 2 | 0.0982 | 0 | 100.00% |
| 3 | 0.0208 | 0 | 100.00% |
| 4 | 0.0446 | 0 | 100.00% |
| 5 | 0.0476 | 0 | 100.00% |
| 6 | 0.0089 | 0 | 100.00% |
| 7 | 0.4286 | 0 | 100.00% |
| 8 | 0.0685 | 0 | 100.00% |
| 9 | 0.4315 | 0 | 100.00% |
| **Average** | **0.1398667** | **0** | **100.00%** |

The graph for error propensity (Figure 4.12) was rounded to the closest two decimal points. A terrific variance was clearly seen between error propensity of the traditional approach and the QM3 approach. In other words, the traditional method presented a 0.14 (0.1399) probability of error whereas QM3showed only 0.00 (0.0000). Besides that, an amazing total of 100% error reduction was collected from the findings in this category.

Figure 4.12: Error propensity of traditional method and proposed model QM3 in the fifth percentage group



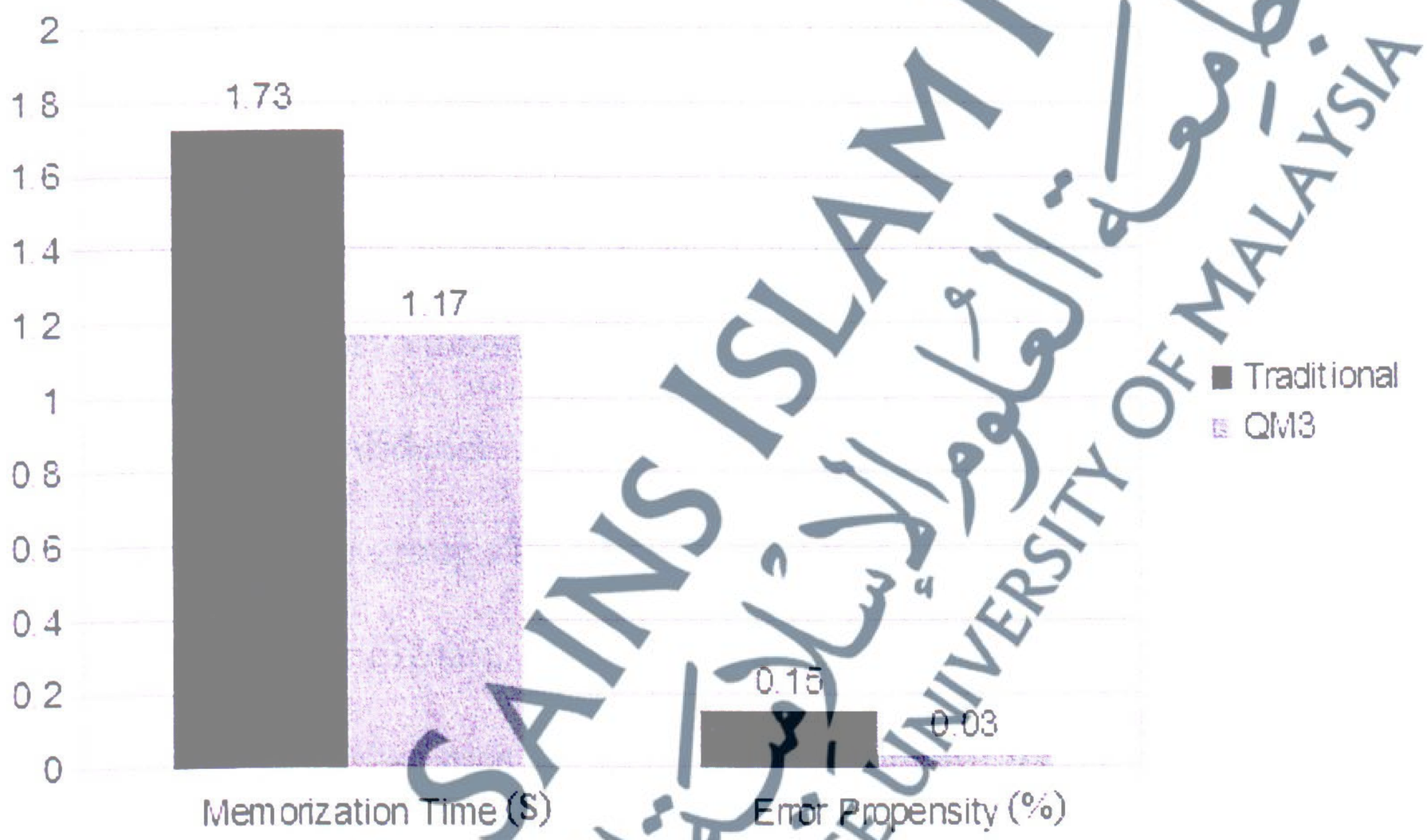

Generally, from the above mentioned categories for both the memorization time and error propensity, it was quite clear that Quranic Multimedia Memory Model (QM3) reduced the time needed to memorize each letter in every certain Ayat. In other words, there was a significant difference between the average of memorization time of the traditional approach and QM3 among the participants in each category. In addition, there was a vast difference between the error propensity of the traditional method and QM3 between each category.

Summarizing both of the results gave rise to Table 4.12 and Figure 4.13. Via comparison, the memorization time of the traditional method was found to be 1.7305s as contrasted to QM3, which was only 1.1666s. This denoted a 32.33 % time reduction. A positive result was also witnessed for the error propensity measure. Here, the traditional method narrated an error possibility of 0.1485 as compared to 0.0251 which was displayed by QM3. Both of the results indicated a promising manifestation on the impact of QM3 towards memorization. It can therefore be rationalized with reasonable certainty that QM3 does improve the traditional method in terms of time and accuracy.

Table 4.12: Average summary between traditional method and proposed model QM3

| | Traditional | QM3 | Reduction |
|---|---|---|---|
| **Memorization Time (S)** | 1.7305 | 1.1666 | 32.58 % |
| **Error Propensity (%)** | 0.1485 | 0.0251 | 83.26 % |

Figure 4.13: Traditional method vs. QM3



To further verify the significance of the results, ANOVA was performed on both measures; the memorization time and error propensity. In order to determine the validity of comparison for memorization time, ANOVA was done to ascertain whether there was a significant difference between the mean of the memorization time for the two groups; traditional method ( $\mu_1$ ) and QM3 ( $\mu_2$ ). The ANOVA resultswere compiled in Table 4.15 with $\alpha = 0.05$.

$H_0 : \mu_1 = \mu 2$ (no significant difference in the mean of memorization time)

$H_a : \mu_1 \neq \mu 2$ (significant difference in the mean of memorization time)

The table 4.13 which was labeled as Descriptiveillustrated: The descriptive table (see below) offered some very valuable descriptive statistics, including the mean, standard deviation and 95% confidence intervals for the dependent variable (Memorization Time) for each separate group (Traditional and QM3), in addition to when all groups were combined together (Total).

Table 4.13: Descriptive statistics for memorization time for traditional method and proposed model via Spss.

T_QM3_Memorization Time

| | N | Mean | Std. Dev' | Std. Error | 95% Confidence Interval for Mean | | Min | Max |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| 1 | 35 | 1.730457 | .1026813 | .0173563 | 1.695185 | 1.765729 | 1.6071 | 1.9780 |
| 2 | 35 | 1.166600 | .0403132 | .0068142 | 1.152752 | 1.180448 | 1.1250 | 1.2735 |
| Total | 70 | 1.448529 | .2943328 | .0351795 | 1.378347 | 1.518710 | 1.1250 | 1.9780 |

Given the assumption of normal distribution for memorization time by the mentioned techniques, the research should proceed testing the assumptions underlying the analysis of variance (ANOVA) (The assumption of homogeneity of variance). The

Levene test results in Table 4.14 were significant (P > 0.05) with cross participants according to memorization time. This implied that there were significant differences among the variances according to the memorization time.

Table 4.14: Test of homogeneity of variances

| T_QM3_Memorization Time | | | |
|---|---|---|---|
| Levene Statistic | df1 | df2 | Sig. |
| 29.570 | 1 | 68 | .000 |

Table 4.15: ANOVA for memorization time

| **Variation Source** | **SS** | **df** | **MS** | **F** | **$F_\alpha$ ($\alpha = 0.05$)** |
|---|---|---|---|---|---|
| **SSB (Between Group)** | 5.5642 | 1 | 5.5642 | | |
| **SSW (Within Group)** | 0.4137 | 68 | 0.0061 | 914.6224 | 3.9819 |
| **SST (Total)** | 5.9779 | 69 | | | |

ANOVA revealed that F = 914.6224 was considerably larger than $F_\alpha$ = 3.9819. It implied that the null hypothesis $H_0$ can be rejected and the alternative hypothesis $H_a$ should be taken instead. Relating this to the research, it meant that there existed a significant difference between the mean of the memorization time of the traditional method and QM3, which was quite remarkable. This concluded that the improvement portrayed by QM3 from the aspect of memorization time was statistically significant when contrasted against the traditional one.

A similar confirmation was required for the results on error propensity. Again, ANOVA was employed to decide whether to accept or reject the possibility that there was a significant difference between the mean of the error propensity for the traditional method (μ1) and QM3 (μ2). If there was, then the null hypothesis ($H_0$) that asserted the insignificance of the result can be discarded altogether. The results of ANOVA were tabulated in Table 4.18.

$H_0 : \mu_1 = \mu_2$ (no significant difference in the mean of error propensity)

$H_a : \mu_1 \neq \mu_2$ (significant difference in the mean of error propensity).

The descriptive Table 4.16offered some very valuable descriptive statistics, including the mean, standard deviation and 95% confidence intervals for the dependent variable (Error propensity) for each separate group (Traditional and QM3), in addition to when all groups were combined together (Total).

Table 4.16: Descriptive statistics for error propensityfor traditional method and proposed model via Spss.

T_QM3_Error Propensity

| | N | Mean | Std. Dev | Std. Error | 95% Confidence Interval for Mean | | Min | Max |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| 1 | 35 | .148480 | .1061161 | .0179369 | .112028 | .184932 | .0089 | .4315 |
| 2 | 35 | .025051 | .0270542 | .0045730 | .015758 | .034345 | .0000 | .1166 |
| Total | 70 | .086766 | .0988596 | .0118160 | .063193 | .110338 | .0000 | .4315 |

Given the assumption of normal distribution for error propensity by the mentioned techniques, the research should proceed by testing the assumptions underlying the Analysis of Variance (ANOVA) (The assumption of Homogeneity of Variance). The Levene test results in Table 4.17 were significant (P > 0.05) with cross participants

according to error propensity. This implied that there were significant differences among the variances according to the error propensity.

Table 4.17: Test of homogeneity of variances

| T_QM3_ Error propensity | | | |
|---|---|---|---|
| Levene Statistic | df1 | df2 | Sig. |
| 26.955 | 1 | 68 | .000 |

Table 4.18: ANOVA for error propensity

| **Variation Source** | **SS** | **df** | **MS** | **F** | **$F_\alpha$** ($\alpha = 0.05$) |
|---|---|---|---|---|---|
| **SSB (Between Group)** | 0.2597 | 1 | 0.2597 | 42.3460 | 3.9819 |
| **SSW (Within Group)** | 0.4170 | 68 | 0.0061 | | |
| **SST (Total)** | 0.6767 | 69 | | | |

ANOVA indicated that the value of F = 42.3460 was much greater than the critical value of $F\alpha = 3.9819$. This implied that the null hypothesis ($H_0$) was rejected and the alternative hypothesis ($H_a$) that supported the significance of this particular result will be accepted instead. Statistically speaking, the analysis also indicated that the error propensity of the traditional approach was significantly reduced with the usage of QM3. Given the positive affirmation of both results by ANOVA, they were now properly validated.

Findings from the observation and checklists for participants with traditional methods of learning and memorizing of the holy Quran (pretest) in classroom as in the table below which showed that majority of the replies 80% (8 out of 11) remained negative based on the constructed checklists. It was interesting to note that only 30% (3 out of 11) were positive. It showed that majority of the participants were not interested or happy inside the classroom.

Table 4.19: Participant's observation and checklist findings with TM in class (Faryadi, Q. 2012)

| No | The Evaluation criteria with traditional method in the classroom | Replies |
|---|---|---|
| 1 | Did the participants stay interested during the class? | (No) |
| 2 | Had the participants concentrate to the instructor? | (No) |
| 3 | Were the participants motivated in the class? | (No) |
| 4 | Did the participants complain about class condition? | (Yes) |
| 5 | Did the participants understand the lesson properly? | (No) |
| 6 | Were the participants confident in the class? | (No) |
| 7 | Had the participants ask any questions throughout the lesson? | (Yes) |
| 8 | Did the participants retain the lesson and continue to learn? | (No) |
| 9 | Did the participants come to the classroom in a happy mode? | (No) |
| 10 | Did the participants disturb the instructor? (make him angry) | (Yes) |
| 11 | Did the participants sense importance in the classroom? | (No) |

Findings from the observation and checklists for participants with the QM3 methods of learning and memorizing of the holy Quran (posttest) inside the class in the table below represented that 81% (9 out of 11) from the answers remained positive and negative based on the constructed checklists; while only 20% (2 out of 11) were

negative. This showed that the majority of the participants were interested and happy inside the classroom.

Table 4.19: Participant's observation and checklist findings with QM3 in class (Faryadi,2012)

| No | The Evaluation criteria with QM3 in the classroom | Replies |
|---|---|---|
| 1 | Did the participants stay interested during the class? | (Yes) |
| 2 | Had the participants concentrate to the instructor? | (Yes) |
| 3 | Were the participants motivated in the class? | (Yes) |
| 4 | Did the participants complain about class condition? | (No) |
| 5 | Did the participants understand the lesson properly? | (Yes) |
| 6 | Were the participants confident in the class? | (Yes) |
| 7 | Had the participants ask any questions throughout the lesson? | (Yes) |
| 8 | Did the participants retain the lesson and continue to learn? | (Yes) |
| 9 | Did the participants come to the classroom in a happy mode? | (Yes) |
| 10 | Did the participants disturb the instructor? (make him angry) | (No) |
| 11 | Did the participants sense importance in the classroom? | (Yes) |

Furthermore, the findings of the observations from this study indicated that participants were interested and motivated to carry on learning and memorizing the holy Quran in classroom. About 81.8% (9 out of 11) of the observation checklists showed positive answers. The findings pointed out that participants were eager to learn, as indicated from the expressions of their faces and their desire to be engaged in the learning activities. Participants seemed so satisfied and therefore were extremely interested and motivated to learn and memorize the holy Quran. The findings

indicated, thus, that the construction of knowledge based on a multimedia learning environment such as QM3 was effective and efficient.

In other words, the findings achieved from the observation in the classroom advised that QM3 motivated the participants and made them interested to keep learning and to carry on eagerly memorizing the holy Quran in the constructivist classroom. Observations by the researcher also indicated that participants were interested and satisfied with the QM3 and were confident about learning and memorizing the holy Quran. Furthermore, this was apparent from the body language, excitement and engagement in the classroom. According to Keller's ARCS Model, motivation was an essential component of any instructional design. Participants learned because they were motivated (Faryadi, Q. 2011), 2012).

Findings from the evaluation of Multimedia Learning Tools in the Markets:

**Statistical Analysis**

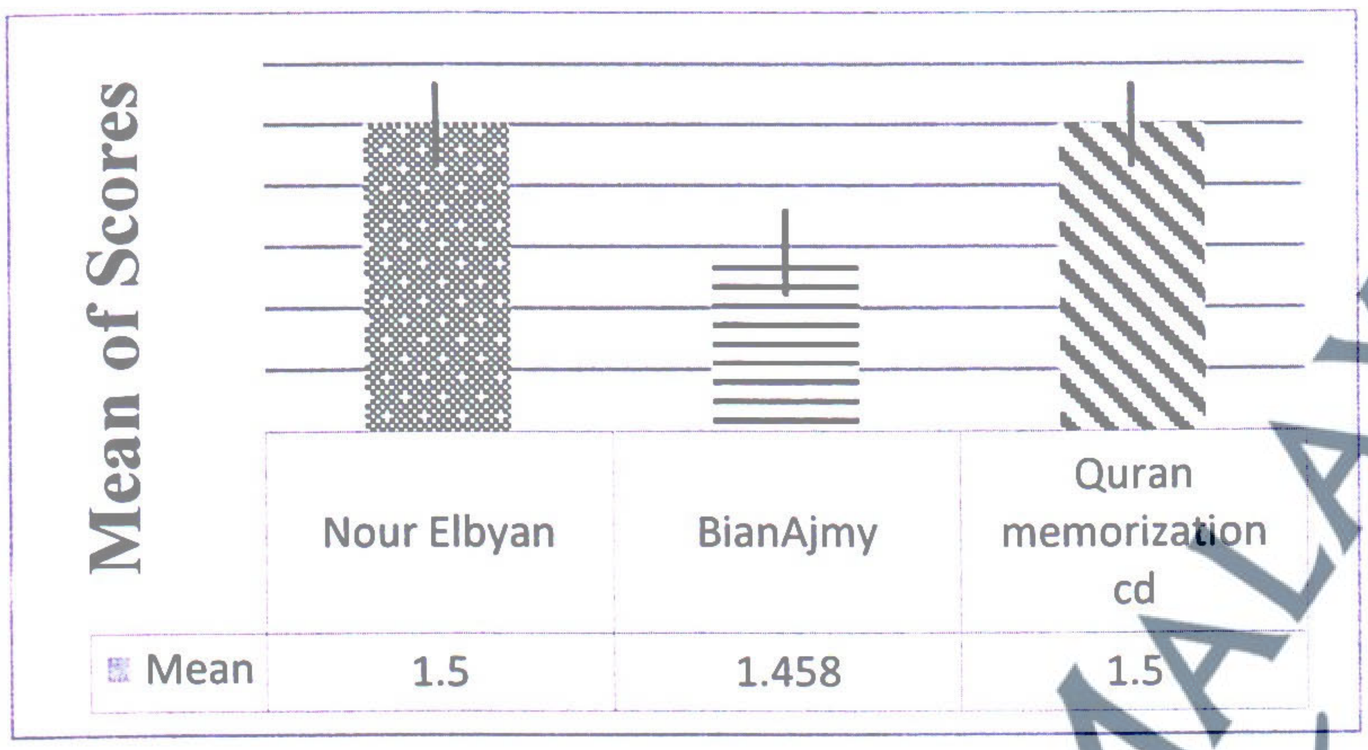
1- statistical analysis for a General Review of Arabic Multimedia Courseware in Markets of Malaysia

**Descriptive Statistics**

Table 4.21: Descriptive statistical for three different applications

| | Nour Elbyan | BianAjmy | Quran memorization cd |
|---|---|---|---|
| N (Questions no) | 48 | 48 | 48 |
| Mean | 1.500 | 1.458 | 1.500 |
| Std. Deviation | 0.546 | 0.5442 | 0.543 |
| Minimum | 1.00 | 1.00 | 1.00 |
| Maximum | 3.00 | 3.00 | 3.00 |

Figure 4.14: Mean plot with standard deviation for three different applications

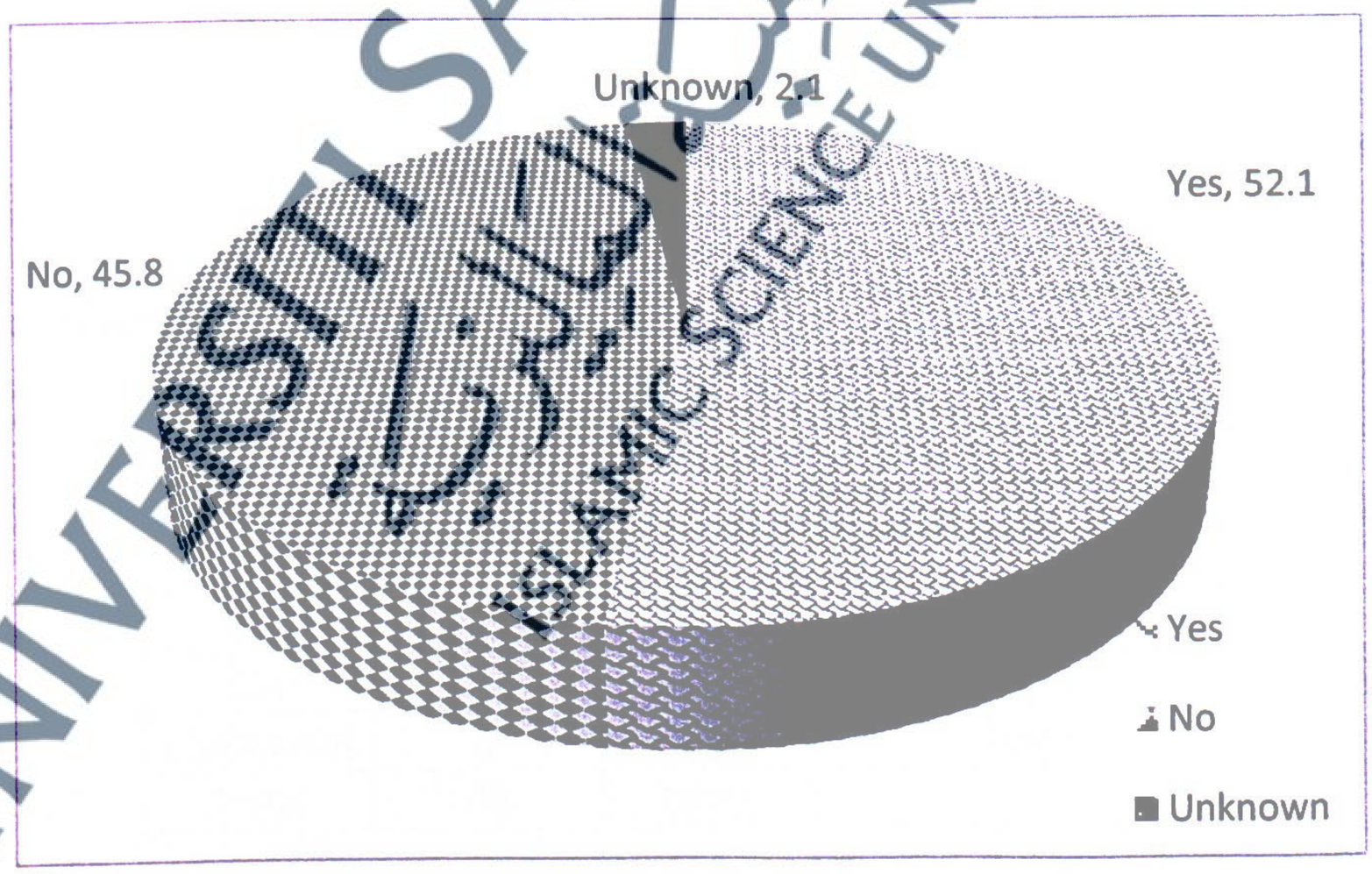



**Nour Elbyan**

Table 4.22: Descriptive statistic Nour Elbyan

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Yes | 25 | 52.1 | 52.1 |
| No | 22 | 45.8 | 97.9 |
| Unknown | 1 | 2.1 | 100.0 |
| Total | 48 | 100.0 | |

Figure 4.15: A survey for Nour Elbyanon general review for Nour Elbyan, the checklist is presented in appendix F

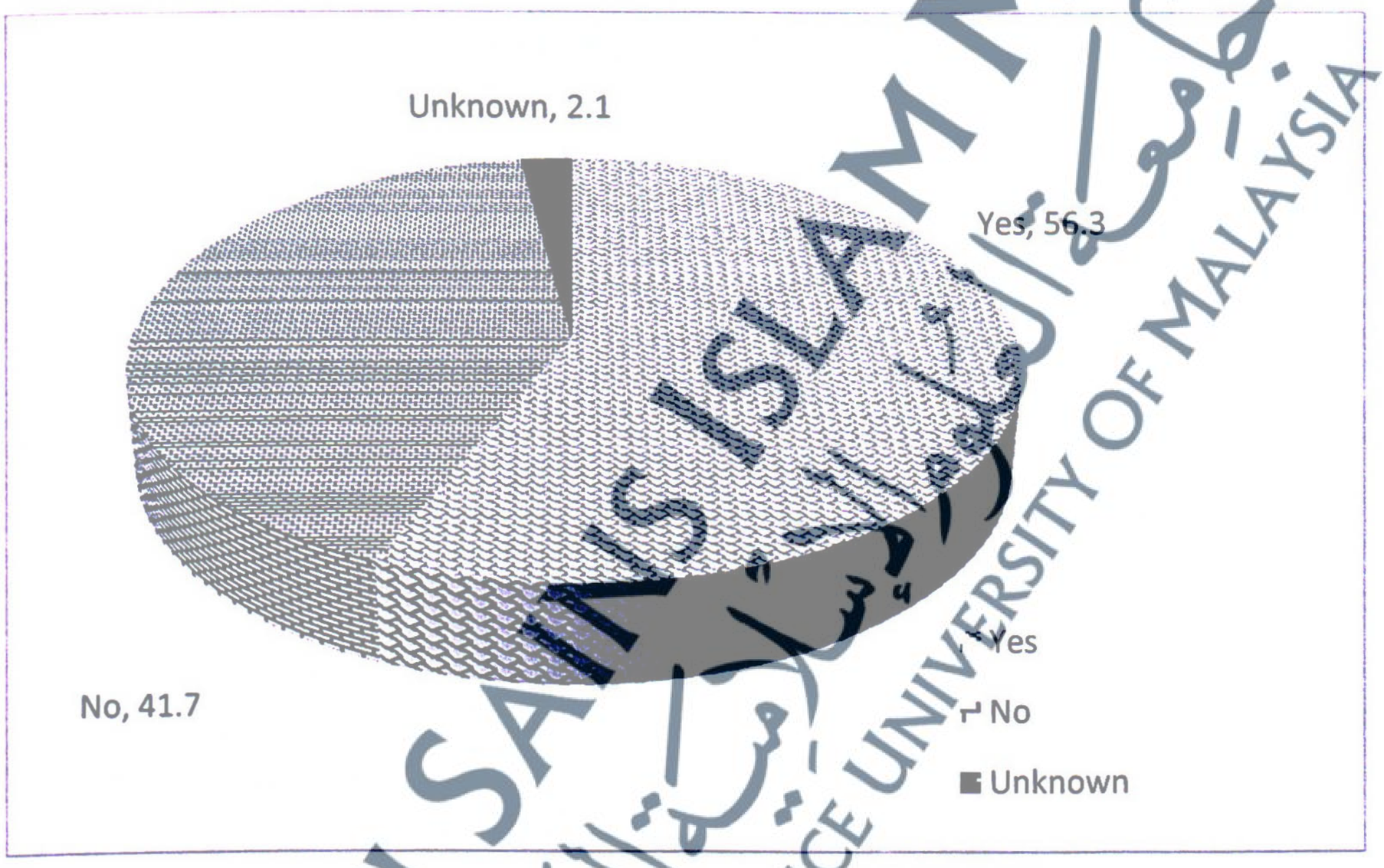


**BianAjmy**

Table 4.23: Descriptive statistic BianAjmy

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Yes | 27 | 56.3 | 56.3 |
| No | 20 | 41.7 | 97.9 |
| Unknown | 1 | 2.1 | 100.0 |
| Total | 48 | 100.0 | |

Figure 4.16: A surveyon of general review for BianAjmy, the checklist is presented in appendix F

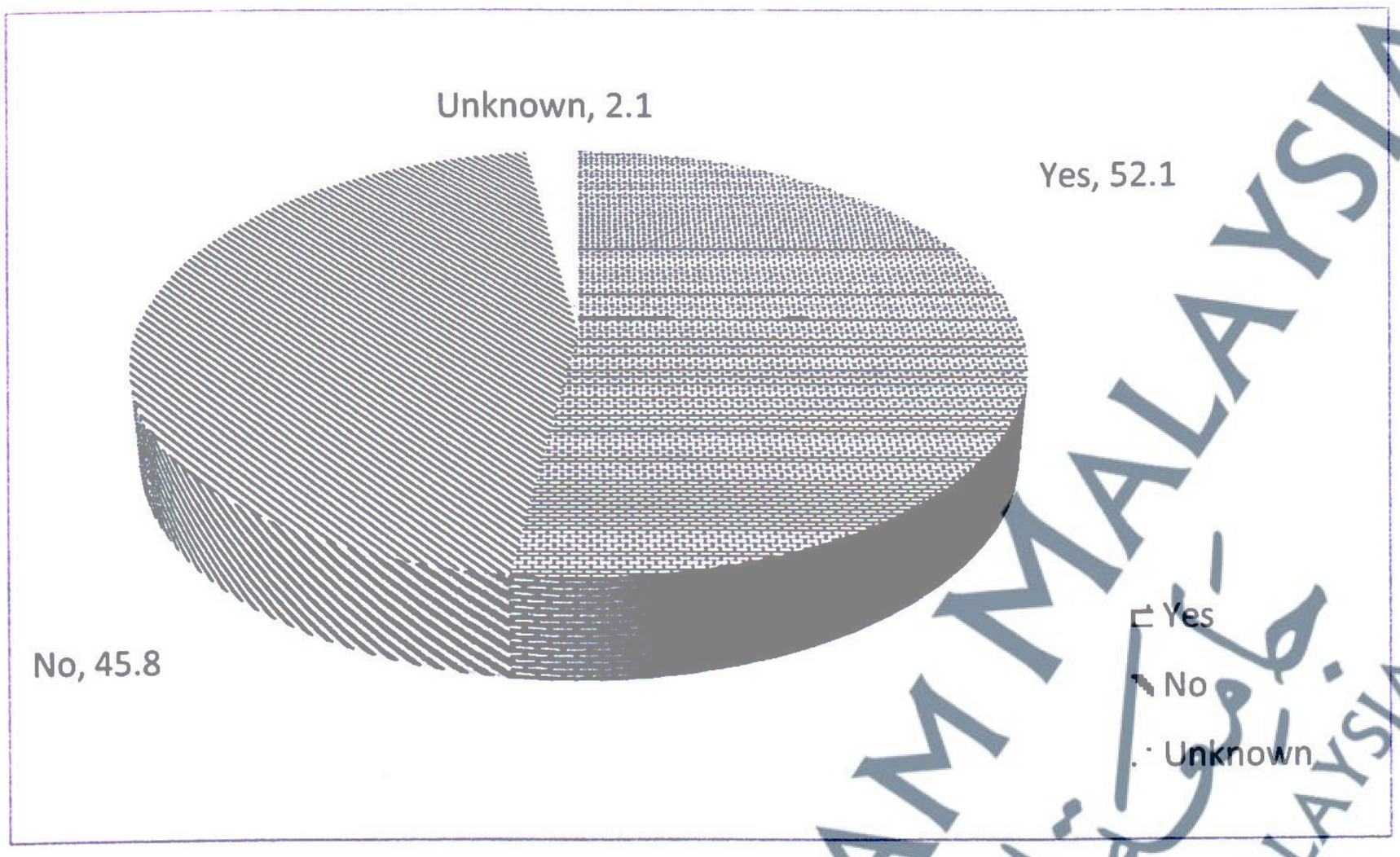



**Quran memorization cd**

Table 4.24: Descriptive statistic quran memorization cd

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Yes | 25 | 52.1 | 52.1 |
| No | 22 | 45.8 | 97.9 |
| Unknown | 1 | 2.1 | 100.0 |
| Total | 48 | 100.0 | |

Figure 4.17: A survey on general review for Quran memorization cd,the checklist is presented in appendix F




To know the significant differences among the Applications,analysis of variancetype one (one way ANOVA) was applied.

Table 4.25: ANOVA for the significant differences among the applications

| | Sum Of Squares | df | Mean Square | F | P-Value |
|---|---|---|---|---|---|
| Between Groups | .056 | 2 | .028 | .093 | 0.911 |
| Within Groups | 41.917 | 141 | .297 | | |
| Total | 41.972 | 143 | | | |

Depending on the p-value (p-value > 0.05), there was no significant difference between the Applicationsused. On the other hand, null hypothesis at 0.05 significant levels can be rejected, which meant that the three programs had the same average in use.

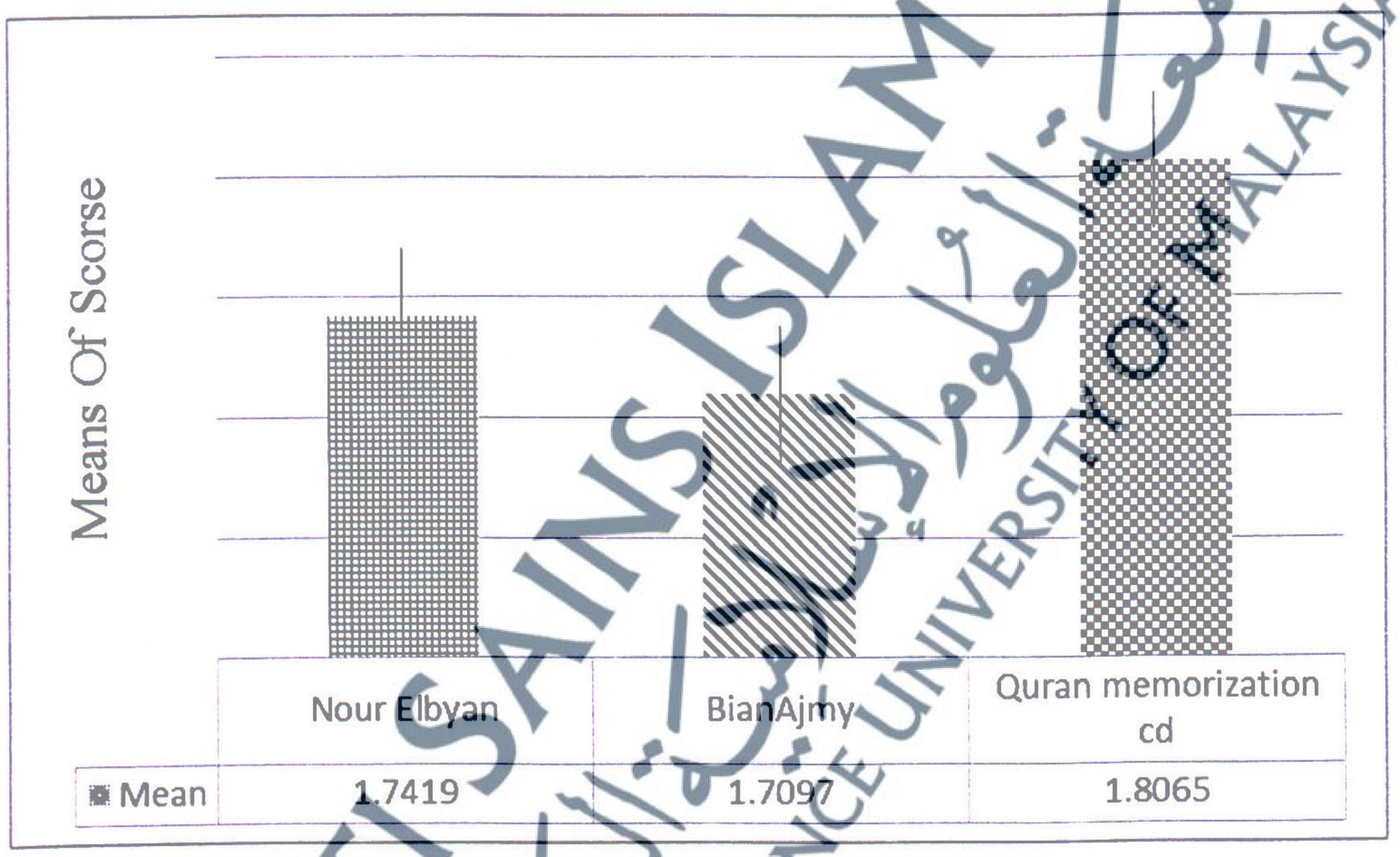
## 2- Statistical Analysis for Specific Review

### Descriptive Statistics

Table 4.26: Descriptive statistic for three different applications

| | Nour Elbyan | BianAjmy | Quran memorization cd |
|---|---|---|---|
| N (Question no) | 31 | 31 | 31 |
| Mean | 1.7419 | 1.7097 | 1.8065 |
| Std. Deviation | 0.4448 | 0.4614 | 0.4016 |
| Minimum | 1.00 | 1.00 | 1.00 |
| Maximum | 2.00 | 2.00 | 2.00 |

Figure 4.18: Mean plot with standard deviation for three different applications

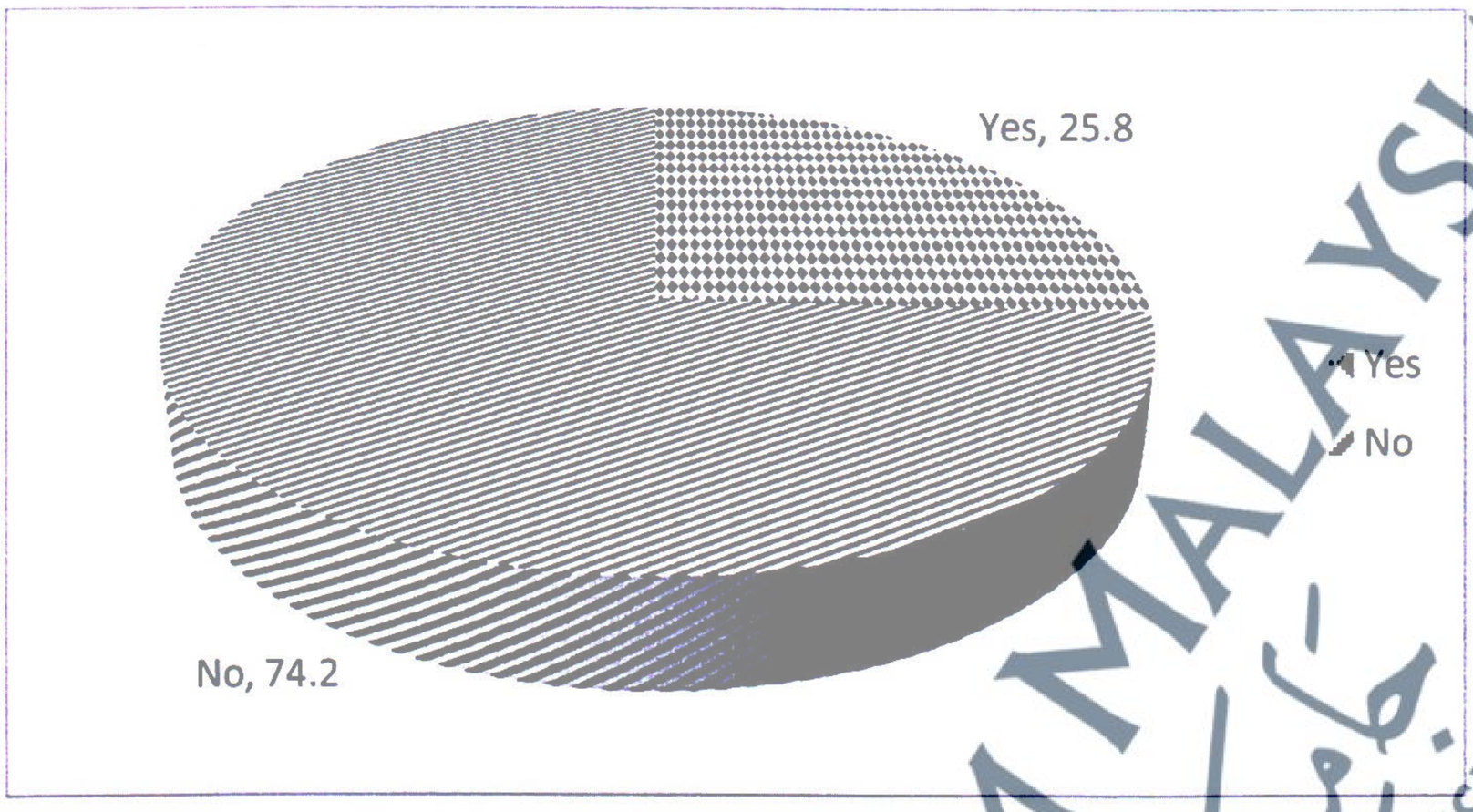



### Nour Elbyan

Table 4.27: Descriptive statistic for Nour Elbyan

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Yes | 8 | 25.8 | 25.8 |
| No | 23 | 74.2 | 100 |
| Total | 31 | 100.0 | |

Figure 4.19: A survey on specific review for Nour Elbyan,the checklist is presented in appendix G

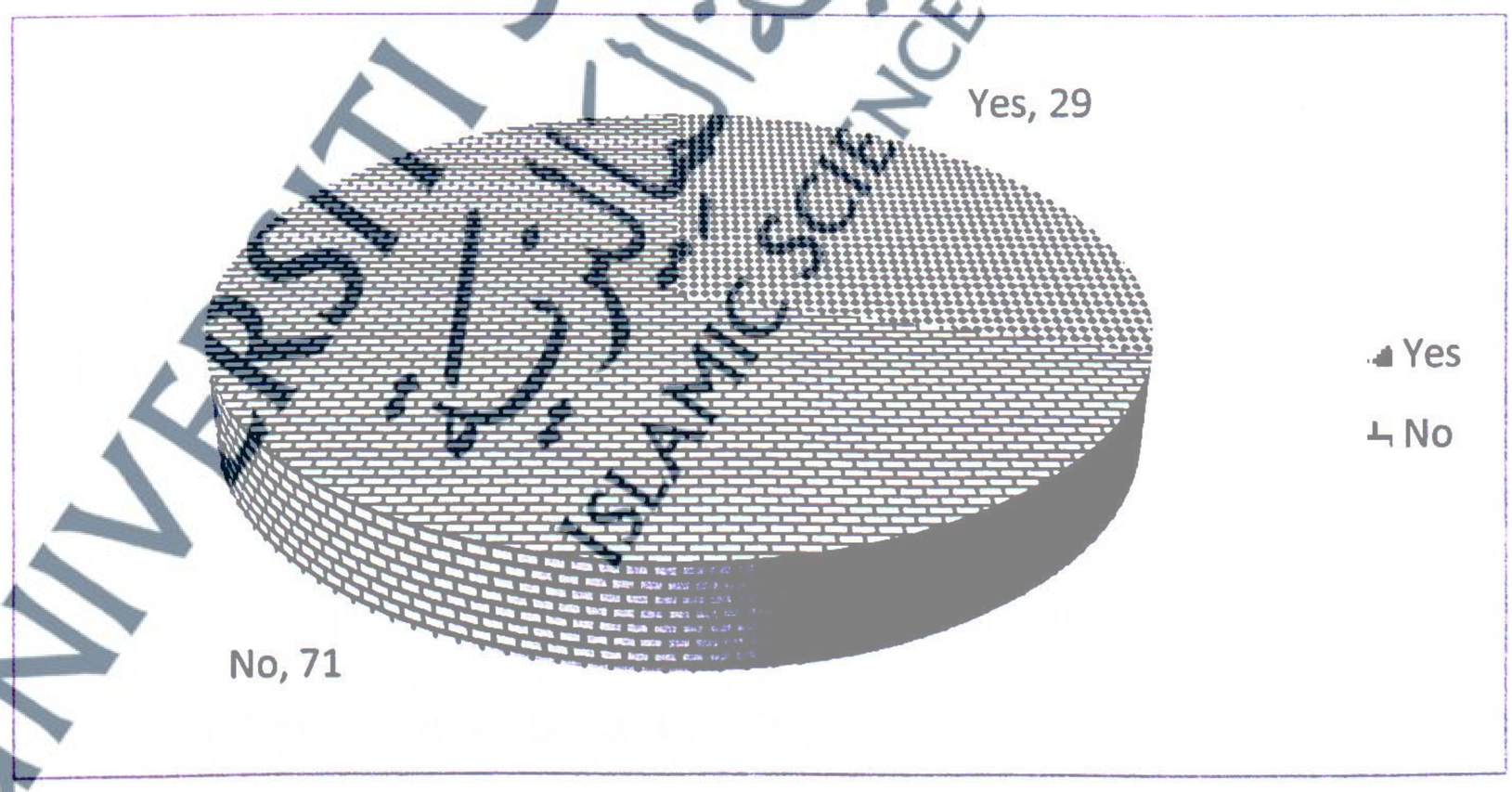



**BianAjmy**

Table 4.28: Descriptive statistic for BianAjmy

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Yes | 9 | 29.0 | 29.0 |
| No | 22 | 71.0 | 100.0 |
| Total | 31 | 100.0 | |

Figure 4.20: A survey on specific review for BianAjmy,the checklist is presented in appendix G

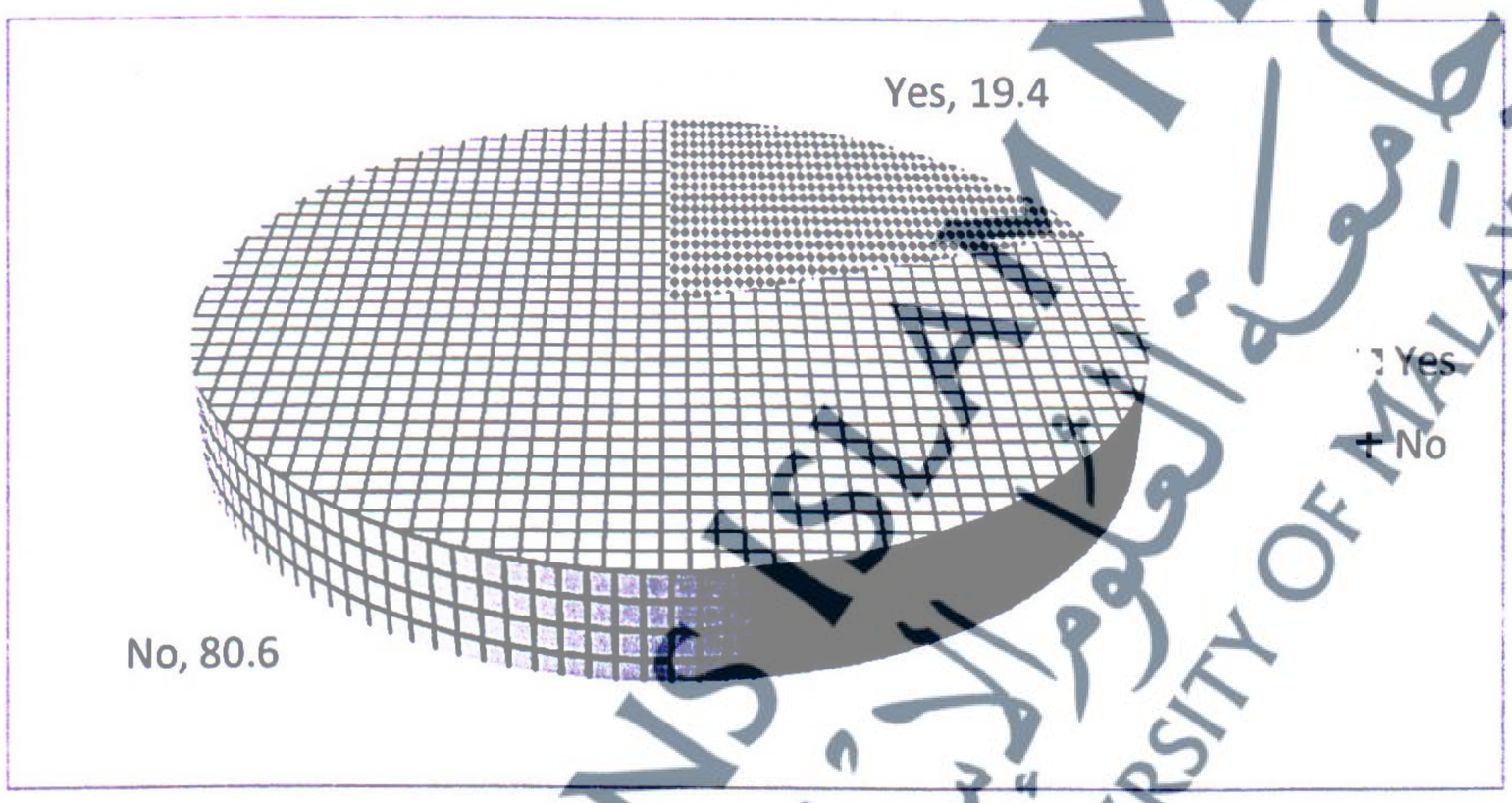


**Quran memorization cd**

Table 4.29: Descriptive statistic for quran memorization cd

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Yes | 6 | 19.4 | 19.4 |
| No | 25 | 80.6 | 100.0 |
| Total | 31 | 100.0 | |

Figure 4.21: A survey on specific review for Quran memorization cd,the checklist is presented in appendix G




To know the significant differences among the Applications,analysis of variancetype one (one way ANOVA) was applied.

Table 4.30: ANOVA for the significant differences among the applications

| | Sum Of Squares | Df | Mean Square | F | P-Value |
|---|---|---|---|---|---|
| Between Groups | 0.151 | 2 | 0.075 | 0.395 | 0.675 |
| Within Groups | 17.161 | 90 | 0.191 | | |
| Total | 17.312 | 92 | | | |

Based on the p-value (p-value > 0.05), there was no significant difference between the Applicationsused. On the other hand, null hypothesis at 0.05 significant levels can be rejected. That meant that the three programs had the same average in use.

## 4.3 Summary

On the basis of the results, it was quite clear that QM3performed better than the traditional method in terms of memorization time and error propensity. QM3reduced the time required for memorization by approximately 30% when compared to the traditional method. In addition, QM3lowered down the propensity of error for the traditional method by more than 80%. **An**alysis **O**f **Va**riance ANOVA confirmed the significance of both results. The improvement of performance displayed by QM3 can be associated to the employment of decomposition, cueing and schematization that offset the innate drawback of repetition, which was used heavily in the traditional method.