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# Chapter 4: Data presentation, analysis, and interpretation

## 4.0 Introduction

This chapter forms an integral part of the research work as it presents the results of the research generated from test responses using tables, graphs, and charts and analyses and interprets them in order to come to conclusions. The results were analyzed using Statistical Package for the Social Sciences (SPSS) version 21. Also the chapter analyses and interpret interview responses.

## 4.1 Diagnostic test

Diagnostic tests were intended to measure the performance of students before the research began. The results would be used to group and mix better performing students with poor performing students so as to reduce biased results at the end of the research.

### 4.1.1. Diagnostic test grades

The diagnostic test grade is intended to group students into 2 categories based on their Performance.

#### Figure 4.1.1.1: Diagnostic test response rate

|  |  |  |  |
| --- | --- | --- | --- |
| Marks | | Frequency | Percent |
| Valid | 15 | 2 | 5.0 |
| 28 | 1 | 2.5 |
| 30 | 1 | 2.5 |
| 33 | 3 | 7.5 |
| 40 | 2 | 5.0 |
| 43 | 1 | 2.5 |
| 45 | 2 | 5.0 |
| 48 | 1 | 2.5 |
| 50 | 3 | 7.5 |
| 53 | 1 | 2.5 |
| 55 | 1 | 2.5 |
| 58 | 3 | 7.5 |
| 60 | 2 | 5.0 |
| 63 | 1 | 2.5 |
| 65 | 4 | 10.0 |
| 68 | 1 | 2.5 |
| 73 | 2 | 5.0 |
| 80 | 1 | 2.5 |
| 85 | 3 | 7.5 |
| 93 | 1 | 2.5 |
| 95 | 2 | 5.0 |
| 98 | 1 | 2.5 |
| 100 | 1 | 2.5 |
| Total | 40 | 100.0 |

Figure 4.1.1.1 shows Diagnostic test response rate. These are the marks obtained by each student out of 100%.

|  |  |  |
| --- | --- | --- |
| Figure 4.1.1.2: Diagnostic test result statistics | | |
| **Diagnostic Test Result Statistics** | | |
| N | Valid | 40 |
| Missing | 0 |
| Mean | | 58.63 |
| Minimum | | 15 |
| Maximum | | 100 |

From the diagnostic test marks, figure 4.1.1.2 was generated showing the mean mark, minimum mark and the maximum mark. The minimum mark was 15 out of 100 which was below 50% and the maximum mark was a perfect score of 100 out of 100

### 4.1.2. Diagnostic test Grades

#### Figure 4.1.2.1. Diagnostic test grades statistics

|  |  |  |  |
| --- | --- | --- | --- |
|  | | Frequency | Percent |
| Valid | O | 2 | 5.0 |
| E | 5 | 12.5 |
| D | 5 | 12.5 |
| C | 16 | 40.0 |
| B | 3 | 7.5 |
| A | 9 | 22.5 |
| Total | 40 | 100.0 |

The above diagram, figure 4.1.2.1 was generated using student’s diagnostic marks. Grade O to grade D where below 50% and grade C to A where 50% up to 100%. More students managed to score in grade C which was 50% - 65% marks which was made up of 40% of the total student. The remaining 60% of students were evenly distributed with 30% of students scoring below grade C and another 30% of students scoring above grade C.

#### Figure 4.1.2.3. Diagnostic test grades pass rate statistics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Student Grades | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | FAIL | 14 | 35.0 | 35.0 | 35.0 |
| PASS | 26 | 65.0 | 65.0 | 100.0 |
| Total | 40 | 100.0 | 100.0 |  |

From the above, 26 students (65%) managed to score above 50% marks which was grade C and above and 14 students (35%) scored below 50% marks which was grade D and below. From these results, more than half of the students managed to pass the diagnostic test. These results were sufficient to be placed into groups.

### 4.1.3. Student Groups

Student groups would be split in the following manner; the best passed students would be split into 2 halves ‘using simple random sampling. The failed students would also be split into 2 halves’ using simple random sampling. Then the first half of the failed students would be added to the 1st half of passed students and the 2nd failed student would be added to the 2nd half of passed students.

From the previous results, 26 passed students were split into two halve of 13 students each, and 14 failed students into groups two halves of 7 students each. The first half of the failed students were added to the first half of passed students and the second half of failed students into the second half of passed students.

This process resulted in 2 groups, the first group of 20 students (50%) would study using online learning and the second group of 20 students (50%) would study using traditional learning.

## 4.2. Benchmarking test

The purpose of Benchmarking test was to calculate student’s performance and determiner their grades based on their performance. The test would contain all the aspects learnt from month beginning to month end.

### 4.2.1: Benchmark test marks

The same Benchmark test was given to both online learning students and traditional learning students.11 Benchmark test where given in total from January to November with each test being given at the end of each month. The Benchmark test where all recorded out of 100%.

#### Figure 4.2.1.1. Benchmark Monthly Statistics

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benchmark Monthly Statistics | | | | | | | | | | | | | |
|  | | January | February | March | April | May | June | July | August | September | October | November |
| N | Valid | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Online Mean | | 45.875 | 50.375 | 46.000 | 46.500 | 62.375 | 63.625 | 61.875 | 63.625 | 68.000 | 66.250 | 72.250 |
| Online Sum | | 917.5 | 1007.5 | 920.0 | 930.0 | 1247.5 | 1272.5 | 1237.5 | 1272.5 | 1360.0 | 1325.0 | 1445.0 |
|  | |  |  |  |  |  |  |  |  |  |  |  |
| Traditional Mean | | 51.000 | 43.125 | 43.500 | 56.500 | 42.875 | 47.875 | 48.250 | 50.000 | 53.375 | 54.250 | 58.750 |
| Traditional Sum | | 1020.0 | 862.5 | 870.0 | 1130.0 | 857.5 | 957.5 | 965.0 | 1000.0 | 1067.5 | 1085.0 | 1175.0 |

The above diagram figure 4.2.1.1 shows the total and mean monthly benchmark test results for both online students and traditional students for a period of 11 months, January to November

#### Figure 4.2.1.2. Benchmark Monthly Statistics line graph

From the above statistical data, the totals of each student’s monthly total from January to November where added together. The mean grad

es of the total were calculated to find the total Benchmark grade for each student respective to each group.

At the beginning of the first months, there were no significant difference in student’s performance. The difference started increasing as the month of May was approaching with increased performance in online learning students. The two group’s performance from the month of May to November increased parallel to each other at a constant rate with online learning student’s performance on top

### 4.2.2: Benchmark test annual mean Grade marks

At the end of November, each student’s benchmark test results were added together and a total mean benchmark percentage of each student was recorded. The formula was

total benchmark monthly mark/11 Months \* 100%

The diagram below was generated from the above formula

#### Figure 4.2.2.1. Total Benchmark Test Marks

|  |  |  |
| --- | --- | --- |
| Online Test Marks | | Traditional Test Marks |
| Valid | 43.40 | 36.6 |
| 44.80 | 40.2 |
| 47.50 | 41.6 |
| 49.50 | 42.0 |
| 49.80 | 42.7 |
| 50.00 | 43.9 |
| 50.50 | 44.8 |
| 52.70 | 45.7 |
| 53.60 | 46.6 |
| 56.40 | 47.0 |
| 60.50 | 48.0 |
| 60.70 | 50.0 |
| 63.00 | 52.3 |
| 63.90 | 52.7 |
| 65.20 | 54.5 |
| 65.50 | 60.2 |
| 68.40 | 62.3 |
| 75.20 | 65.2 |
| 77.30 | 70.5 |
| 78.20 | 52.3 |
| Total | Total |

The diagram above figure 4.2.2.1 shows total benchmark mean for each student under online learning and traditional learning.

#### Figure 4.2.2.2. Benchmark Test Marks Statistics

|  |  |  |
| --- | --- | --- |
| Online Benchmark Total | | |
| N | Valid | 20 |
| Missing | 0 |
| Mean | | 58.8050 |
| Sum | | 1176.10 |

|  |  |  |
| --- | --- | --- |
| Traditional Benchmark Total | | |
| N | Valid | 20 |
| Missing | 0 |
| Mean | | 49.955 |
| Sum | | 999.1 |

From the above statistics and marks, the grades were generated. The total sum and mean for each group is also shown. The Online learning group performed better than traditional learning group with a difference of 177 in total marks and 8.85% mean.

Benchmark Test Grades

#### Figure 4.2.2.3. Benchmark Test Annual Grade Statistics

Online Benchmark Test Grade Traditional Benchmark Test Grade

|  |  |  |
| --- | --- | --- |
|  | | Frequency |
| Valid | D | 2 |
| C | 12 |
| B | 3 |
| A | 3 |
| Total | 20 |

|  |  |  |
| --- | --- | --- |
|  | | Frequency |
| Valid | D | 6 |
| C | 12 |
| B | 2 |
| Total | 20 |

From the above diagrams, Online students grades where 3 students (15%) had A’s, 3 students (15%) had B’s, 12 students (60%) had C’s and 2 students (10%) had D’s. More than half (90%) students managed to score above average grade. Traditional Learning grades where 2 B’s (10%), 12 C’s (60%) and 6 D’s (30%). More than half (70%) students managed to score grade C and above. On average, Online group scored better than Traditional groups with a difference of 20%.

The totals of each group’s monthly total from January to November where added together. the totals were calculated and presented below.

#### Figure 4.2.2.4. Benchmark Annual Statistics

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Benchmark Descriptive Statistics** | | | | | | |
|  | N | Minimum | Maximum | Sum | Mean | Std. Deviation | |
| Online Learning | 20 | 43.40 | 78.20 | 1176.10 | 58.8050 | 10.66329 | |
| Traditional Learning | 20 | 36.6 | 70.5 | 999.1 | 49.955 | 8.9309 | |

#### Figure 4.2.2.5. Total Mean Benchmark Annual Statistics

|  |  |  |  |
| --- | --- | --- | --- |
| Group | Total Mark | Total Average Mark(20 students) | Mean average mark(11 months) |
| Online Learning | 12935 | 1176.10 | 58.8% |
| Traditional Learning | 956.8 | 999.1 | 49.9% |

From the student results for Benchmark tests, Online application group’s total average mark was 611.25 which returned a 55.6% pass rate out of 20 students. The traditional approach group’s total average mark was 526,25 which returned a pass rare to 47.8% out of 20 students.

### 4.2.3 Benchmark test summery

Online learning group pass rate mark was above average with a mean value of 58.8% as compared to Traditional learning group which was 49.9%. Online learning group also had a minimum monthly mean of 43.40% and a maximum of 78.20%. From the stated statistics, Online students performed better than Traditional learning students.

## 4.3. Summative Tests Grades

The purpose of Summative test was to evaluate student’s performance at the end of the year. Only 1 summative test was given in December. It was graded out of 100%.

Summative Test

#### Figure 4.3.1.1. Summative Test Marks

Online Learning Traditional Learning

|  |  |  |
| --- | --- | --- |
|  | | Frequency |
| Valid | 37.5 | 2 |
| 50.0 | 1 |
| 52.5 | 3 |
| 55.0 | 2 |
| 57.5 | 2 |
| 65.0 | 1 |
| 67.5 | 1 |
| 70.0 | 3 |
| 75.0 | 1 |
| 87.5 | 1 |
| 92.5 | 1 |
| 95.0 | 1 |
| 98.0 | 1 |
| Total | 20 |

|  |  |  |
| --- | --- | --- |
|  | | Frequency |
| Valid | 17.5 | 1 |
| 25.0 | 2 |
| 30.0 | 1 |
| 32.5 | 2 |
| 37.5 | 1 |
| 42.5 | 1 |
| 45.0 | 1 |
| 47.5 | 1 |
| 52.5 | 1 |
| 55.0 | 1 |
| 57.5 | 1 |
| 60.0 | 1 |
| 65.0 | 1 |
| 70.0 | 1 |
| 75.0 | 1 |
| 80.0 | 1 |
| 85.0 | 1 |
| 95.0 | 1 |
| Total | 20 |

The above diagram shows the summative test marks for online learning students and traditional learning students for the month of December.

The test results collected above where used to generate the following statistics

#### Figure 4.3.1.2. Summative Test Marks Statistics

|  |  |  |
| --- | --- | --- |
| Summative Test Online Learning | | |
| N | Valid | 20 |
| Missing | 0 |
| Mean | | 64.900 |
| Minimum | | 37.5 |
| Maximum | | 98.0 |
| Sum | | 1298.0 |

|  |  |  |
| --- | --- | --- |
| Summative Test Traditional | | |
| N | Valid | 20 |
| Missing | 0 |
| Mean | | 51.500 |
| Minimum | | 17.5 |
| Maximum | | 95.0 |
| Sum | | 1030.0 |

From the above diagram, figure 4.3.1.2, Online learning students performed better than traditional learning students with reference to total marks, minimum, maximum and mean percentage.

#### Figure 4.3.1.3. Summative Test Grade Statistics

Online Learning Grades Traditional Learning Grades

|  |  |  |  |
| --- | --- | --- | --- |
|  | | Frequency | Percent |
| Valid | D | 2 | 10.0 |
| C | 8 | 40.0 |
| B | 5 | 25.0 |
| A | 5 | 25.0 |
| Total | 20 | 100.0 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | | Frequency | Percent |
| Valid | O | 1 | 5.0 |
| E | 5 | 25.0 |
| D | 2 | 10.0 |
| C | 6 | 30.0 |
| B | 3 | 15.0 |
| A | 3 | 15.0 |
| Total | 20 | 100.0 |

From the above diagram figure 4.3.1.3, student’s summative test marks where graded. More students from traditional learning group scored below 50% mark which is grade C. 8 students from traditional learning group failed the summative test and from online learning group, only 1 student did not pass. Overly, online learning group performed better on the summative test with 90% of students passing the exam above 50% mark and 60% students on traditional learning group scored above 50% mark, the rest 40% students failed the summative test.

#### Figure 4.3.1.5. Summative Test Total Statistics

The total marks for online and traditional learning group for all students where added together respective to each group. The following data was generated.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | N | Minimum | Maximum | Sum | Mean |
| Summative Test Online | 20 | 37.5 | 98.0 | 1298.0 | 64.900 |
| Summative Test Traditional | 20 | 17.5 | 95.0 | 1030.0 | 51.500 |

From the above diagrams under figure 4.3.1.5, online student’s overall performance exceeded that of traditional learning students with an overall mark of 1298 for online learning students and 1030 for traditional learning students which returned a mean percentage of 98% for online learning and 95% for traditional learning students.

## 4.4. Interviews

The results from the interviews of the students recognized the reasons for the performance on the tests written and their views on how the forms of learning had impacted their educational understanding and perspectives. Their responses were mixed responses respective to their group and their overall grade.

### 4.4.1 Ease use of online learning

The best-performing student in online learning had mixed feedback on how it was easy to use the learning system. quote *‘Using online learning was hard at first but it became easy as time passed*’. The least performing student in online learning had difficulties in time management as a result of difficulties in balancing studies and day-to-day life. From the interview, the student said ‘it was hard to focus on studies due to everything that goes on home, chores and other activities ‘.

From this question, online learning did not have any drawbacks but its effectiveness was affected by other external factors that affected student’s performance.

### 4.4.2 Effort on online school Work

Both students did put a lot of work in online learning according to the interview. The best-performing student did get help from relatives familiar with online learning on how to use, navigate and connectivity. The least-performing student in online learning had help at the start of the research but lacked constant monitoring as time went which is one of the contributing factor to the poor performance.

### 4.4.3 Satisfaction on traditional learning

This referred to how well the students enjoyed learning using traditional learning. The best traditional learning student from the interview said ‘it was a familiar environment since l have been taught using this method of learning since kindergarten’. The experience and absence of the need to learning new technologies made it easy for this student to concentrate only on the required school work.

The least performing student in traditional learning had hard time with traditional learning, the reason from the interview was, ’Traditional learning did not satisfy my studying needs because the lessons would end with the teacher leaving the classroom’. This made educational resources unavailable after school time halting new material including during weekends until the next school day.

### 4.4.4 Management of learning material on traditional learning

Management of learning materials for traditional learning student would involve storing stationary in a manner that the student would remember and keep track of every record, book and papers for future use and personal performance assessment. Both best-performing and least-performing student had hard time keeping track of their learning material. ‘It was hard to keep track of what l have covered and not covered and some of the books would get tone up, ripped or lost’, this response was from the best-performing student of traditional learning.