PROJECT 1 - USAGE OF AI SERVICES AND TOOLS FOR LEARNING AMONG STUDENTS IN THE FACULTY OF COMPUTING

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1.0 Introduction

The integration of artificial intelligence (AI) services and tools within educational settings has become increasingly common, offering promising opportunities to enhance students' learning experiences. As we move forward in the era of digital transformation, it becomes crucial to understand how AI impacts educational methods, particularly within the Faculty of Computing at UTM. With the emergence of AI-driven technologies like intelligent tutoring systems, personalised learning platforms, and automated grading systems, students at UTM's Faculty of Computing now have access to customised and dynamic educational experiences. Against this technological backdrop, we aim to understand how students within the Faculty of Computing at UTM utilise AI services and tools to support their learning endeavours, and to explore prevailing attitudes towards these technologies and their impact on academic performance and engagement. This study aims to investigate the use of AI services and tools for learning among students in the Faculty of Computing at UTM. Through a comprehensive questionnaire-based survey, we aim to shed light on the patterns, preferences, and perceptions regarding the adoption of AI in education at UTM. Through rigorous data collection and analysis, we aim to uncover the effectiveness and implications of AI integration in creating a more enriched and efficient learning environment within the Faculty of Computing at UTM.

2.0 Data Collection

There are totally 67 respondents who are users of AI services and tools for learning among students in the Faculty of Computing at UTM to answer the survey. The means we use to collect all data is via Google Form. We distributed the Google form to the selected population via Whatsapp group and Google Meet. The variables of data to be measured in the survey are shown below:

No.	Variables	Data Measurement	Data Collected
1.	Gender	Nominal	Male, Female
2.	Age	Ratio	Age entered by students
3.	Course	Nominal	SECBH, SECVH, SECPH, SECJH, SECRH
4.	CGPA	Ratio	Pointer filled by students
5.	Familiarity with AI concept	Ordinal	Not Familiar, Familiar, Very Familiar
6.	Amount of time used (please state answer in hours per week)	Interval	1 hour a week, 2 hours a week, more than 2 hours a week

7.	When did you start using AI products	Ordinal	Less than a year ago, a year ago, two years ago, more than two years ago
8.	Do you believe that AI will positively impact society?	Nominal	It will not, it might not, no idea, it might, it will
9.	Number of AI related workshops attended?	Ratio	Amount entered by students
10.	Number of AI devices/services used?	Ratio	Amount entered by students
11.	How much money fo you use for AI products	Ratio	Amount entered by students
12.	Involvement of AI related research project	Nominal	Currently Involved, Previously Involved, Never Involved

2.1 Methodology

To visualise all the data presented, we use a wide range of graphical mediums from bar charts, pie charts, scatter plots and histograms. This gives readers a better understanding of the data presented and provides a visual representation of the information. To create these charts, we utilised an online service that converts data into charts, and also RStudio to create some graphs.

All calculations for the measures of central tendency and dispersion are done through R or calculated manually using the following formulas:

Statistics	Formula
Mean	$$\bar{x} = \frac{1}{n}\left(\sum_{i=1}^{n} x_i\right) = \frac{x_1 + x_2 + \cdots + x_n}{n}$$
Median	if n is odd, $\mathrm{med}(x) = x_{(n+1)/2}$ if n is even, $\mathrm{med}(x) = \dfrac{x_{(n/2)} + x_{((n/2)+1)}}{2}$
Quantile	$Q_1 = [\tfrac{1}{4}(n)]$th item $Q_2 = [\tfrac{1}{2}(n)]$th item $Q_3 = [\tfrac{3}{4}(n)]$th item
Interquartile range (IQR)	$(\mathrm{IQR} = Q_3 - Q_1)$
Lower and upper fences	Lower fence $= Q_1 - (1.5 \times \mathrm{IQR})$ Upper fence $= Q_3 + (1.5 \times \mathrm{IQR})$

3.0 Data Analysis
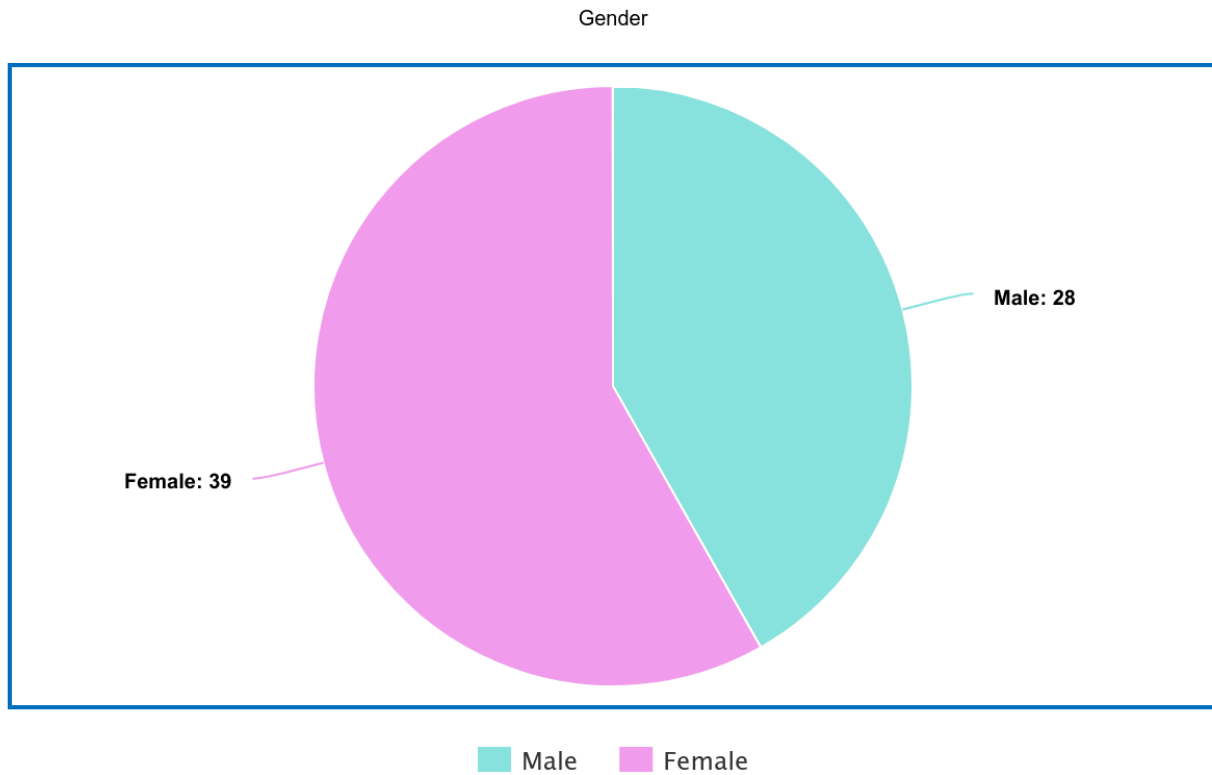
3.1 Gender of Each Respondent

Gender

Figure 1: The pie chart shows the gender of respondents

The respondents' gender distribution is displayed in the pie chart. It demonstrates that the number of female students is 39 out of 67 (58.21%). However, there are 28 male students out of 67 (41.79%). To conclude, the majority of respondents are female, comprising 58.21% of the total, while male students make up 41.79%.
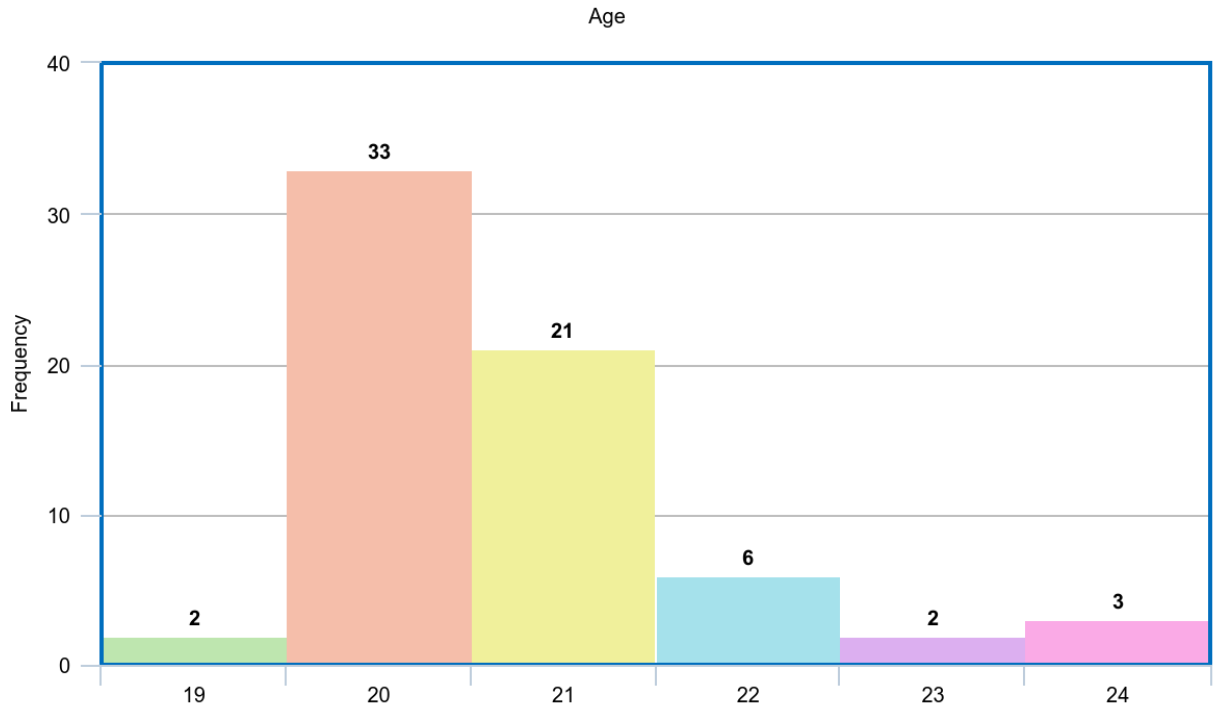
3.2 Age of Each Respondent

Age

Figure 2: The histogram shows the frequency of the respondents age distribution

The respondents' age distribution is displayed in the histogram. It demonstrates that there are 2 students aged 19 out of 67 (2.99%). Additionally, there are 33 students aged 20 out of 67 (49.25%). Furthermore, there are 21 students aged 21 out of 67 (31.34%). Moreover, there are 6 students aged 22 out of 67 (8.96%). Subsequently, there are 2 students aged 23 out of 67 (2.99%). Lastly, there are 3 students aged 24 out of 67 (4.48%). To conclude, the majority of respondents are aged 20, comprising 49.25% of the total, followed by those aged 21 at 31.34%.
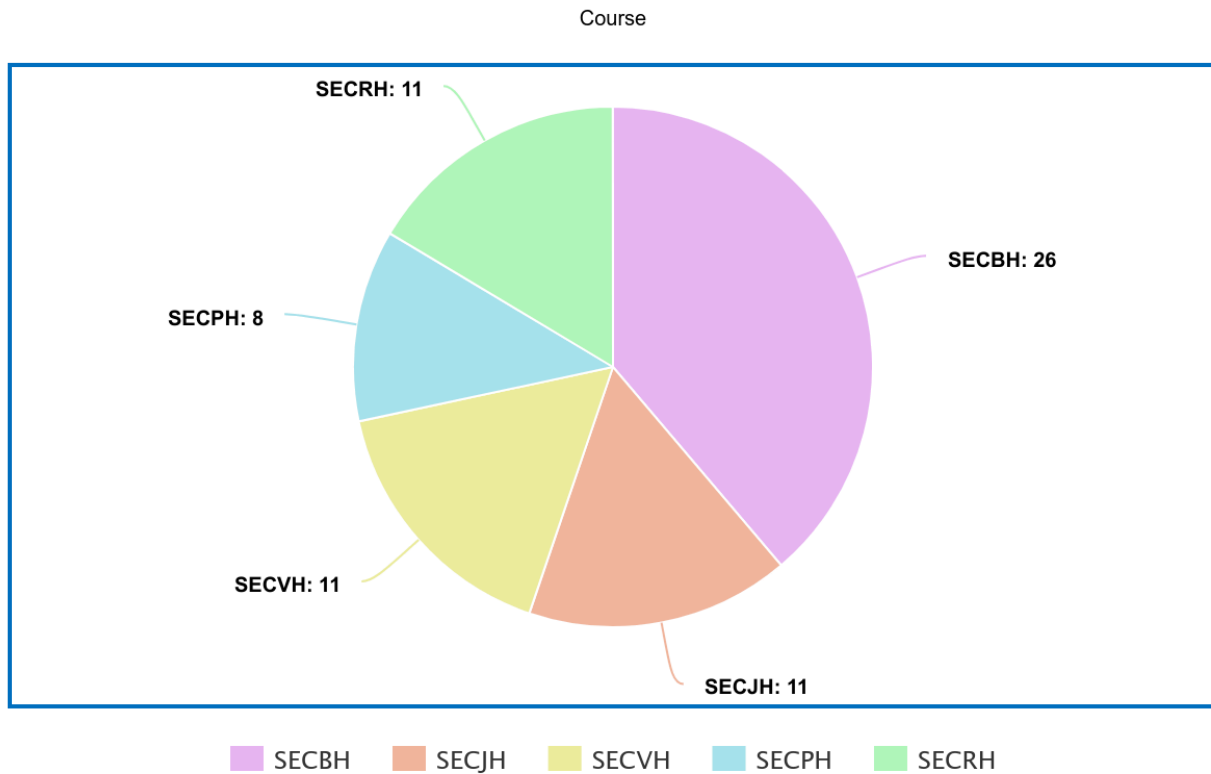
3.3 Course of Each Respondent

Figure 3: The pie chart shows the percentage of each of the students' course

The respondents' distribution based on their Computer Science courses is displayed in the pie chart. It demonstrates that there are 26 students out of 67 (38.81%) enrolled in the Bioinformatics (SECBH) course. However, there are 11 students each out of 67 (16.42%) enrolled in the Software Engineering (SECJH) course, the Graphic and Multimedia (SECVH) course, and the Computer Network and Security (SECRH) course. Additionally, 8 students out of 67 (11.94%) are enrolled in the Data Engineering (SECPH) course. To conclude, the majority of students, comprising 38.81% of the total, are enrolled in the Bioinformatics (SECBH) course, followed by an equal percentage of students enrolled in Software Engineering (SECJH), Graphic and Multimedia (SECVH), and Computer Network and Security (SECRH) courses, each making up 16.42% of the total, while 11.94% are enrolled in the Data Engineering (SECPH) course.
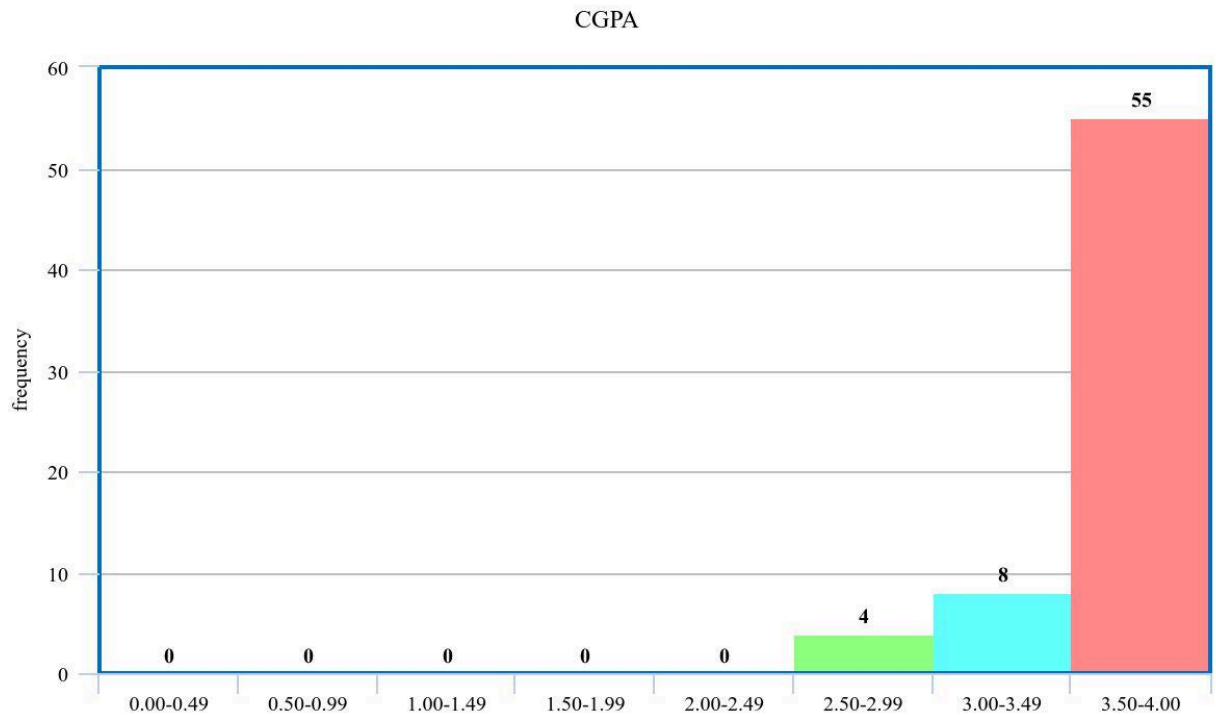
3.4 CGPA of Each Respondent

CGPA

Figure 4: Histogram of students' CGPA

The respondents' CGPA is displayed in the histogram. It demonstrates that the number of students with CGPAs between 0 and 2.49 is 0. However, there are four students out of 67 (5.97%) with CGPAs ranging from 2.50 to 2.99. Subsequently, eight students out of 67 (11.94%) had CGPAs ranging from 3.00 to 3.49. Finally, there are 55 students out of 67 (82.09%) whose CGPA ranges from 3.50 to 4.00. The median is 3.745, the mode is CGPA 4.00 and the mean is 3.626. To conclude, most students' CGPA is around 3.50 until 4.00, with a frequency of 55 students.

3.5 How Much Do Students Understand About The Concept of AI

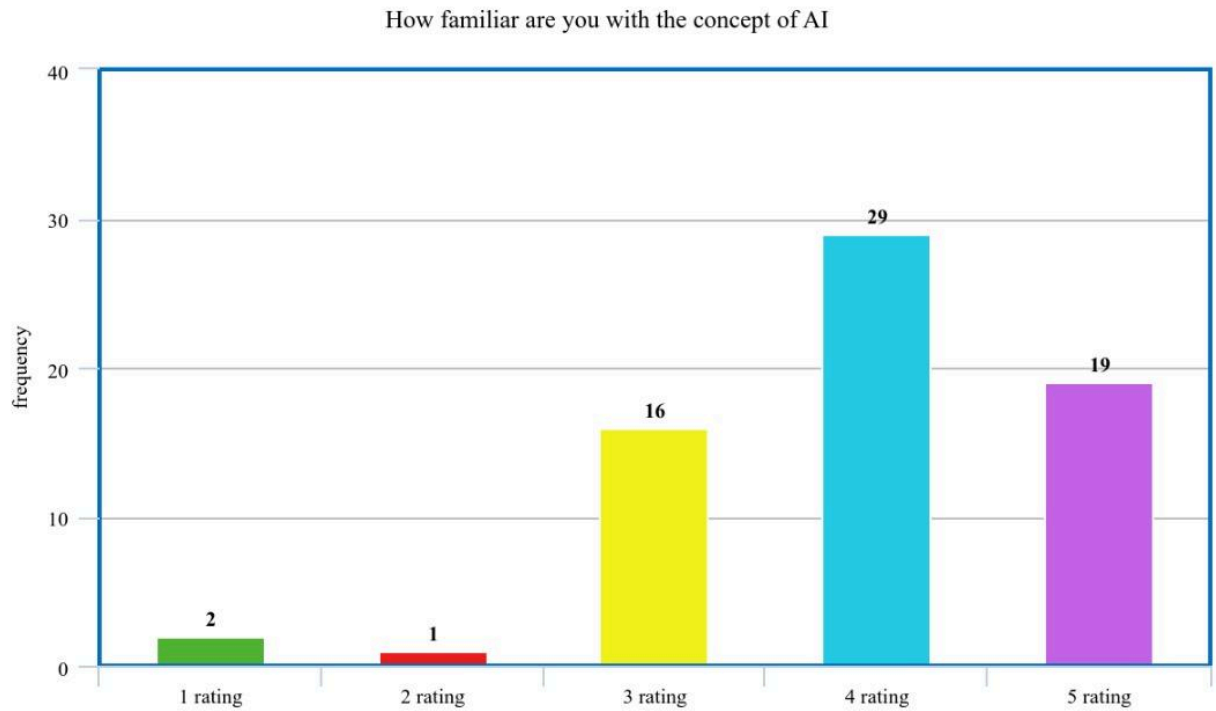How familiar are you with the concept of AI

Figure 5: The bar chart which shows the familiarity of students who understand about the concept of AI

The respondent for how familiar you are with the concept of AI displayed in this bar chart. There are 2 respondents (2.99%) that rate 1 which is not familiar with AI concepts, while 1 respondent (1.49%) rate 2 which is slightly familiar. Besides that, 16 respondents (23.88%) rate 3 which is moderately familiar with AI concept and for the highest 29 respondents (43.28%) rate 4 which is familiar with AI concept. Finally for the second highest ,19 respondents (28.36%) choose rate 5 which is extremely familiar with AI concepts. The mode is rated 4. In conclusion, there are 29 respondents that choose 4 ratings in their familiarity of the concept of AI.

3.6 When Did Respondents Start Using AI Products
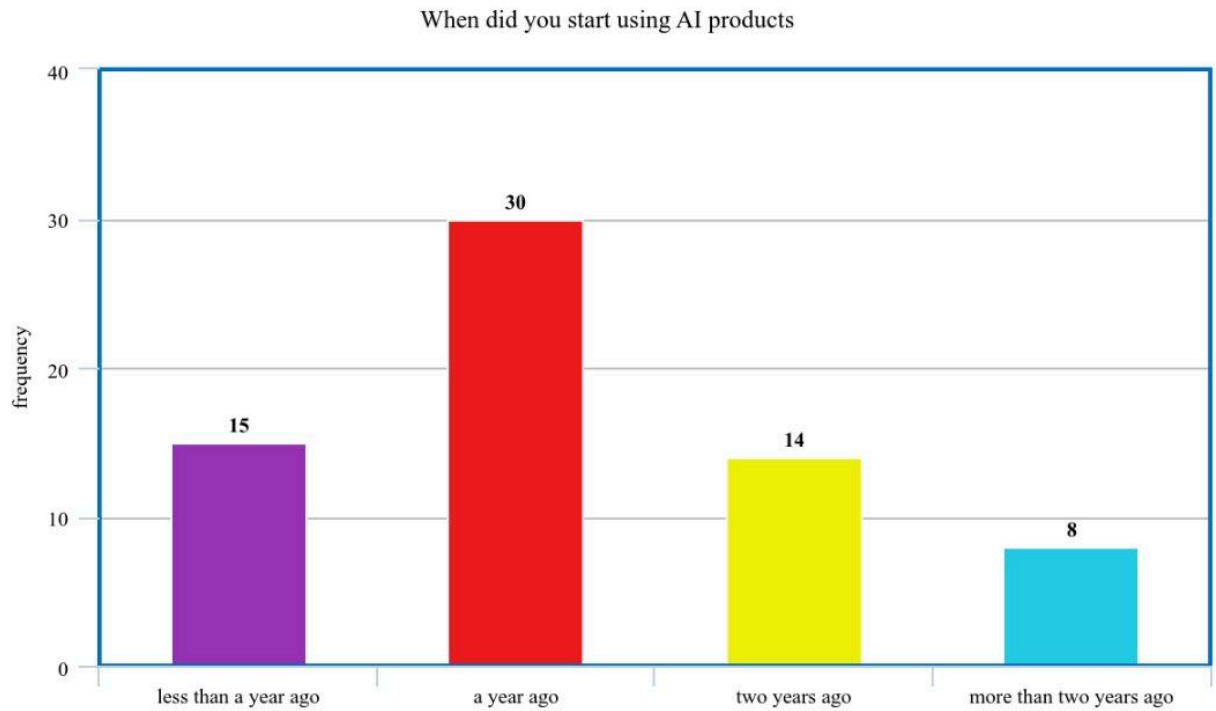
When did you start using AI products

Figure 6: The bar chart which explains the frequency of each timeline

Based on this chart, there are 15 respondents (22.39%) that started to use AI products less than a year ago. There were 30 respondents (44.78%) using AI products a year ago and two years ago there were 14 respondents (20.89%) . Finally, more than 2 years ago there were 8 respondents (11.94%) who started using AI products. Mode for this bar chart is a year ago. In conclusion, respondents recently started using AI a year ago.

3.7 How Many Different AI Services Have Respondent Used

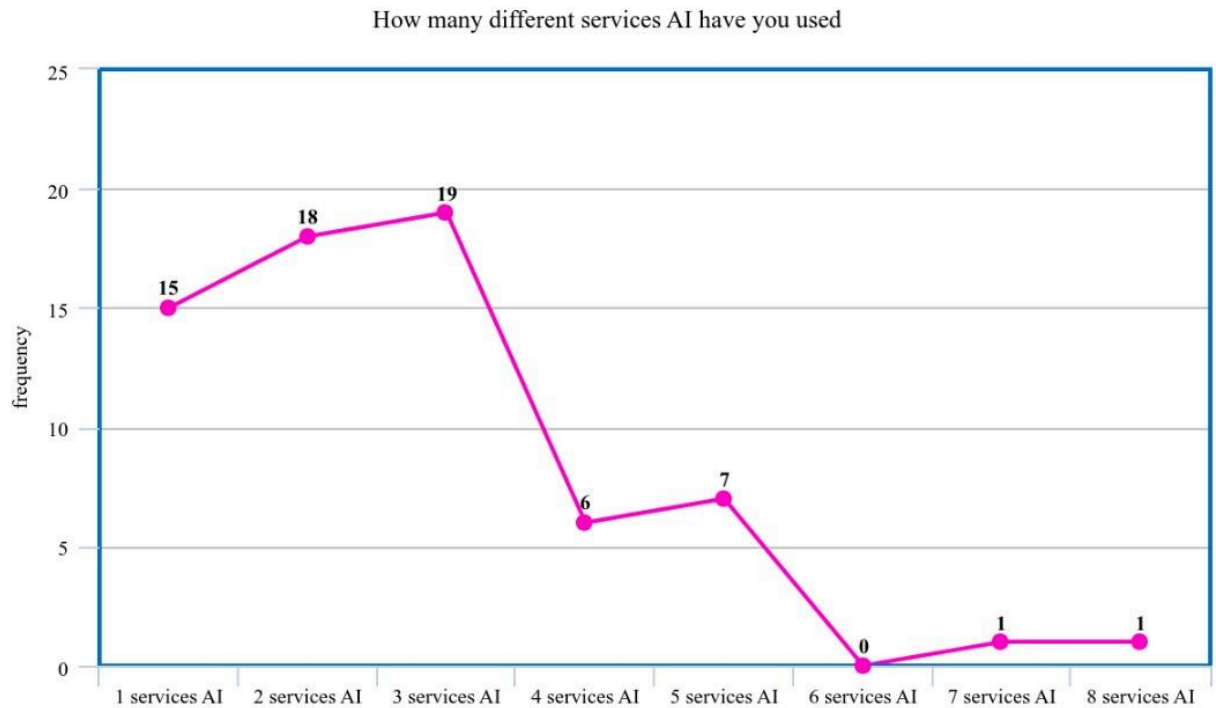How many different services AI have you used

Figure 7: Polygon graph which shows the frequency of how many services do each respondents used

On this polygon graph , there are 15 respondents (22.39%) that use 1 service of AI, while for 2 services of AI there are 18 respondents (26.87%) choosing that. Moreover, 19 respondents (28.36%) choose to use 3 services of AI and for 4 services of AI there are 6 respondents (8.96%). Besides that, 5 services of AI were chosen by 7 respondents (10.45%) while 6 services of AI there is no one choosing that (0.0%). Subsequently, 7 and 8 service AI got 1 respondent each (2.98%). Mode for this graph is 19 services of AI used. For min there is 8.36. In conclusion, there are 19 respondents that use 3 different AI services.

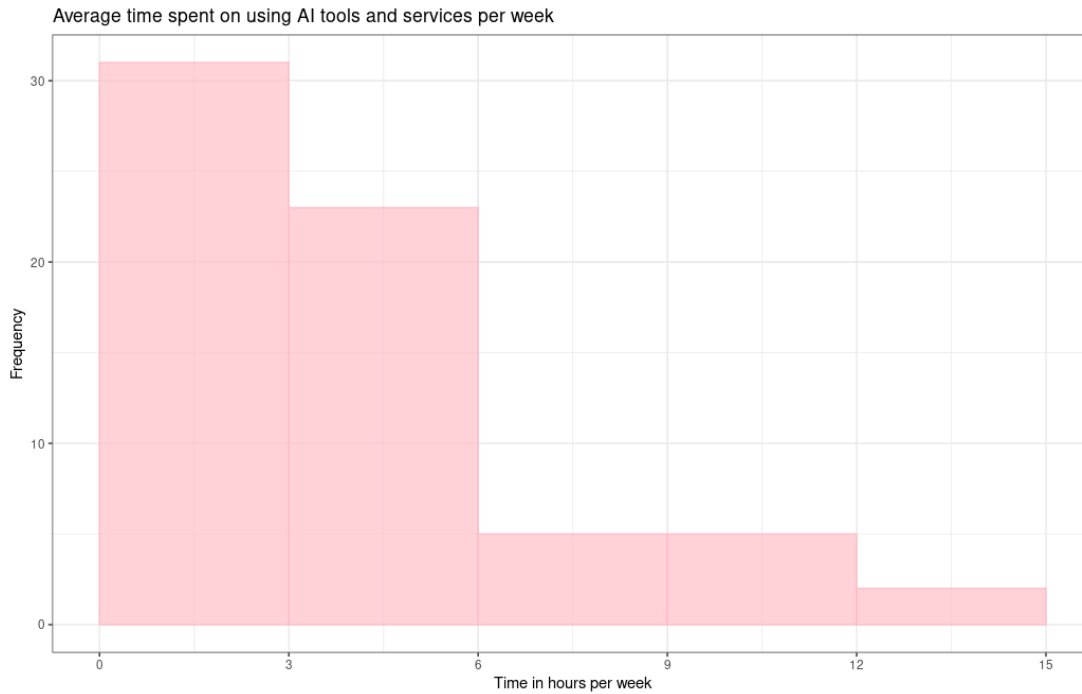## 3.8 Time spent using AI tools and services per week

Figure 8: Histogram of time spend using AI tools and services per week in hours

The histogram above shows the time respondents spend in hours per week on AI tools and services for learning. Based on the histogram above, 31 respondents (46.27%) spend between 0 to 3 hours a week on AI tools and services. Meanwhile, 23 respondents (34.33%) spend between 3 to 6 hours per week on AI tools and services. 5 respondents (7.46%) spend between 6 to 9 hours per week and 9 to 12 hours per week respectively on using AI tools and services for learning. Finally, only 2 respondents (2.99%) state that they spend between 12 to 15 hours a week on these services. In conclusion, most respondents spend between 0 to 3 hours weekly on AI services and the least spend between 12 to 15 hours on them, while the average student spends 4.46 hours per week on these tools.

3.9 Number of AI related workshops attended

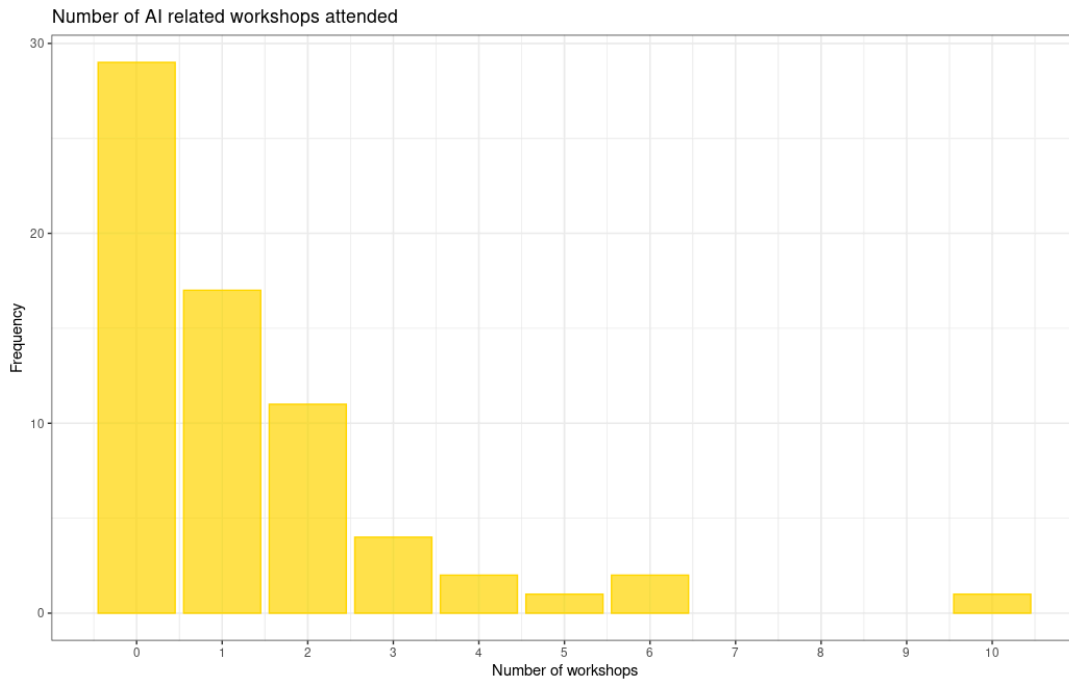Number of AI related workshops attended

Figure 9: Bar chart of number of AI related workshops attended

The bar chart above shows the number of AI related workshops attended by respondents. From the figure, 29 respondents (43.28%) have never attended an AI related workshop before. Next, 17 respondents (25.37%) have attended only 1 workshop, 11 respondents (16.42%) have attended 2 and 4 respondents (5.97%) have attended three AI related workshops. 2 respondents (2.99%) have attended 4 and 6 workshops respectively, while 1 respondent (1.49%) attended 5 and 10 workshops respectively. The maximum number of respondents have not attended any AI related workshops, while the least amount of respondents have attended 5 and 10 workshops. We can conclude that most respondents have not attended any AI related workshops.

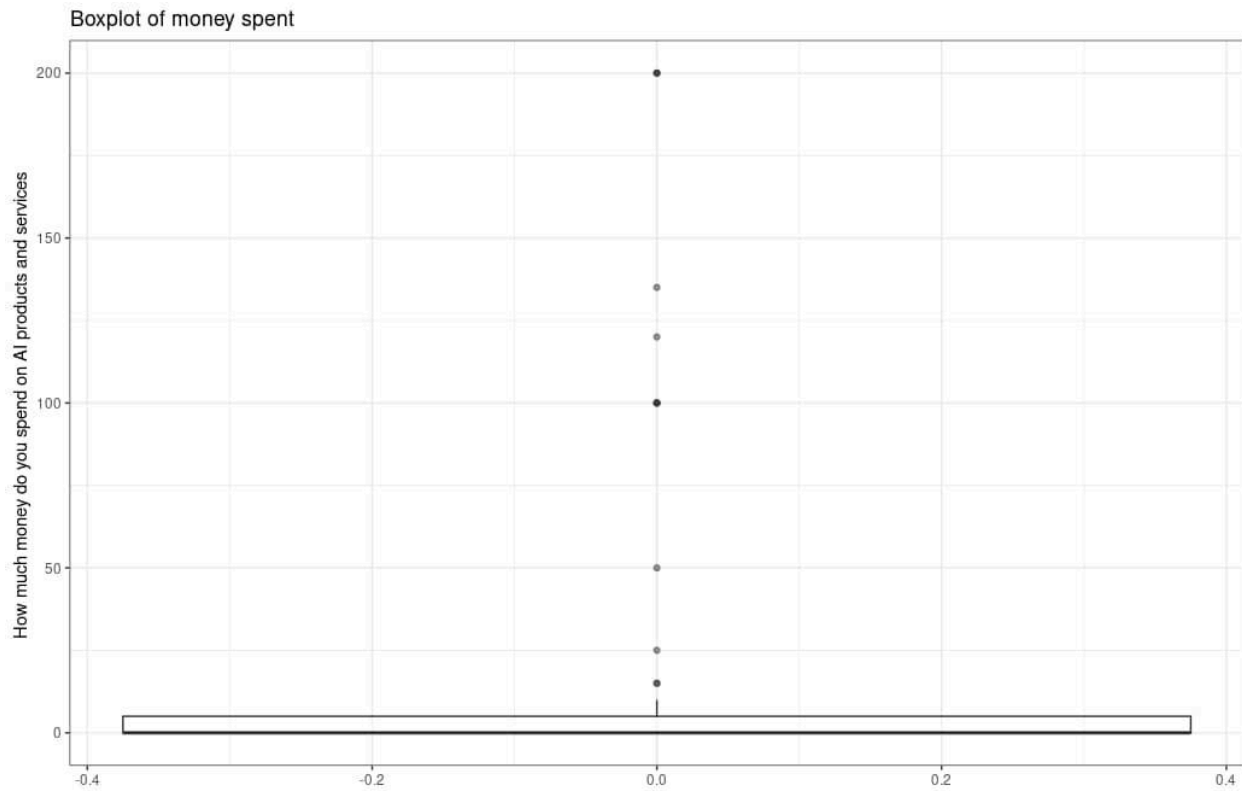**3.10 Amount of money spent on AI tools and services**

Figure 10: Box plot of money spent on AI tools and services

The box plot above shows the amount of money respondents spent on AI tools and services. Based on the figure above, the minimum amount of money students spend on AI tools and services is RM 0, while the maximum amount spent is RM 200. The first quartile, median and final quartile of the data is RM 0, RM 0 and RM 5 respectively. The outliers in this box plot are RM 9, RM 21, RM 28, RM 33, RM 35, RM 40, RM 41, RM 42, RM 44, RM 45, RM 49 and RM 50. Furthermore, the mean of the data is RM 20.87. From the shape of the boxplot, we can tell that the data has a positive skew, and so the median is actually a better indicator of the central tendency of the data. Hence, most respondents do not spend any money on AI tools and services, which is a reasonable conclusion since the most popular AI tools and services for learning are free or offer free versions of their services.

3.11 Students Who Have Been Previously Involved In AI Related Research Projects

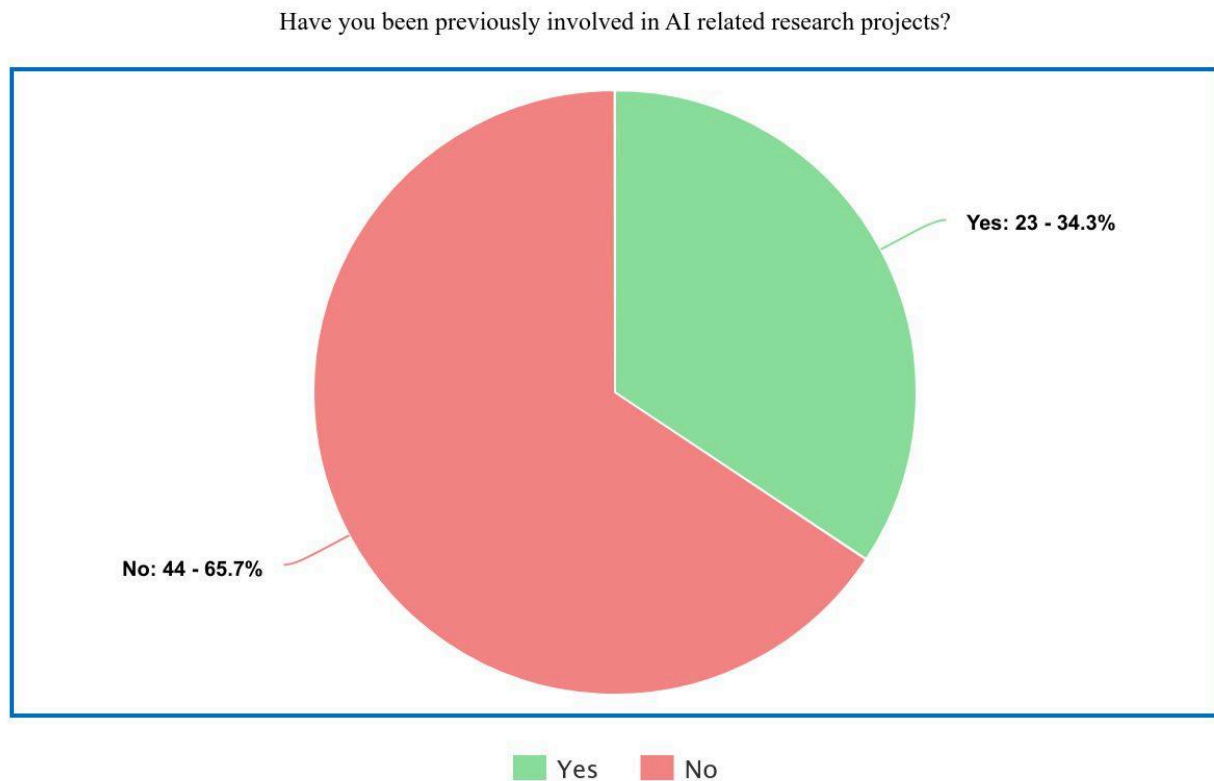Have you been previously involved in AI related research projects?

Figure 11: Pie Chart for the answer of students who have been involved in AI research projects

According to the pie chart above, out of the total 67 respondents, 44 said "No," or 65.7% of the sample. Furthermore, 23 pupils, or 34.3% of the total response, answered in the affirmative. From this chart, we gathered that the mode is "No" with 65.7% of the sample. In conclusion, most students have not been involved in any AI related research projects.

3.12 The Rating of Students Who Believe That AI Will Positively Impact Society
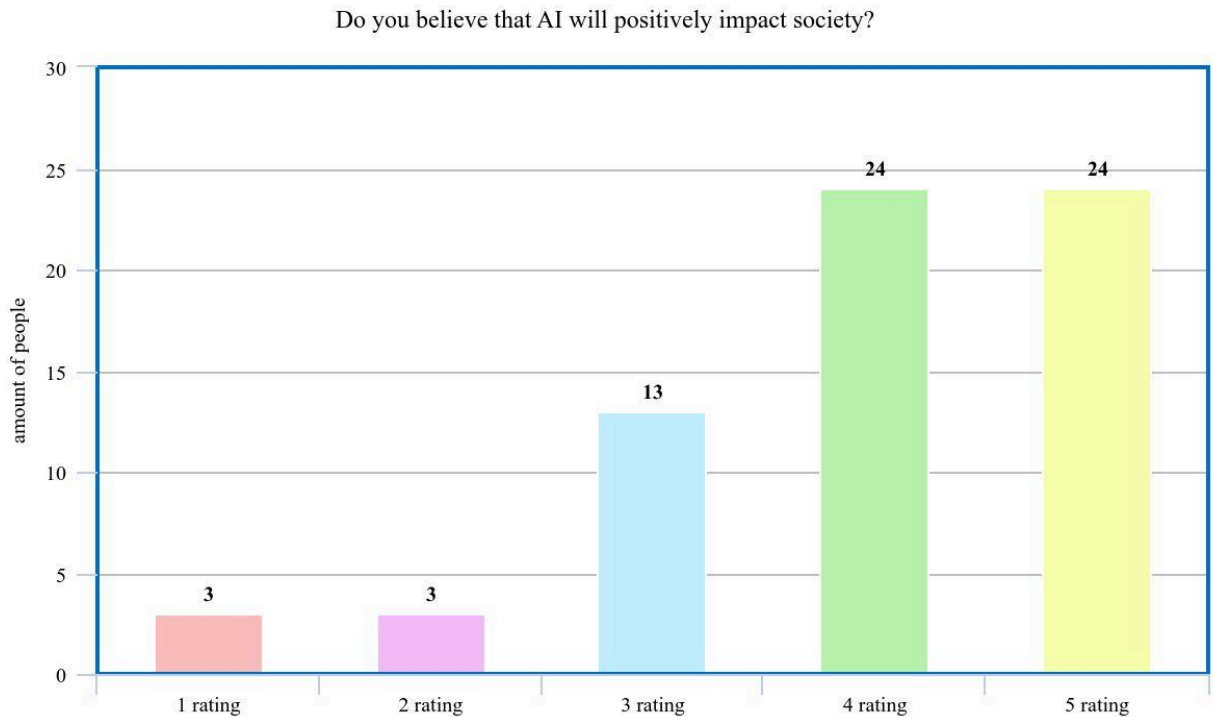

Figure 12: Bar chart showing rating of respondents to the question of their belief in AI's impact on society.

The answers given by the respondents to the question on the likelihood of AI having a good impact on society, as shown in the bar chart, ranged from 1, 2, 3, 4, and 5. 1 denotes an unlikely positive influence, 2 a less likely positive impact, 3 a somewhat likely positive impact, 4 a likely positive impact, and 5 the most likely positive impact. 3 of the respondents (4.48%) rate 1, 3 of the respondents (4.48%) rate 2, 13 of the respondents (19.40%) rate 3, 24 of the respondents (35.82%) rate 4 and 5 of the respondents (35.82%) rate 5. The mode of the data is, 4 and 5 rating with the same amount being 24 people. In conclusion, most of the respondents believe that AI will impact society for the better.

4.0 Comparison of Data With Their Relevancy

4.1 The Gender of Respondents and Have Respondent Been Involved in an AI Related Project

Figure 13: The stacked bar chart show that the comparison of gender and the answer of students who have been involved in AI research projects

From the stacked bar chart, It shows the gender of respondents and the answers of students who have previously been involved in AI related projects. In gender pie charts, it shows that the mode is female, with 39 out of 67 (58.21%). The male percentage is 41.79% with 28 out of 67 respondents. Whereas for the second pie chart, it shows that the number of respondents saying "no" to the question of having been previously involved in any AI related workshop is 44 out of 67 (65.7%). The amount of people being affirmative is 23 out of 67 (34.3%).

With relative frequency in consideration, the amount of female and male who have not been involved in AI related projects is almost the same with the difference in percentage being 2.38%. The percentage of female respondents who have not been involved in any AI related project is 66.67% from 26 out of 39 female respondents whilst the percentage of male who have not been involved in AI related projects is 64.29% from 18 out of 28 male respondents. The amount of female and male who have been involved in AI related projects is almost the same with the difference in percentage being 2.38%. The percentage of female respondents who have not been involved in any AI related project is 33.33% from 13 out of 39 female respondents whilst the percentage of male who have been involved in AI related projects is 35.71% from 10 out of 28 male respondents.

Conclusively, the stacked bar chart shows that most female respondents and the male respondents equally have not been involved in AI related activities therefore proving that gender has no influence towards respondents being uninvolved in AI related projects. Therefore, it is important to motivate both parties in being involved in AI related projects or workshops as these activities will help students understand AI better, fostering inclusivity and diversity within the field.

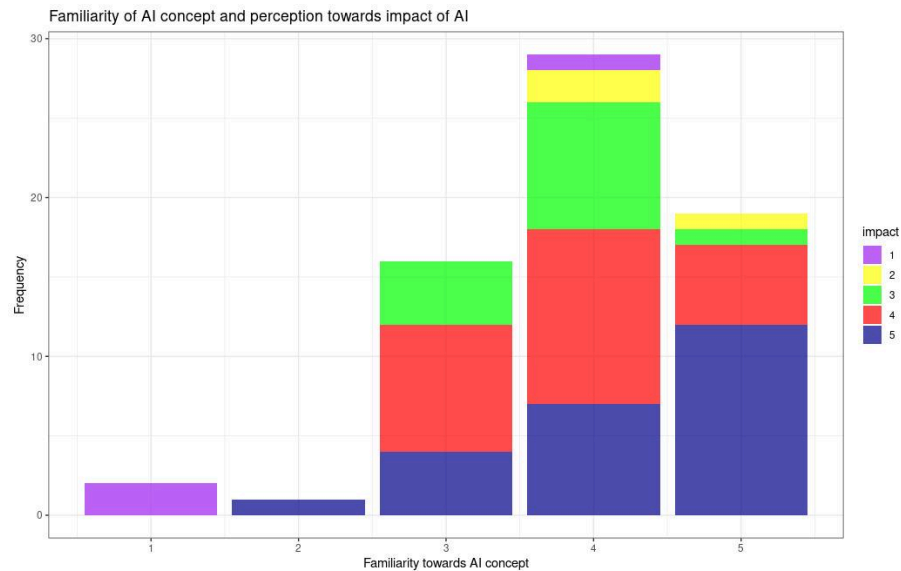**4.2 How Much Do Students Understand About AI and Do They Think It Will Have a Good Effect on Society**

Figure 14: The stacked bar graph shows the correlation between how much students understand about the concept of AI and their beliefs in the positive impact on AI

The stacked bar chart x-axis ranged from 1, 2, 3, 4, and 5. The numbers 1 through 5 indicate unlikely, 2 slightly likely, 3 fairly likely, 4 likely, and 5 extremely likely. Based on figure 10 it shows that students who is not familiar with AI is 2 (2.99%), students who is somewhat familiar with AI is 1 (1.49%), students who is moderately familiar with the concept of AI is 16 (23.88%) and the students who is familiar with the concept of AI is 29 (43.28%) and the students who is extremely familiar with the concept of AI is 19 (28.36%). The rating of students who don't believe that AI will positively impact society for the better is 3 (4.48%). Next, the students who believe that AI will slightly benefit society for the better is 3 (4.48%). Subsequently, the number of students who moderately believe that AI will positively impact society for the better is 13 (19.40%). Next, the number of students who believe that AI will positively impact society is 24 (35.82%). Lastly, the number of students who believe that AI will extremely impact society for the better is 24 (35.82%).

In conclusion, from the comparison, the more likely the students who are familiar with AI, the more likely they are to believe that AI will positively impact society. Thus, we believe that it's important to increase education and knowledge on the usage of AI throughout students. Additionally, giving students a deeper comprehension of AI can enable them to assess its ethical impact thoroughly and contribute to its responsible implementation in society.

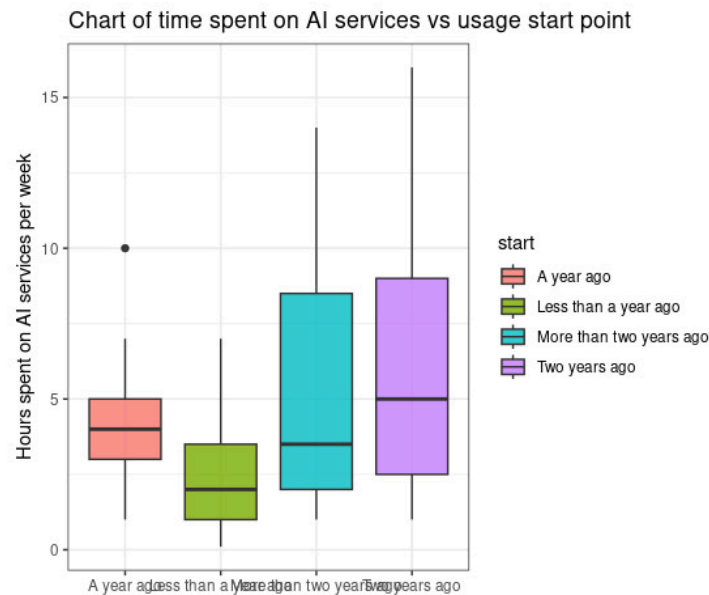## 4.3 Comparison Between The Amount Spent on AI services and When Respondents Start Using AI services

Figure 15: Box plot of the amount spent on AI services and when respondents start using AI services

Based on this plot, there are 15 respondents (22.39%) that started to use AI products less than a year ago. There were 30 respondents (44.78%) using AI products a year ago and two years ago there were 14 respondents (20.89%) . Finally, more than 2 years ago there were 8 respondents (11.94%) who started using AI products. Mode for this bar chart is a year ago. In conclusion, respondents recently started using AI a year ago.

The box plot also highlights the amount of money respondents spent on AI services. Most respondents spent RM 0 on these tools, with the mode and median being RM 0. The maximum amount of money spent on AI tools and services is RM 200, while the average respondent spends RM 20.87 on these tools.

The box plot shows that there is a difference in the amount of hours spent on AI tools and services in hours per week depending on when a user starts using them. Users who have spent more than two years using these tools and services spend more hours per week than those who have only used it in the past year. The usage of AI services per week increases with how long a user has been using the service. This might be because when a user is more familiar with these tools and services due to long usage, they will use it more often throughout the week to aid with their studies.

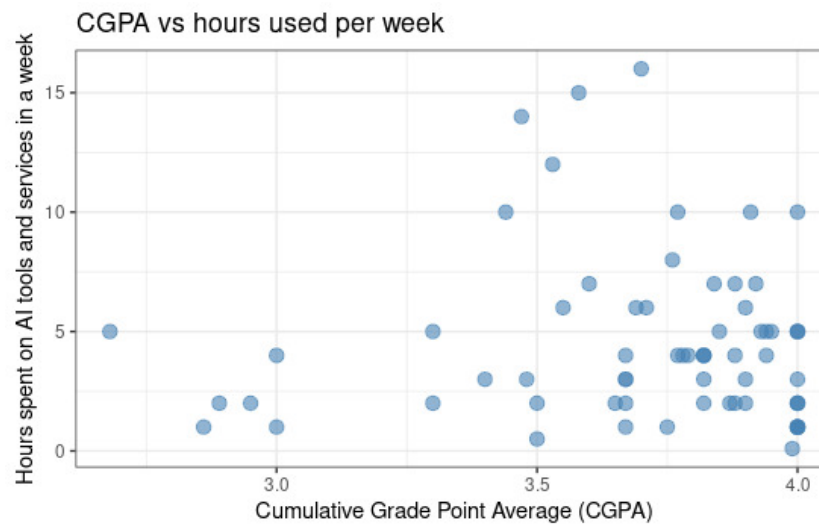**4.4 Comparison between CGPA and The Amount Hours Used Per Week**

Figure 14: This scatter plot shows the CGPA and the amount of hours used per week

The respondents' CGPA is displayed in the scatter plot. It demonstrates that the number of students with CGPAs between 0 and 2.49 is 0. However, there are four students out of 67 (5.97%) with CGPAs ranging from 2.50 to 2.99. Subsequently, eight students out of 67 (11.94%) had CGPAs ranging from 3.00 to 3.49. Finally, there are 55 students out of 67 (82.09%) whose CGPA ranges from 3.50 to 4.00. The median is 3.745, the mode is CGPA 4.00 and the mean is 3.626. To conclude, most students' CGPA is around 3.50 until 4.00, with a frequency of 55 students.

The scatter plot above shows the hours spent on AI tools and services in a week by respondents. On average, a student spends 4.46 hours on AI tools and services, with a median being 4.0 hours used. The maximum amount of time spent is 16 hours and the least amount of time spent is 0.1 hours a week. Based on the responses, the mode of the time spent on AI tools and services is 2 hours per week, with a frequency of 13 students.

This scatter plot indicates that an individual's CGPA may improve with more time spent using AI services, although a student's current CGPA is not indicative of the amount of hours they use AI tools and services in a week. This shows that AI services help students with their studies and can increase the efficacy of their studies. With the help of AI, students can improve their academic performance and achievement by customising their learning experience, having access to specialised educational materials, getting fast feedback, and making the most of their study schedules.

4.5 Comparison between gender and time spent using AI tools and services
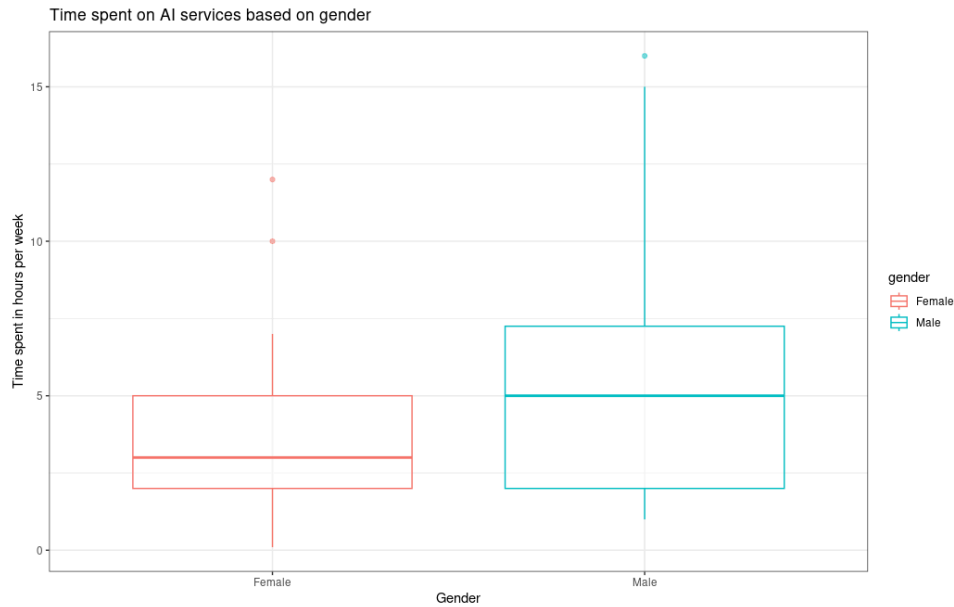

Figure 15: Box plot of time spent on AI services based on gender

The box plot above shows the amount of time spent on AI services in hours per week based on gender. Based on the box plot above, there is an obvious gender difference in the usage of AI services in hours per week. There are a total of 39 female respondents, with the minimum time spent being 0.1 hours, and the maximum time spent being 12 hours per week. On average, female respondents spend 3.71 hours using AI tools and services. The box plot for female respondents has a positive skew, hence the median of 3.0 hours per week is a more accurate statistic for usage of AI tools and services among female respondents.

In comparison, among the 67 respondents there are 28 male respondents. The minimum time given in hours per week by male respondents is 1.0 hour, while the maximum time given is 16.0 hours. Male respondents spend an average of 5.5 hours per week on AI tools and services, while the median is 5.0 hours per week. In conclusion, there is a gender difference in the usage of AI tools and services, which might be linked to differences in gender in familiarity with AI technologies.

5.0 Conclusion

Based on the comprehensive data analysis conducted on the usage of artificial intelligence (AI) services and tools for learning among students in the Faculty of Computing at UTM, several significant insights have emerged. The integration of AI into educational settings has shown promising prospects in enriching students' learning experiences, aligning with the ongoing digital transformation in education. From the data collected, it is evident that the majority of respondents are female, comprising 58.21% of the total, while male students make up 41.79%. This gender distribution underscores the importance of encouraging greater female participation in AI-related fields to foster diversity of perspectives and creative solutions. Regarding age distribution, the majority of respondents are aged 20, comprising 49.25% of the total, followed by those aged 21 at 31.34%. This demographic profile provides valuable insights into the age distribution of students engaging with AI services and tools for learning within the Faculty of Computing. The distribution based on Computer Science courses reveals that the majority of students, comprising 38.81% of the total, are enrolled in the Bioinformatics (SECBH) course. This highlights the varying interests and preferences among students in selecting their specialised fields within Computer Science. The analysis of respondents' CGPA distribution demonstrates that most students' CGPA falls within the range of 3.50 to 4.00, with a frequency of 55 students, indicating a high level of academic achievement among respondents. Furthermore, the data on respondents' familiarity with AI concepts and their beliefs regarding AI's impact on society reveal that the more familiar students are with AI, the more likely they are to believe in its positive impact on society. This emphasises the importance of enhancing education and knowledge on AI concepts to foster informed decision-making and responsible implementation of AI technologies. The comparison between the amount spent on AI services and when respondents started using AI products highlights the trend of recent adoption of AI services among respondents, with a majority initiating usage a year ago. Lastly, the correlation between CGPA and the amount of hours used per week on AI services indicates a positive relationship, suggesting that increased usage of AI services correlates with higher academic performance among students.

In conclusion, this study provides valuable insights into the usage of AI services and tools for learning among students in the Faculty of Computing at UTM. It underscores the significance of fostering greater understanding and adoption of AI technologies in education, while also highlighting areas for further research and improvement to enhance the efficacy and impact of AI integration in creating a more enriched and efficient learning environment within the Faculty of Computing at UTM.

Appendix 1

Sample of questionnaire questions.

USAGE OF AI SERVICES AND TOOLS FOR LEARNING AMONG STUDENTS IN THE FACULTY OF COMPUTING

This survey is conducted as part of a project for
the class Probability and Statistical Data Analysis (PSDA SECI1143-01)
Section 01. The purpose of this survey is **to investigate the usage of AI services and tools for learning among students in the Faculty of Computing, UTM.** AI learning tools and services refer to such platforms that one may use to enhance their learning.

This survey is divided into **two** parts:
Part A: Demographic information
Part B: Information about the usage of AI learning tools and services

All information collected are kept **confidential** and for **research purposes only**.

* Indicates required question

DEMOGRAPHIC INFORMATION

1. Gender *

   Mark only one oval.

   ◯ Male

   ◯ Female

2. Age *

3. Course *

Mark only one oval.

⬭ SECJH

⬭ SECRH

⬭ SECBH

⬭ SECPH

⬭ SECVH

4. CGPA *

_____

INFORMATION ABOUT USAGE OF ARTIFICIAL INTELLIGENCE (AI) TOOLS AND SERVICES FOR LEARNING

5. How familiar are you with the concept of AI? *

Mark only one oval.

	1	2	3	4	5	
Not :	◯	◯	◯	◯	◯	Very familiar

6. When did you start using AI products? *

Mark only one oval.

⬭ Less than a year ago

⬭ A year ago

⬭ Two years ago

⬭ More than two years ago

7. How many different AI services have you used? (Numerical answer: 1, 2, 3, etc.) *

_____

8. On average, how much time do you spend using AI tools and services in a study week? *
   (Example: 1 hour a week, 2 hours a week)

_____

9. How many AI related workshops have you attended? *

_____

10. How much money do you spend on AI products and services? *

_____

11. Have you been previously involved in AI related research projects? *

   Mark only one oval.

   ( ) Yes

   ( ) No

12. Do you believe that AI will positively impact society? *

   Mark only one oval.

	1	2	3	4	5	
It wi	( )	( )	( )	( )	( )	It will

   THANK YOU

   Thank you for filling up our survey.

Appendix 2

The result of the questionnaire.

https://docs.google.com/spreadsheets/d/1O3g0e0hFN9qt1r92rzxYBthP3jl08yjmmx3wrlvOQTs/edit?usp=drivesdk