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A quantitative study exploring DLSL college students' overall online learning experience and their perceptions on different AI-applied learning services for quarantined education

C3A

Group 6

Arguelles, Zeth Raphael

Cabungcal, Harold

Pangilinan, Patrick

Sajnani, Sanjay

Vergara, Aaron Charles

Yambao, Angela Mae

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ABSTRACT

Artificial Intelligence (AI) has a wide range of educational applications, such as personalized learning platforms to boost student learning and automated evaluation systems to aid teachers. Machine learning, algorithm creation, and natural language processing are all examples of AI. AI applications are reshaping educational resources. In spite of the fact that AI has the ability to provide adequate opportunities for learners and educators, there is still the issue of choosing the appropriate AI-based solution for learning that is suitable to the needs of DLSL college students especially in this quarantined education environment. By utilizing a quantitative approach, the overall online learning experience of DLSL college students, as well as their perceptions towards different provided AI-based education services are assessed. The quantifiable statistics from administered online survey questionnaires were analyzed through the use of frequency distribution tables and Likert Scale measurements. Conclusively, the research garnered average satisfaction on current overall online learning experiences and above average perceptions on provided AI-based education services, suggesting that education services using AI concepts could be applied to improve students' online learning experiences.

INTRODUCTION

The phenomenon of the COVID-19 pandemic lockdown has been a momentous event in recent times, placing the entire world under significant economic recession and limiting all common face-to-face activities. To control the spread of the pandemic, world governments were forced to lead drastic changes and adaptations among their communities, changing the common lifestyle people were used to towards a new, harsh normal. Haleem et al (2020), on the effects of COVID-19 pandemic in daily life, identified extensive and far-reaching consequences that could be divided in three categories: (1) healthcare, (2) economic, and (3) social. Impacts on healthcare are shown to be intensely severe due to being the vanguard against the ongoing outbreak, leading to significant reduction and limitation of valuable medical supplies and resources, especially health human resources such as nurses, doctors, and other MedTech professionals. For economics, it led towards significant crippling of sources of supply, as procurement and manufacturing services slowed down or halted completely, leading to consequential impacts on global cash flow and revenue growth of countries all around the world. Socially, the incident brought the service sector to significant degradation, with numerous businesses being forced to suspend activities or discontinue the entire business itself. Alongside this, small to large-scale gatherings, such as of the cultural, religious, recreational, academic, and familial kind were disrupted, due to enactment of quarantine restrictions, together with the emergence of considerable social fear and stress in contracting the disease and possibly infecting others.

The impact of COVID-19 in current society has shown a visible impact in students' learning worldwide. The incident brought what could be considered the largest disruption of education systems in human history, affecting nearly 1.6 billion learners in more than 200 countries, which is more than 94% of the world's student population (Pokhrel and Chhetri, 2021). The effects of this historical shift can be seen with Mahdy's 2020 study on the academic performance of veterinary medical students and Tan's 2021 quantitative analysis on student learning performance during quarantine orders in Malaysia.

Mahdy's findings discovered that out of 1,392 participants from 92 different countries who participated on the quantitative data gathering, the mean evaluation score for online education in general was 5.1 ± 2.4 out of 10 while practical parts were 3.6 ± 2.6 out of 10, displaying that the quality of general online education they experienced is below average, with the practical learning's quality significantly being negatively affected. Alongside this, the average evaluation of student performance was 4.02 ± 1.11 points out of 5, with most of the participants in the study believing that the COVID-19 pandemic lockdown affected their academic performance with varying degrees. The results of the study indicate the declining academic performance of students worldwide, and the significant need for the creation of more appropriate and effective methods of providing lessons online, especially with practical education. Godber and Atkins' 2021 qualitative and collaborative autoethnography with two higher education lecturers in New Zealand acknowledges this unique characteristic of the phenomenon, in which there is an inability of students who learn through practical contexts, to enact kinesthetically on in the field

activities in a meaningful manner, due to COVID-19 restrictions. Such a situation was to be expected, as the unexpected shift to remote learning from the usual face-to-face education does not effectively perform well compared to a deliberately designed online teaching and learning (*Scherman, 2020*).

Meanwhile, Tan's (2021) investigation of student learning performance showed a significant difference during the MCO (Movement Control Order) and RMCO (Recovery Movement Control Order) quarantine phases in Malaysia, which highlighted practical and social implications for learners. University student respondents of the study have shown low motivation and performance using online learning methods during the quarantine period of the country. The findings also indicated that social and teaching presences are the most important factor in affecting learning performance. From such, there is a significant need for solutions to address the social and teaching needs of students who are forced to be quarantined within their homes, which is an environment not often conducive for learning.

The impact on education is also evident among institutions and students within the Philippines. The total number of cases confirmed on April 10, 2020, close to the start of when institutions all over the world started shutting down, was about 4,195 (*DOH, 2020*). Around the time of March of 2020, schools all over the country started to suspend face-to-face classes in favor of online learning. Online learning seemed to have been a proper alternative, as it allowed students and teachers to learn and conduct teaching while complying with the need for social distancing. The teachers would prepare

recordings for their lecture and they would give students the freedom to control their own pace. Although it would seem that the problem of teaching students was solved, there were still issues that plagued the students and educators which proved that most of the institutions in the Philippines were not ready for the transition to digital learning. Some of the problems the students have faced were unreliable or unstable internet connection and lack of personal ownership of required hardware and software. These problems were not just exclusive to the students, 13% of 700,000 teachers who answered a survey from DepEd admitted they do not own a computer device at their homes. Only 41% of those teachers had home internet and 49% had reliable enough mobile signal for internet while 10% had none (*ABS-CBN News, 2020*).

The findings in a study conducted by Barrot, J.S et al. (2021), reveal that students' online learning problems differed in terms of type and scope. Their most difficult obstacle was related to their home learning environment, whereas their least difficult one was technical knowledge and ability. According to the students' comments, the pandemic has exacerbated their problems, particularly in terms of learning experience quality, mental health, money, interaction, and mobility. Furthermore, the overall data show that the level of obstacles and techniques differed from student to student. As a result, they should be considered due to the interplay of several elements. Students' replies indicate that their online learning obstacles and techniques were mediated by the resources available to them, their interactions with instructors and classmates, and the school's existing online learning regulations and procedures. The mandated lockdowns and students' socioeconomic situation worsened the issues that

pupils face in the context of the epidemic. The study further adds that while most studies found that technology use and proficiency were the most prevalent problems that students encounter during online classes, the situation is a little different in underdeveloped nations during pandemics. According to the findings, the learning environment is the most difficult obstacle that students must overcome, notably distractions at home (e.g, noise) and limits in learning space and amenities. In terms of the influence of COVID-19 on students' online learning experiences, the data show that teaching and learning quality, as well as students' mental health, were the most negatively impacted. Students' nervousness stems not just from the risks posed by COVID-19, but also from social and physical constraints, unfamiliarity with new learning platforms, technological challenges, and concerns about financial resources.

It's appropriate to give a background for the concept of AI (Artificial Intelligence) before discussing the implications of its use in quarantined education. According to a study conducted by Yang et al. (2019), at the Dartmouth Conference in 1956, John McCarthy coined the word "artificial intelligence" to describe "the science and engineering of developing intelligent machines". AI, as a multidisciplinary field, necessitates the integration of knowledge from several disciplines such as computer science, mathematics, psychology, linguistics, philosophy, neuroscience, artificial psychology, and others. Recent intellectual and engineering advances have facilitated the field's transition from purely theoretical study to the implementation of intelligent systems that solve challenges in a range of aspects of our lives. The current spectrum of such applications includes themes and research as diverse as natural language

understanding and processing, speech comprehension and processing, mechanical/computer vision, autonomous/intelligent robotics, and domain knowledge acquisition, to mention a few examples. In addition to this, despite the broad range of difficulties that AI may address, there are many core techniques that are crucial in all situations, such as information acquisition and maintenance, knowledge representation, solution search, logic reasoning, and machine learning.

Because of the multiple uses of Artificial Intelligence in education, the academic world is becoming increasingly high-tech, with a comfortable and individualized educational experience. AI is assisting in breaking down geographical boundaries by reducing the requirement for classroom instruction. A relevant study by Chen P. (2020) states that the concept of applying artificial intelligence capabilities for instructional purposes is not new in the modern scheme of learning, but its growth prior to the Corona period was somewhat dispersed. The conditions of the pandemic, self-isolation, and lengthy quarantine compelled the search for new opportunities and ways of education in this context. And it was at this point that the possibility of employing artificial intelligence to organize the educational process at all levels of schooling became apparent. The study further adds that the COVID-19 pandemic-caused quarantine played a beneficial role in broadening the range of possibilities for employing artificial intelligence in the field of education, even in areas that were previously thought to be unsuitable or ineffective for it due to the idiosyncrasies of educational tasks. During the COVID-19 quarantine period, computers and AI became an organic and necessary player in the educational process, even in basic school. Many learners, because of temperament and personal

circumstances and attitudes, for example, felt this manner of learning to be appropriate for them. Another study related to AI in education by Chen, L. et al, (2020) expresses that the use of AI algorithms and systems in education is increasing in popularity year after year. Figure 1 depicts the increasing number of articles published in Web of Science and Google Scholar on the themes "AI" and "Education" since 2010. It is worth noting that articles published between 2015 and 2019 made for a substantial share, accounting for 70% of all publications indexed. Researchers are attempting to utilize advanced AI techniques, such as deep learning and data mining, to cope with complicated difficulties and tailor teaching methods for specific students as education progresses.

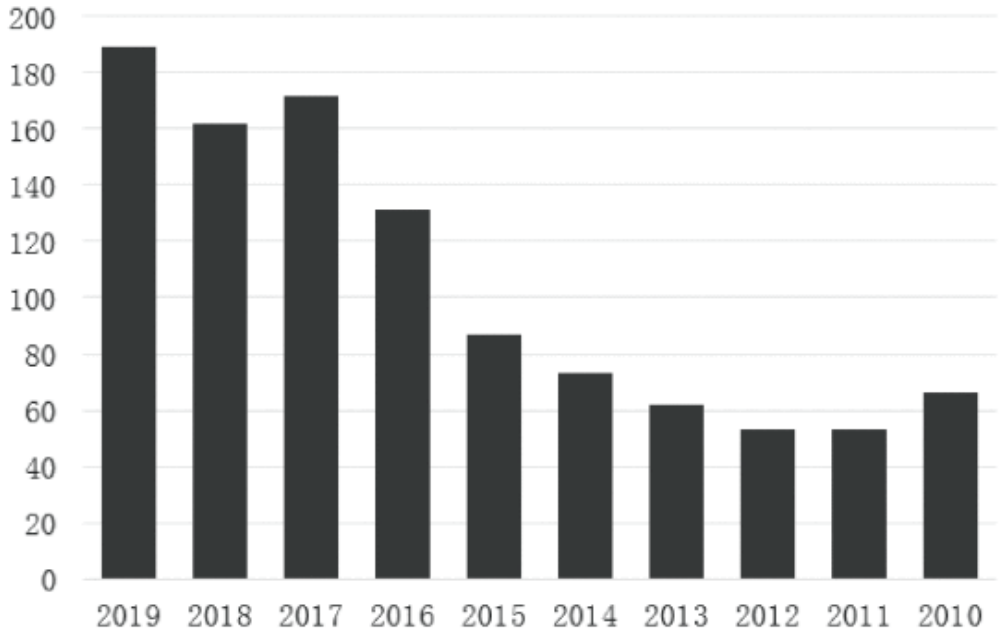

Figure 1. Papers with the key phrases "AI" and "Education" in Web of Science and Google Scholar over the last ten years, by Chen L., et al. (2020).

Overall, AI is projected to collaborate with instructors to reduce their workload and increase efficiency through data insights and automation. AI can increase efficiency, personalization, and simplify administrative processes, giving instructors more time and freedom to give understanding and adaptability in uniquely human characteristics that computers would struggle with, and teachers may gain insights on how their students are performing to create tailored study strategies for a better learning outcome.

From such, this study's purpose was to assess the educational condition of DLSL college students and explore their attitudes and perceptions towards example AI-based education services. The study identified the overall online learning experience of DLSL college students, assessing their satisfaction towards the quality of the learning experience, methodologies used for teaching and self-studying, engagement towards learning, accessibility and adequateness of learning resources, and their resulting academic performance. Alongside this, the study also identified the students' perceptions on specific education services using AI and the applicability of these AI concepts to their own online education experience. This research aims to provide appropriate recommendations for AI-based concepts and technologies to use based on the students' perceptions, which researchers and developers could apply in researching and designing their own AI-based education services.

METHODS

Research Design

Assessing the general perception of multiple DLSL college students required the use of a quantitative research design. This research design allows for the discovery of how people think, act, and feel towards a specific topic in a generalized, quantifiable manner. Quantitative research involves the collection and analysis of numerical data, which could be used to find patterns and averages, make predictions, test causal relationships, and generalize results to wider populations (*Bhandari, 2020*). The study also utilized a descriptive type of quantitative research, in which the design type seeks to identify the current condition or status of an identified variable (*WSSU, 2011*). With this design, the research does not usually begin with a hypothesis, but is more likely to develop one after data collection and analysis, which is applicable as the study aimed to identify possible AI concept recommendations by the end of this study.

Respondents of the Study

The research applied a non-probability, convenience, snowball sampling technique, in which respondents are initially selected based on the researcher's convenience, and then recruited new respondents via the initially selected respondents. Non-probability sampling utilizes non-randomized methods to get the sample, in which instead of being randomized, participants are selected because they are easy to access. Convenience sampling is another type of non-probability sampling is another

non-probability sampling in which participants are chosen as per the researchers' own convenience. Snowball sampling is a technique in which participating respondents are asked for assistance by researchers to identify and recruit more respondents (*Showkat and Parveen, 2017*).

With this sampling method, the researchers initially conveniently selected known 3rd year college students to participate in the quantitative data gathering, who were then asked by the researchers to forward the quantitative survey questionnaire used for data gathering to other DLSL college students that they have connections with through social media. The researchers aimed for a minimum of forty (40) respondents in the snowball sampling, as a confidence level of 95% on this number of respondents allows for a margin of error of 15% on the results of the study, which is the minimum acceptable percentage for a limited participant sample (*Budiu and Moran, 2021*).

Research Locale

The researchers mainly gathered data among college students currently enrolled in De La Salle Lipa, Lipa City, Batangas, as the study focused on the responses of DLSL college students regarding their overall online learning experience and their perceptions on AI-based education services. The respondents could be situated in any place considering that they are currently a college student in DLSL, as the study's data gathering procedures can be performed through online means.

Research Tools and Instruments

To quantitatively measure the overall online learning experience of DLSL college students and their perceptions towards AI-based education services, the study will adapt a questionnaire specifically made for the study, following multiple choice and Likert Scale type questions with two main topics: (1) the overall learning experience, and (2) opinions on AI use in education systems. Under the first main topic, there are five subtopics: (1) quality of learning, (2) methods of learning, (3) engagement on learning, (4) accessibility of learning resources, and (5) academic performance. The Likert Scale questions are structured with the following measures:

- For the subtopics under the 1st main topic:

  1 - minimal satisfaction, 2 - low satisfaction, 3 - average satisfaction, 4 - above average satisfaction, 5 - high satisfaction

- For the subtopics under the 2nd main topic:

  (1) 1 - minimal impact, 2 - low impact, 3 - average impact, 4 - above average impact, 5 - high impact

  (2) 1 - minimal likelihood, 2 - low likelihood, 3 - average likelihood, 4 - above average likelihood, 5 - high likelihood

For the quantitative result analysis, each subtopic and its respective items will be described through the usage of mean frequency distribution statistics. Items per subtopic will also be ranked according to their frequency, to highlight significance in item

responses relating to the respondents. The weighted mean of the Likert Scale results will be calculated and will be given appropriate verbal interpretations according to the value. The Likert Scale's weighted mean values will use the following basis for research analysis results: the range of 1.00 – 1.49 for the lowest rating; 1.50 – 2.49 for the second lowest rating; 2.50 – 3.49 for the third middle rating; 3.50 – 4.50 for the second highest rating, and 4.51 - 5.00 for the highest rating.

Data Gathering Procedure

The researchers personally organized and administered the distribution of the research instruments to the initial conveniently chosen respondents through online mediums. The quantitative questionnaires were given through Google Forms. The respondents were given a brief explanation about the study within the survey form and its significance before making them participate in the data gathering process. The respondents were not forced to answer the survey, and those who volunteered are only asked to provide their DLSL email address to serve as proof of being a DLSL college student. The researchers also asked the respondents to forward the survey to their fellow DLSL college students after they have finished answering the survey. The researchers waited until the response count turned to forty (40) before stopping the data gathering process.

Ethical Consideration

Ethical considerations were observed in the research paper. The participation in the data gathering process was completely voluntary and optional for those who were reached out through the online survey recommendation. The nature of the study was completely explained on the front page of the survey research itself. Only the email address of the respondents was taken in the survey, serving as validation of being an DLSL student. The email addresses were used only for the purpose of this study and were ensured to be kept confidential. All information incorporated in the study will be maintained and kept true, devoid of any kind of deception and falsification. Any forms of affiliation, as well as possible conflicts of interests, are declared in this study, with no exceptions.

RESULTS

The presentation of data followed the sequence of the arrangement of the sections in the survey questionnaire: the demographic information, the overall online learning experience, and the opinions on AI use in education services.

Demographic Information

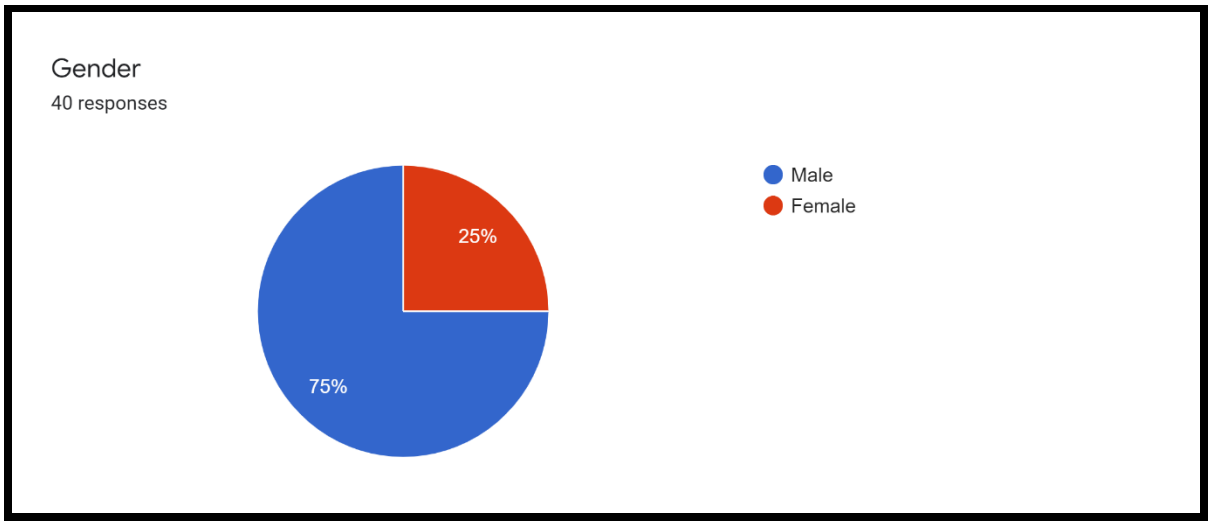

Figure 2. Graph Summary of Respondents According to Gender

Table 1. Frequency Distribution Table of Respondents According to Gender

Gender	Frequency	Percentage	Ranking
Male	30	75 %	1
Female	10	25 %	2
Total	40	100 %	

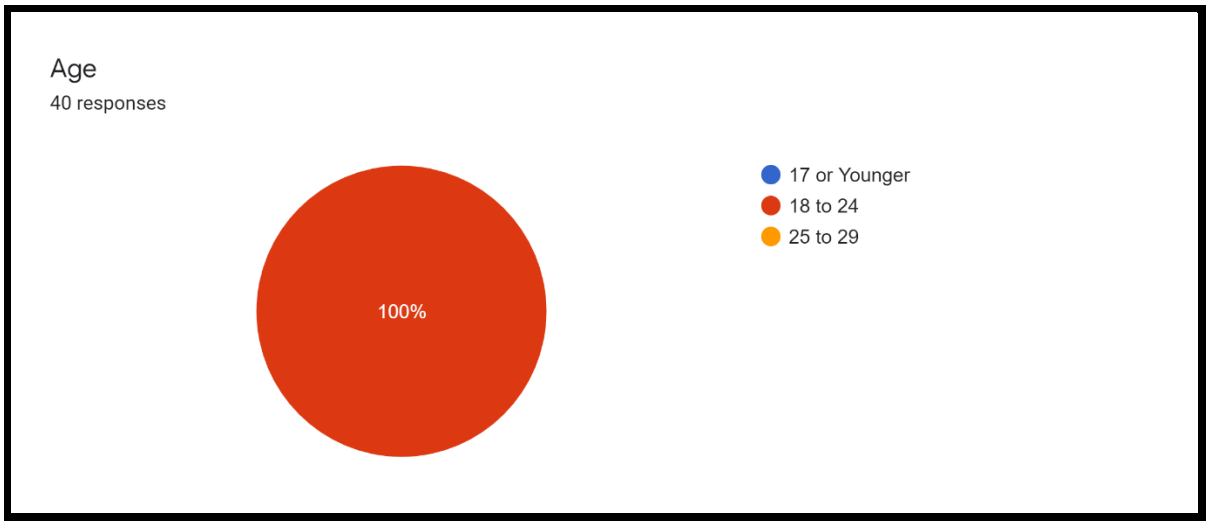

Figure 3. Graph Summary of Respondents According to Age

Table 2. Frequency Distribution Table of Respondents According to Age

Age	Frequency	Percentage	Ranking
18-24	40	100 %	1
Total	40	100 %	

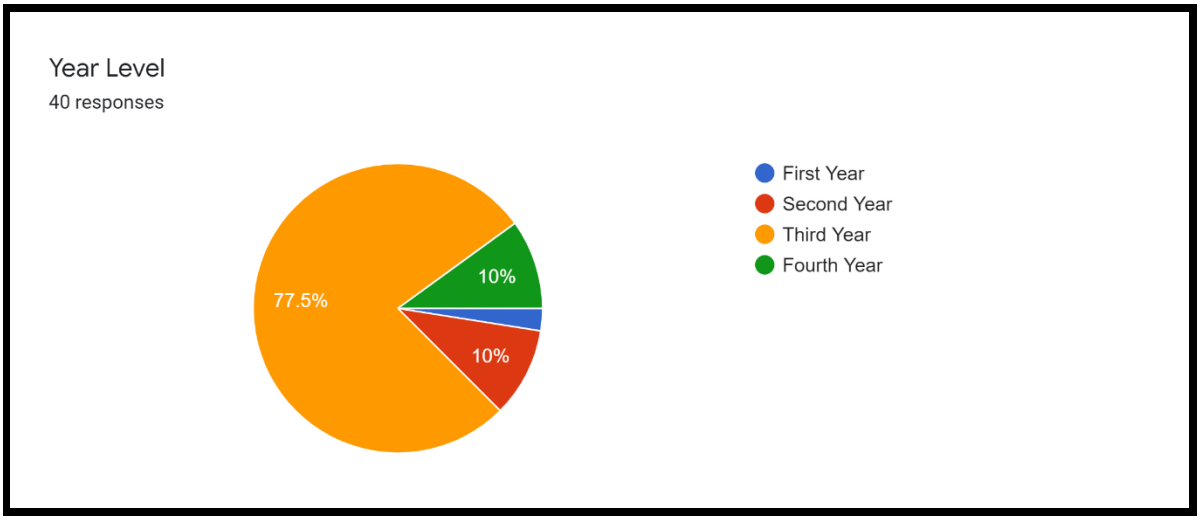

Figure 4. Graph Summary of Respondents According to Year Level

Table 3. Frequency Distribution Table of Respondents According to Year Level

Year Level	Frequency	Percentage	Ranking
First Year	1	1 %	3
Second Year	4	10 %	2
Third Year	31	77.5 %	1
Fourth Year	4	10 %	2
Total	40	100 %	

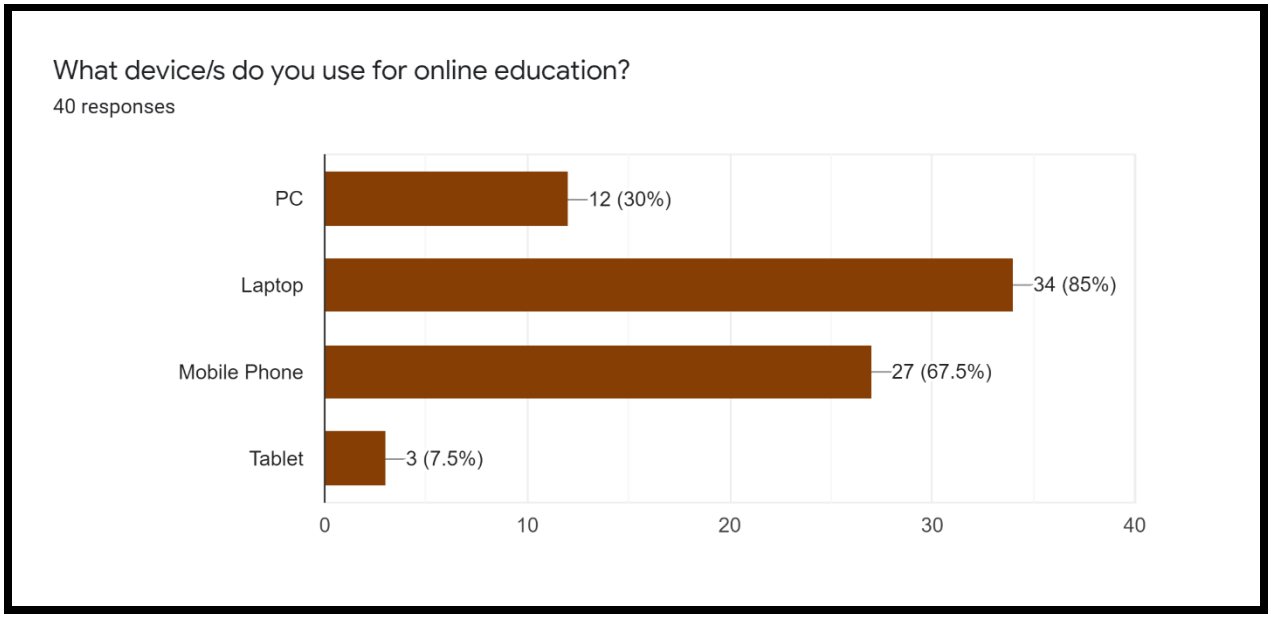

Figure 5. Graph Summary of Respondents According to Devices used for Online Learning

Table 4. Frequency Distribution Table of Respondents According to Devices used for Online Learning

Device	Number of Users	Percentage of Use	Ranking
PC	12	30 %	3
Laptop	34	85 %	1
Mobile Phone	27	67.5 %	2
Tablet	3	10 %	4

Overall Online Learning Experience

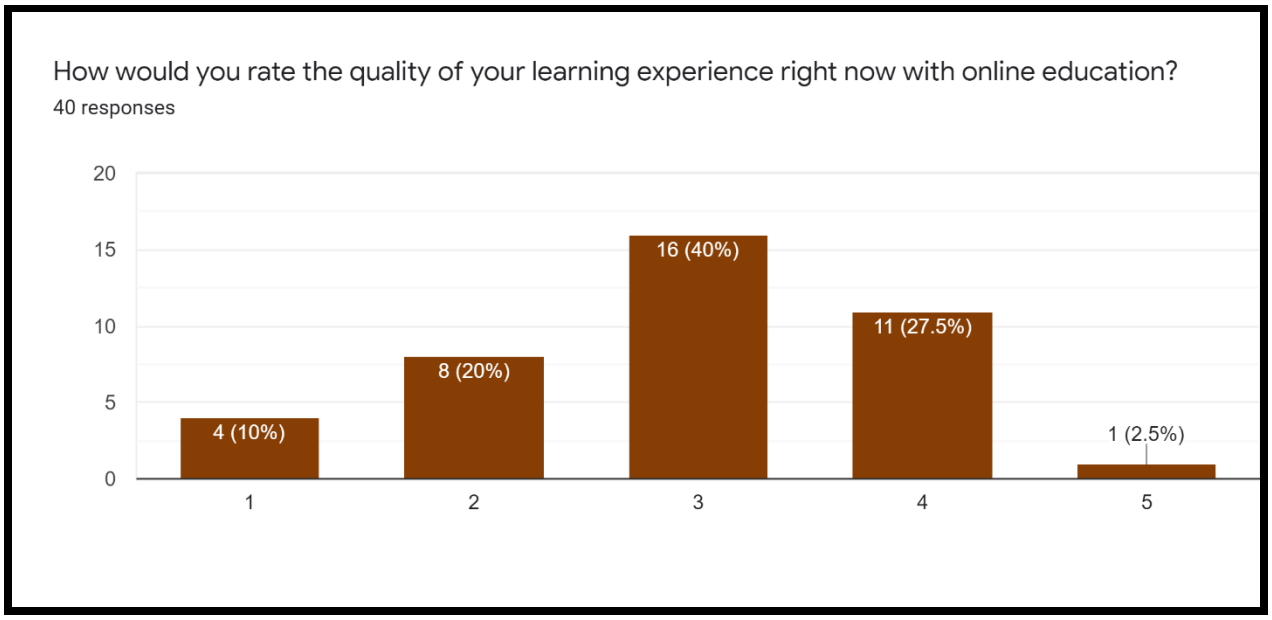

Figure 6. Graph Summary of Respondents According to Quality of Learning

Table 5. Likert Scale Frequency Distribution Table of Respondents According to Quality of Learning

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Satisfaction	4	10 %	4
2	Low Satisfaction	8	20 %	3
3	Average Satisfaction	16	40 %	1
4	Above Average Satisfaction	11	27.5 %	2
5	High Satisfaction	1	2.5 %	5
Total		40	100%	

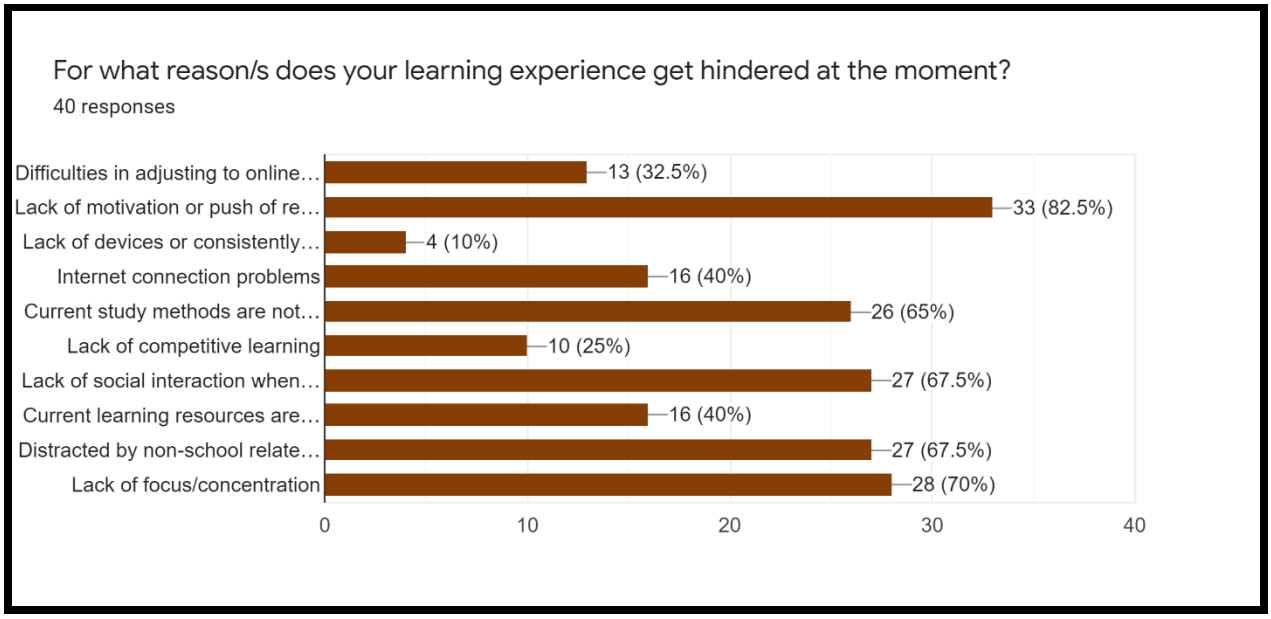

Figure 7. Graph Summary of Respondents According to Quality of Learning Hindrances

Table 6. Frequency Distribution Table of Respondents According to Quality of Learning Hindrances

Reason	Frequency	Percentage	Ranking
Difficulty in adjusting to online learning	13	32.5 %	6
Lack of motivation or push of responsibility	33	82.5 %	1
Lack of consistent working devices	4	10 %	8
Internet connection problems	16	40 %	5
Current study methods are not fun/interesting	26	65 %	4
Lack of competitive learning	10	25 %	7
Lack of social interaction while learning	27	67.5 %	3
Inadequate learning resources	16	40 %	5
Distracted by non-school-related activities	27	67.5 %	3
Lack of focus/concentration	28	70 %	2

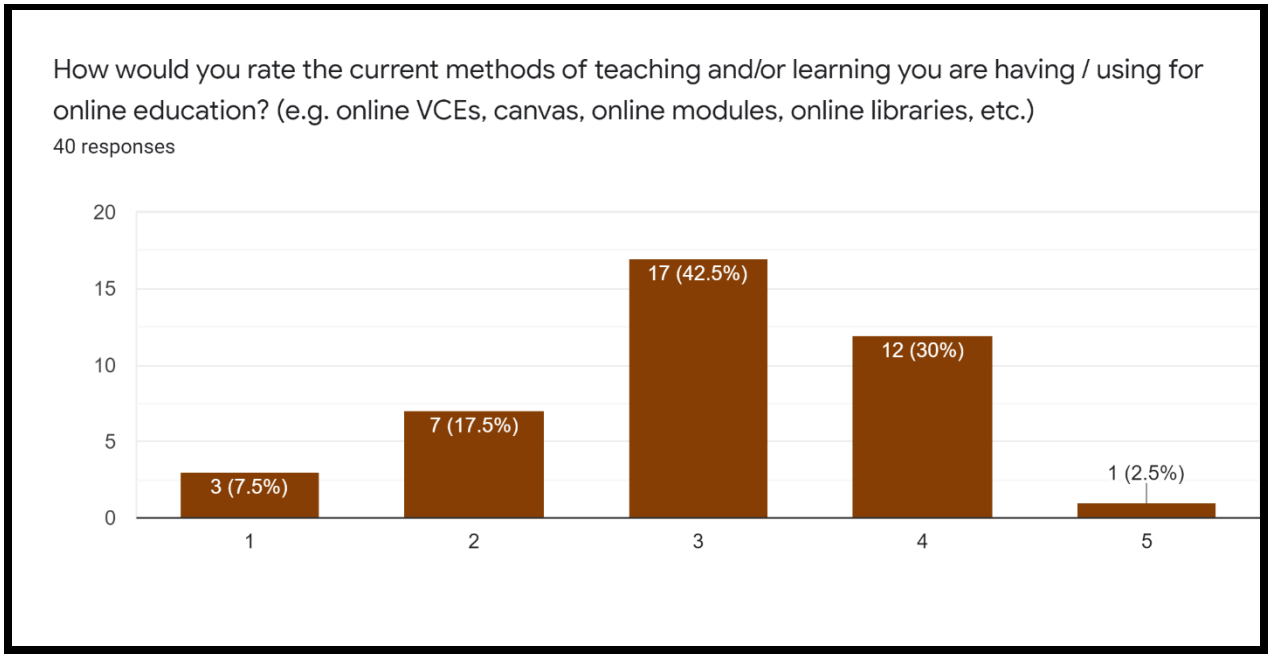

Figure 8. Graph Summary of Respondents According to Methods of Learning

Table 7. Likert Scale Frequency Distribution Table of Respondents According to Methods of Learning

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Satisfaction	3	7.5 %	4
2	Low Satisfaction	7	17.5 %	3
3	Average Satisfaction	17	42.5 %	1
4	Above Average Satisfaction	12	30 %	2
5	High Satisfaction	1	2.5 %	5
Total		40	100%	

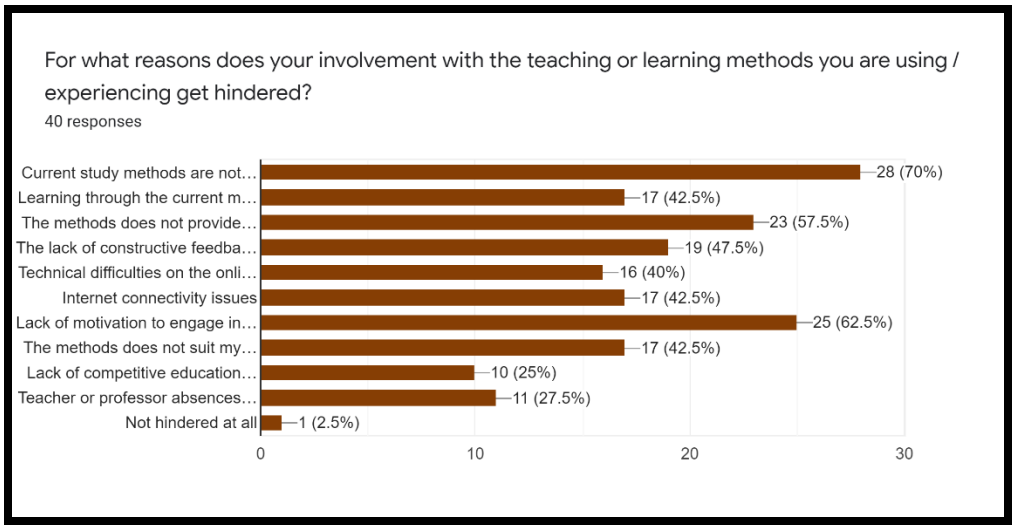

Figure 9. Graph Summary of Respondents According to Methods of Learning Hindrances

Table 8. Frequency Distribution Table of Respondents According to Methods of Learning Hindrances

Reason	Frequency	Percentage	Ranking
Current study methods are not interesting, engaging, or fun	28	70 %	1
Learning through the current methods used by the school is difficult	17	42.5 %	5
The methods does not provide enough satisfying details for learning	23	57.5 %	3
The lack of constructive feedback in learning	19	47.5 %	4
Technical difficulties on the online platforms used for teaching / learning	16	40 %	6
Internet connectivity issues	17	42.5 %	5
Lack of motivation to engage in such methods	25	62.5 %	2
The methods does not suit my studying style, making learning slow	17	42.5 %	5
Lack of competitive education with current methods	10	25 %	8
Teacher or professor absences on planned meeting times	11	27.5 %	7
Not hindered at all	1	2.5	9

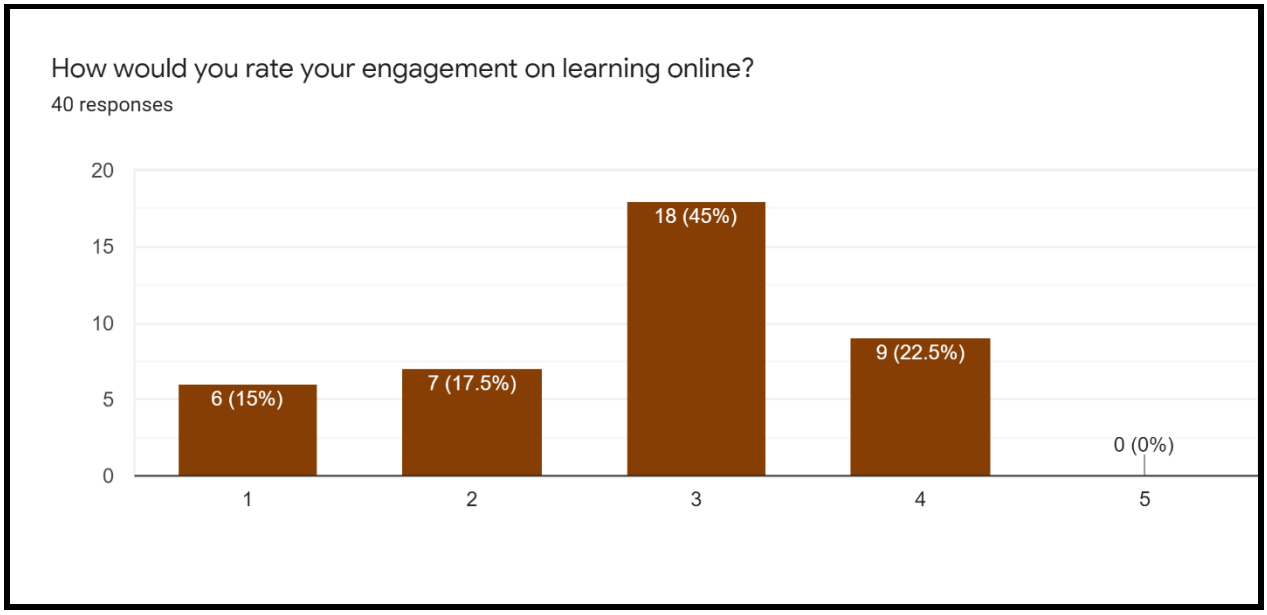

Figure 10. Graph Summary of Respondents According to Engagement on Learning

Table 9. Likert Scale Frequency Distribution Table of Respondents According to Engagement on Learning

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Satisfaction	6	15 %	4
2	Low Satisfaction	7	17.5 %	3
3	Average Satisfaction	18	45 %	1
4	Above Average Satisfaction	9	22.5 %	2
5	High Satisfaction	0	0 %	5
Total		40	100%	

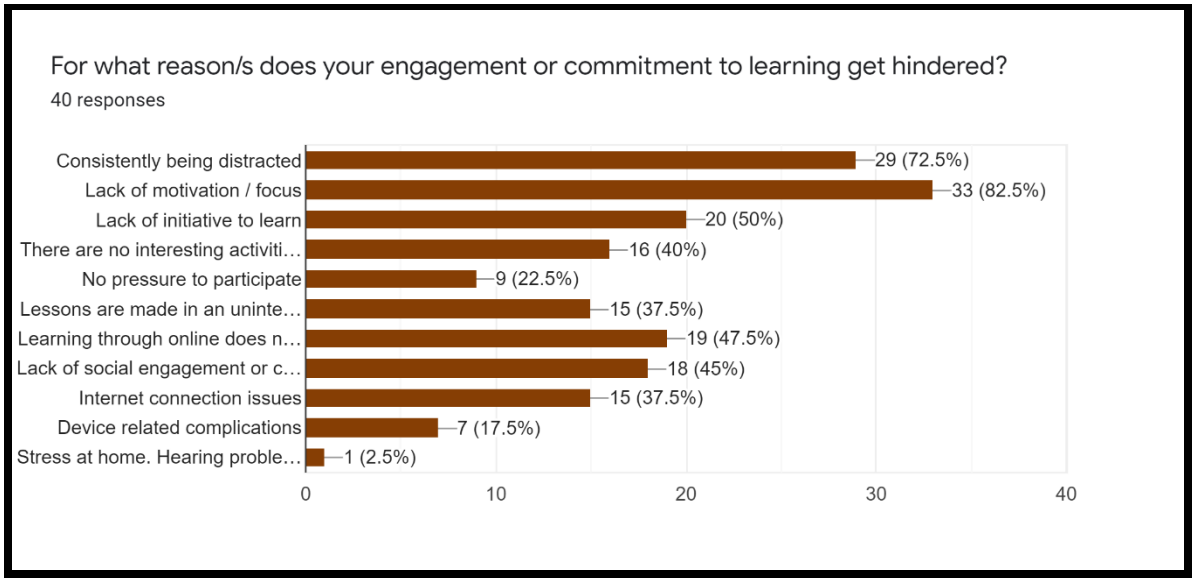

Figure 11. Graph Summary of Respondents According to Engagement on Learning Hindrances

Table 10. Frequency Distribution Table of Respondents According to Engagement on Learning Hindrances

Reason	Frequency	Percentage	Ranking
Consistently being distracted	29	72.5%	2
Lack of motivation / focus	33	82.5%	1
Lack of initiative to learn	20	50%	3
There are no interesting activities to participate in	16	40%	6
No pressure to participate	9	22.5%	8
Lessons are made in an uninteresting way	15	37.5%	7
Learning through online does not feel worth it	19	47.5%	4
Lack of social engagement or collaboration while learning	18	45%	5
Internet connection issues	15	37.5%	7
Device related complications	7	17.5%	9
Stress at Home, hearing problem while studying	1	2.5%	10

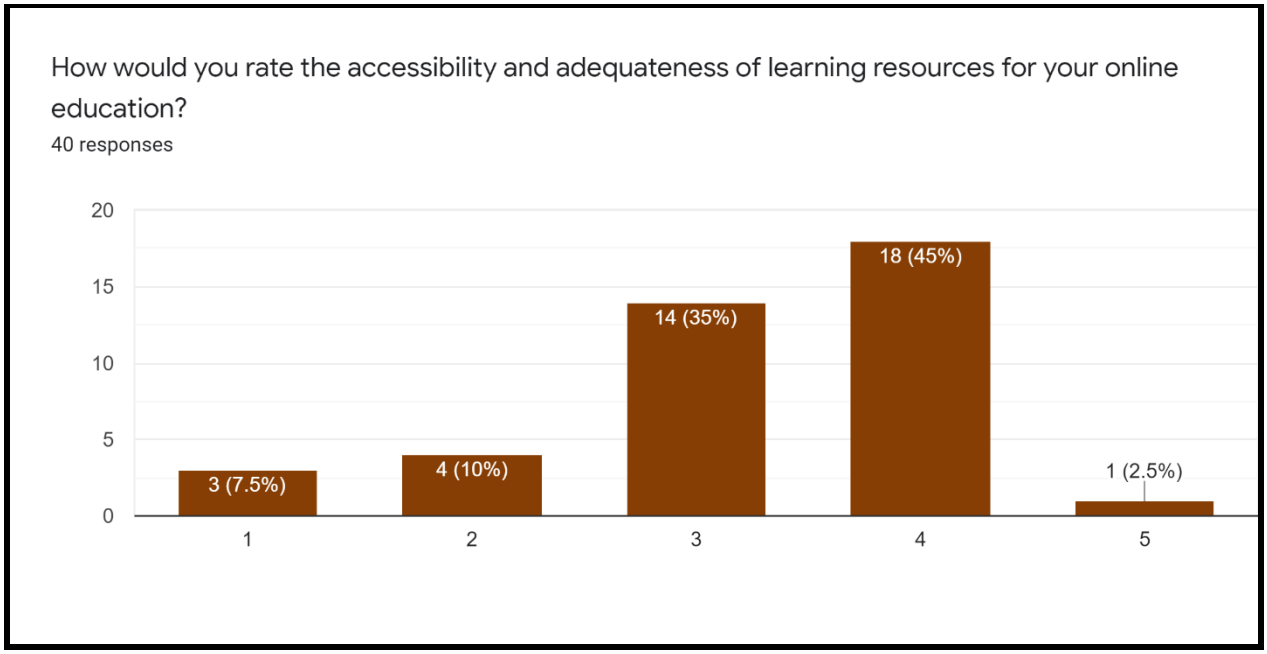

Figure 12. Graph Summary of Respondents According to Accessibility of Learning Resources

Table 11. Likert Scale Frequency Distribution Table of Respondents According to Accessibility of Learning Resources

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Satisfaction	3	7.5 %	4
2	Low Satisfaction	4	10 %	3
3	Average Satisfaction	14	35 %	2
4	Above Average Satisfaction	18	45 %	1
5	High Satisfaction	1	2.5 %	5
Total		40	100%	

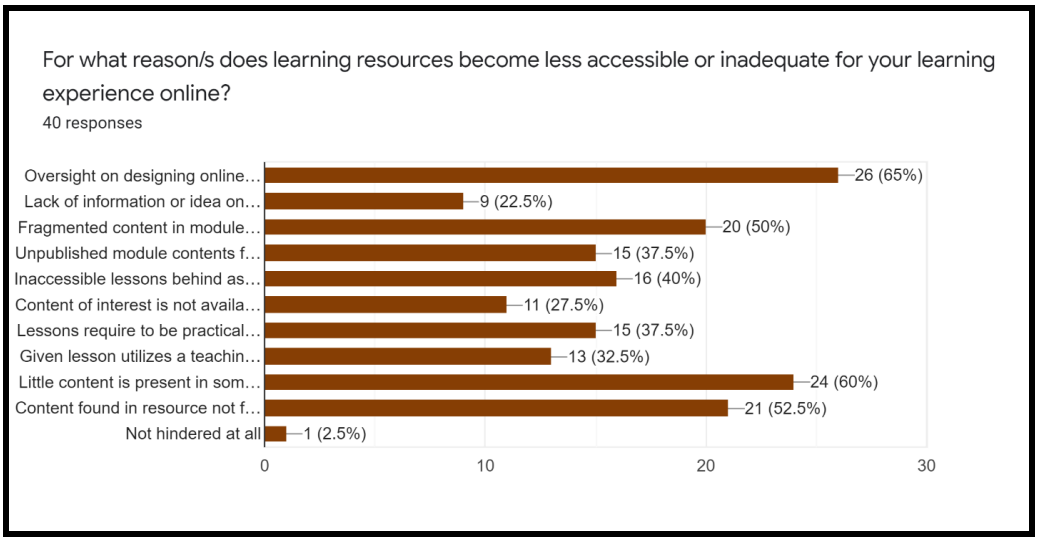

Figure 13. Graph Summary of Respondents According to Accessibility of Learning Resources Hindrance

Table 12. Frequency Distribution Table of Respondents According to Accessibility of Learning Resources Hindrances

Reason	Frequency	Percentage	Ranking
Oversight on designing online modules, such as locked images, files, modules	26	65%	1
Lack of information or idea on how to access school learning resources	9	22.5%	9
Fragmented content in modules, missing parts of content	20	50%	4
Unpublished module contents for a significant amount of time	15	37.5%	6
Inaccessible lessons behind assessments that requires checking	16	40%	5
Content of interest is not available	11	27.5%	8
Lessons require to be practical to fully learn	15	37.5%	6
Given lesson utilizes a teaching method not suited for it	13	32.5%	7
Little content is present in some modules	24	60%	2
Content found in resource not fully explained or elaborated well	21	52.5%	3
Not hindered at all	1	2.5%	10

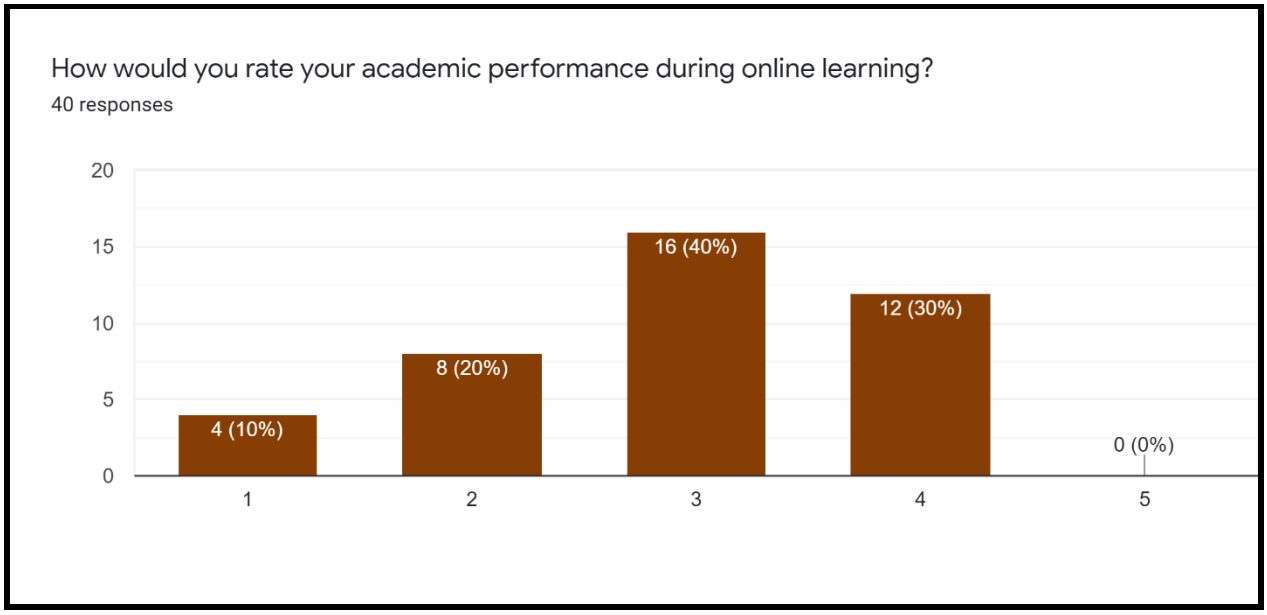

Figure 14. Graph Summary of Respondents According to Academic Performance

Table 13. Likert Scale Frequency Distribution Table of Respondents According to Academic Performance

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Satisfaction	4	10 %	4
2	Low Satisfaction	8	20 %	3
3	Average Satisfaction	16	40 %	1
4	Above Average Satisfaction	12	30 %	2
5	High Satisfaction	0	0 %	5
Total		40	100%	

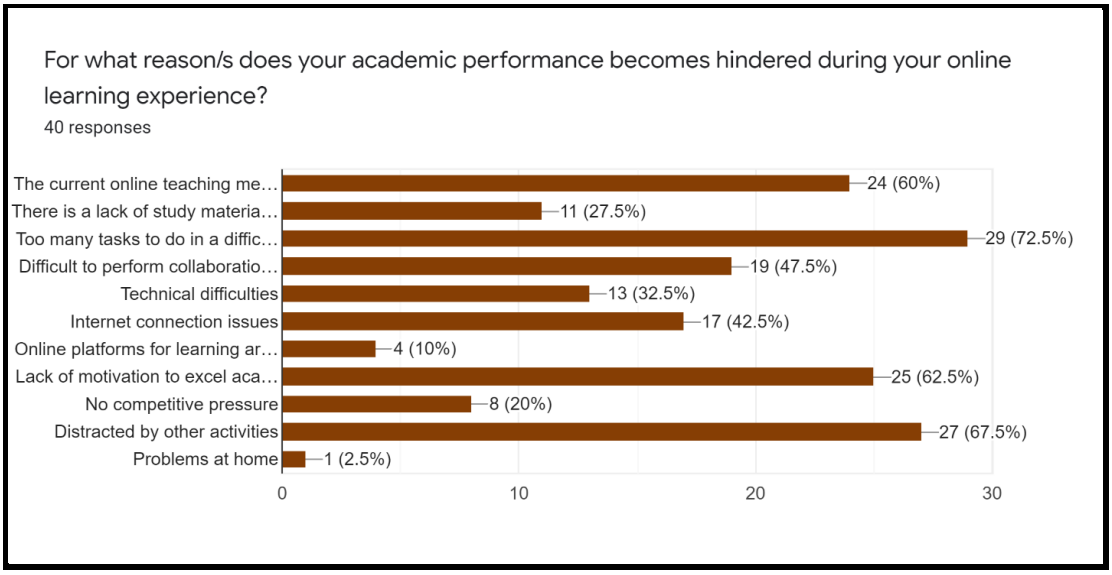

Figure 15. Graph Summary of Respondents According to Academic Performance Hindrances

Table 14. Frequency Distribution Table of Respondents According to Academic Performance Hindrances

Reason	Frequency	Percentage	Ranking
The current online teaching methods are not interesting, fun, or enjoyable	24	60%	4
There is a lack of study materials to learn from	11	27.5%	8
Too many tasks to do in a difficult online learning setting	29	72.5%	1
Difficult to perform collaboration work for group tasks online	19	47.5%	5
Technical difficulties	13	32.5%	7
Internet connection issues	17	42.5%	6
Online platforms for learning are difficult to use	4	10%	10
Lack of motivation to excel academically in online class	25	62.5%	3
No competitive pressure	8	20%	9
Distracted by other activities	27	67.5%	2
Problems at Home	1	2.5%	11

Table 15. Weighted Mean and Verbal Interpretation Table of Respondents According to their Overall Online Learning Experience

Overall Online Learning Experience			
Subtopic	**Weighted Mean**	**Verbal Interpretation**	**Rank**
Quality of Learning	2.925	Average Satisfaction	3
Methods of Learning	3.025	Average Satisfaction	2
Engagement on Learning	2.75	Average Satisfaction	5
Accessibility of Learning Resources	3.25	Average Satisfaction	1
Academic Performance	2.9	Average Satisfaction	4
Total	2.97	Average Satisfaction	

*1.00 – 1.49 = Minimal Satisfaction; 1.50 – 2.49 = Low Satisfaction; 2.50 – 3.49 = Average Satisfaction; 3.50 – 4.50 = Above Average Satisfaction; and 4.51 - 5.00 = High Satisfaction.

Opinions on AI Use in Education Services

ELSA Speak

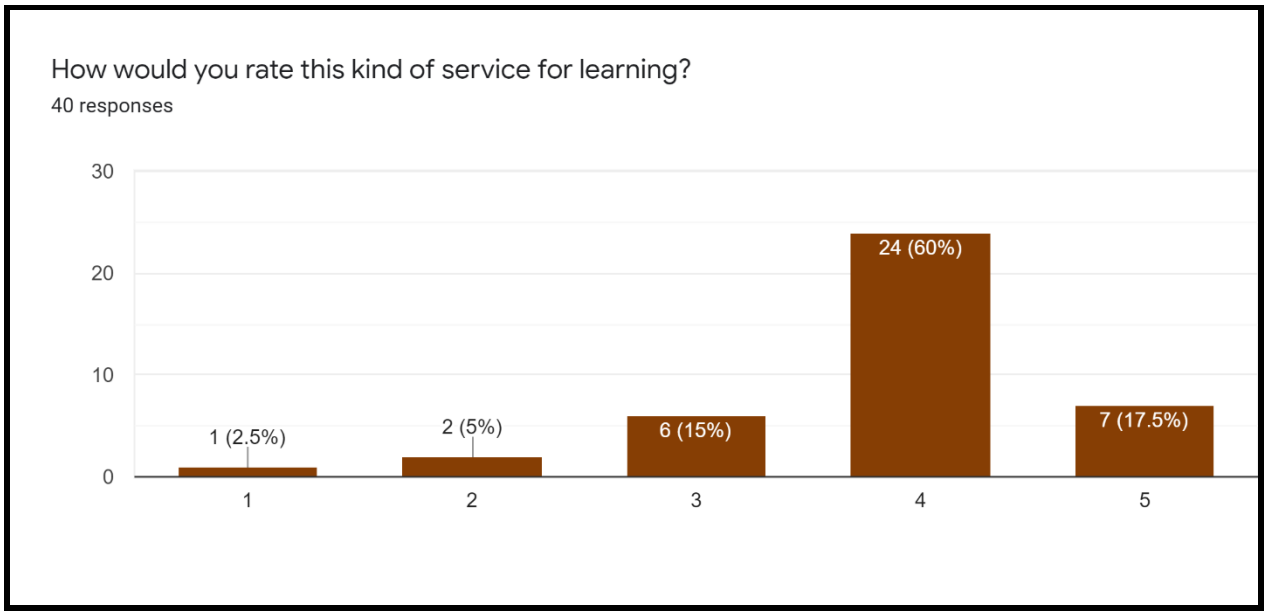

Figure 16. Graph Summary of Respondent's Rating of the ELSA Speak App for Learning

Table 16. Likert Scale Frequency Distribution Table of Respondents According to Rating of the ELSA Speak App for Learning

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Impact	1	2.5 %	5
2	Low Impact	2	5 %	4
3	Average Impact	6	15 %	3
4	Above Average Impact	24	60 %	1
5	High Impact	7	17.5 %	2
Total		40	100%	

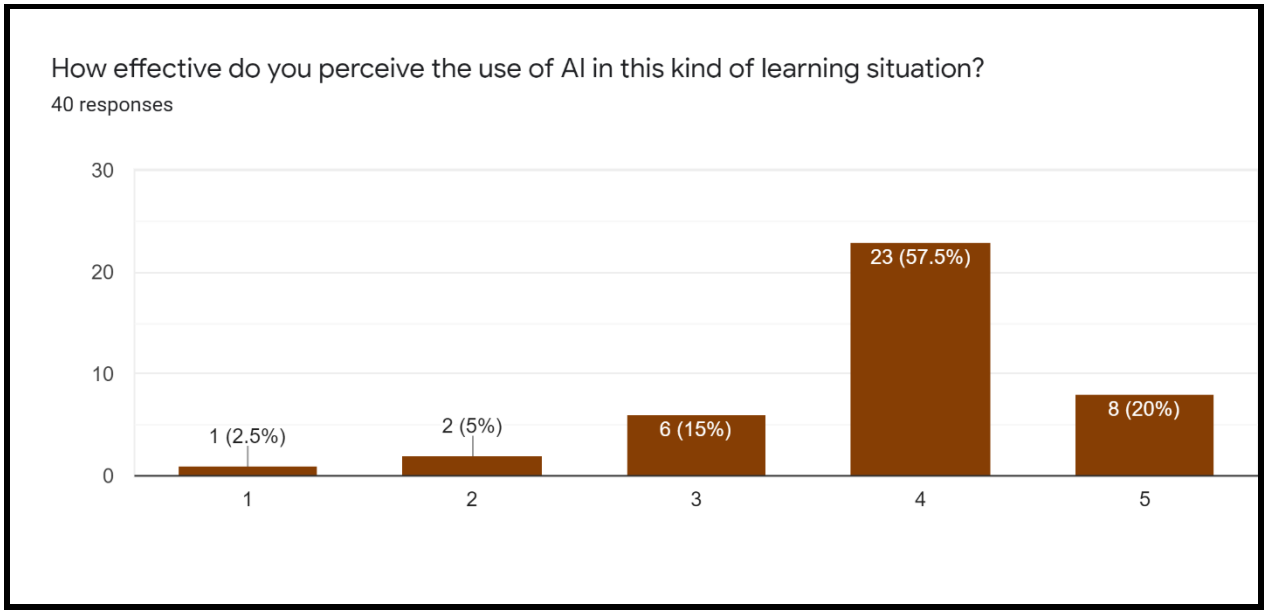

Figure 17. Graph Summary of Respondent's Rating of the Effectiveness of using AI in the ELSA Speak App for Learning

Table 17. Likert Scale Frequency Distribution Table of Respondents According to Rating of the Effectiveness of using AI in the ELSA Speak App for Learning

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Impact	1	2.5 %	5
2	Low Impact	2	5 %	4
3	Average Impact	6	15 %	3
4	Above Average Impact	23	57.5 %	1
5	High Impact	8	20 %	2
Total		40	100%	

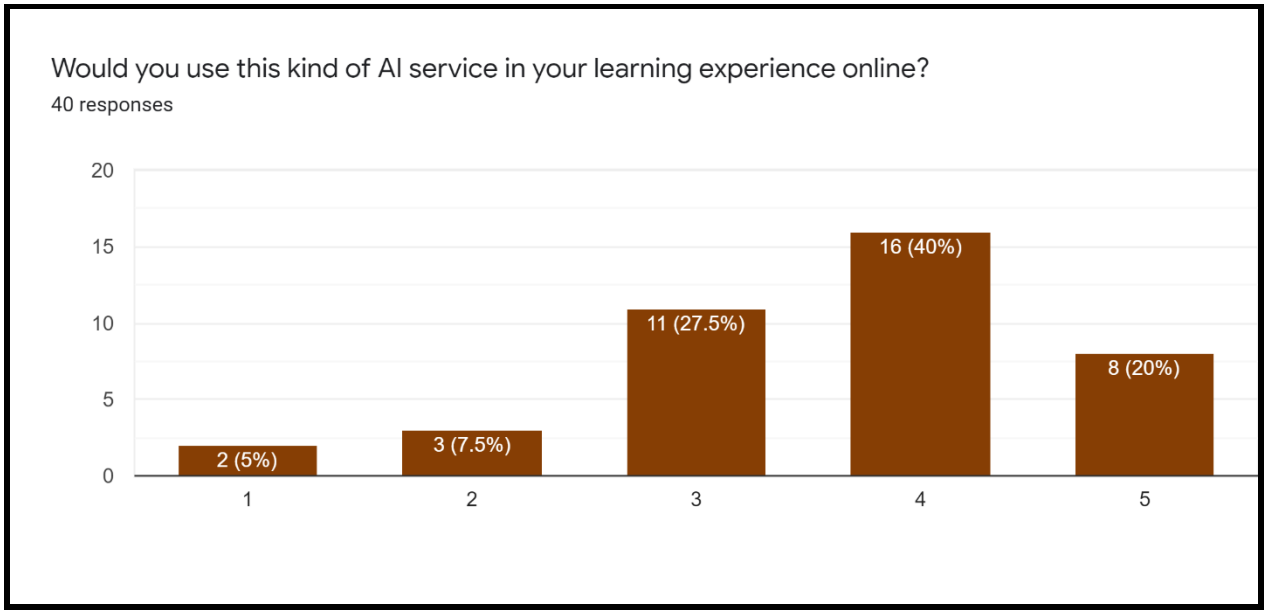

Figure 18. Graph Summary of Respondent's Rating of the Likelihood of Using an AI Service like ELSA Speak App for own Online Education

Table 18. Likert Scale Frequency Distribution Table of Respondents According to Rating of the Likelihood of Using an AI Service like ELSA Speak App for own Online Education

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Likelihood	2	5 %	5
2	Low Likelihood	3	7.5 %	4
3	Average Likelihood	11	27.5 %	2
4	Above Average Likelihood	16	40 %	1
5	High Likelihood	8	20 %	3
Total		40	100%	

Databot

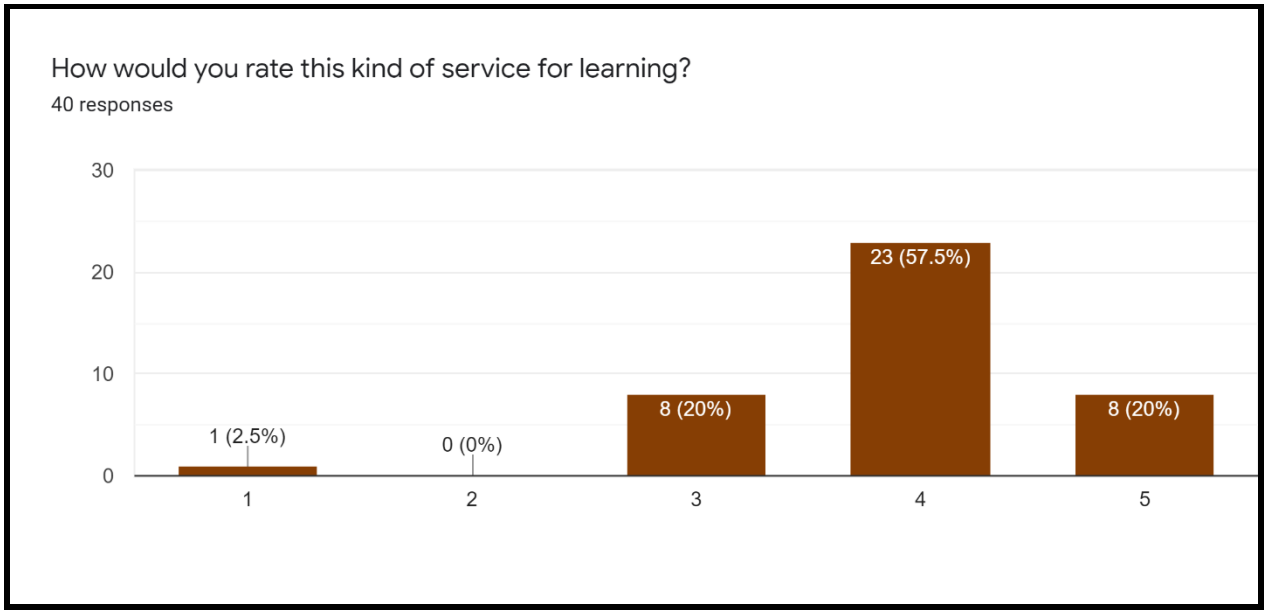

Figure 19. Graph Summary of Respondent's Rating of the Databot App for Learning

Table 19. Likert Scale Frequency Distribution Table of Respondents According to Rating of the Databot App for Learning

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Impact	1	2.5 %	3
2	Low Impact	0	0 %	4
3	Average Impact	8	20 %	2
4	Above Average Impact	23	57.5 %	1
5	High Impact	8	20 %	2
Total		40	100%	

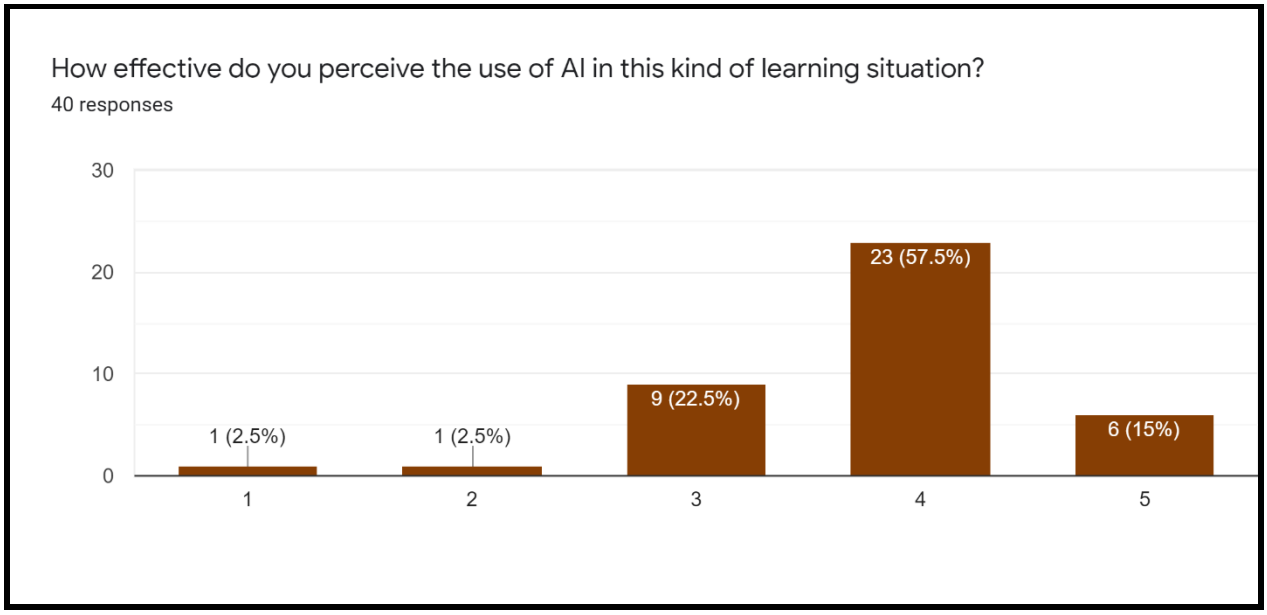

Figure 20. Graph Summary of Respondent's Rating of the Effectiveness of using AI in the Databot App for Learning

Table 20. Likert Scale Frequency Distribution Table of Respondents According to Rating of the Effectiveness of using AI in the Databot App for Learning

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Impact	1	2.5 %	4
2	Low Impact	1	2.5 %	4
3	Average Impact	9	22.5 %	2
4	Above Average Impact	23	57.5 %	1
5	High Impact	6	15 %	3
Total		40	100%	

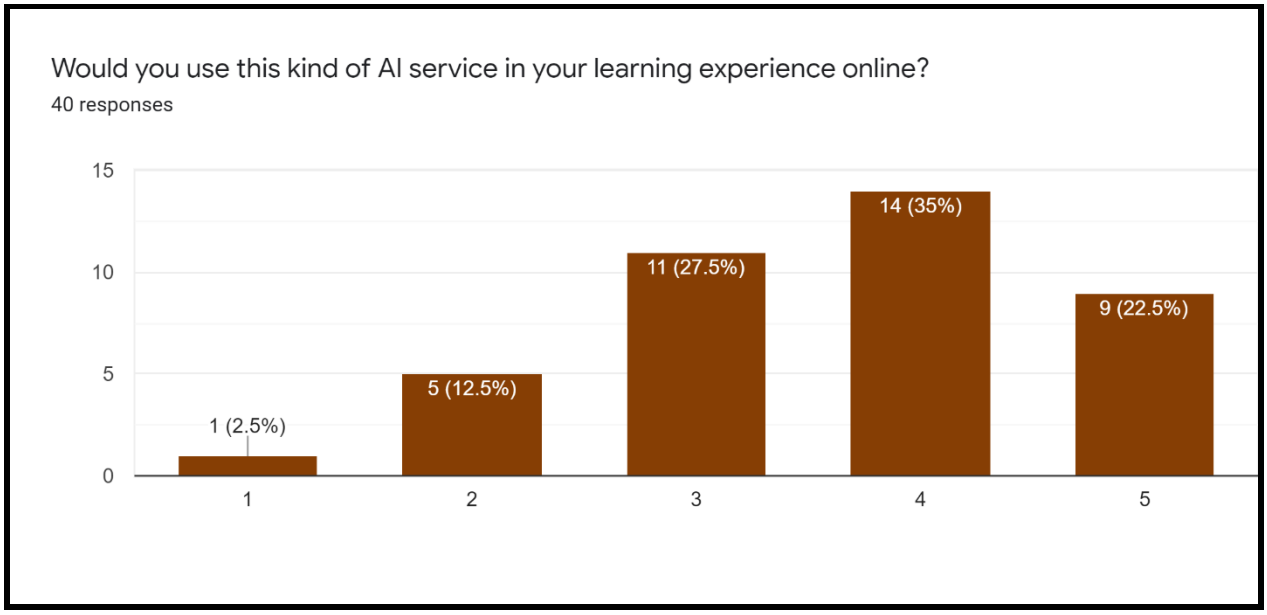

Figure 21. Graph Summary of Respondent's Rating of the Likelihood of Using an AI Service like Databot App for own Online Education

Table 21. Likert Scale Frequency Distribution Table of Respondents According to Rating of the Likelihood of Using an AI Service like Databot App for own Online Education

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Likelihood	1	2.5 %	5
2	Low Likelihood	5	12.5 %	4
3	Average Likelihood	11	27.5 %	2
4	Above Average Likelihood	14	35 %	1
5	High Likelihood	9	22.5 %	3
Total		40	100%	

PowerPoint Presentation Translator

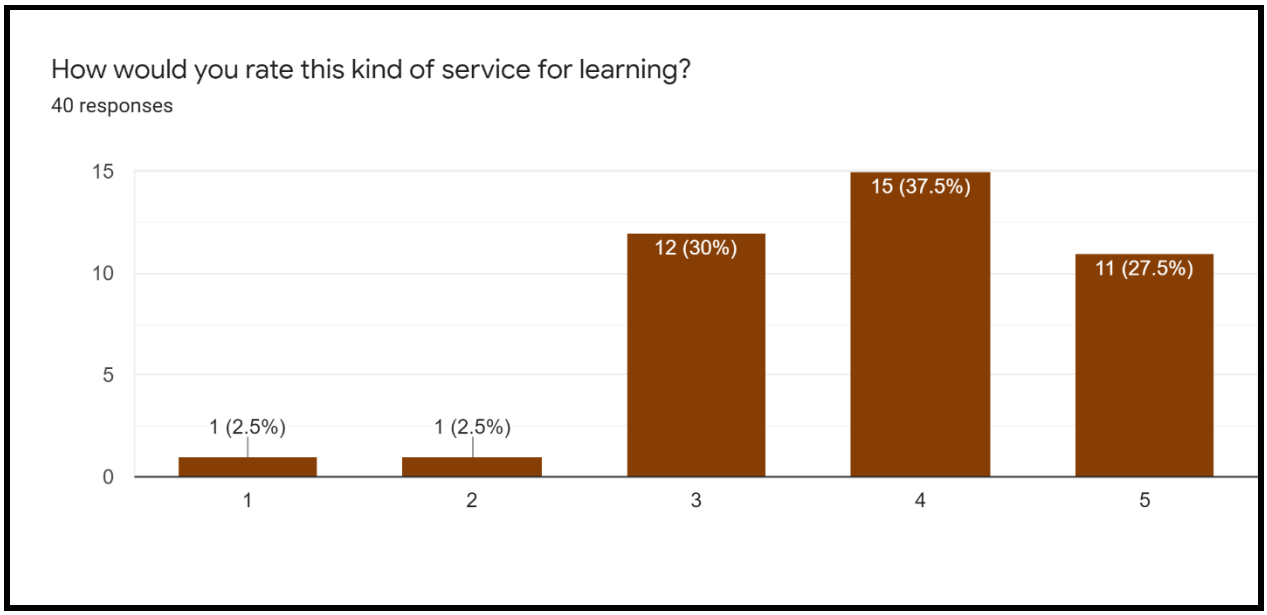

Figure 22. Graph Summary of Respondent's Rating of the PowerPoint Presentation Translator App for Learning

Table 22. Likert Scale Frequency Distribution Table of Respondents According to Rating of the PowerPoint Presentation Translator App for Learning

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Impact	1	2.5 %	4
2	Low Impact	1	2.5 %	4
3	Average Impact	12	30 %	2
4	Above Average Impact	15	37.5 %	1
5	High Impact	11	27.5 %	3
Total				

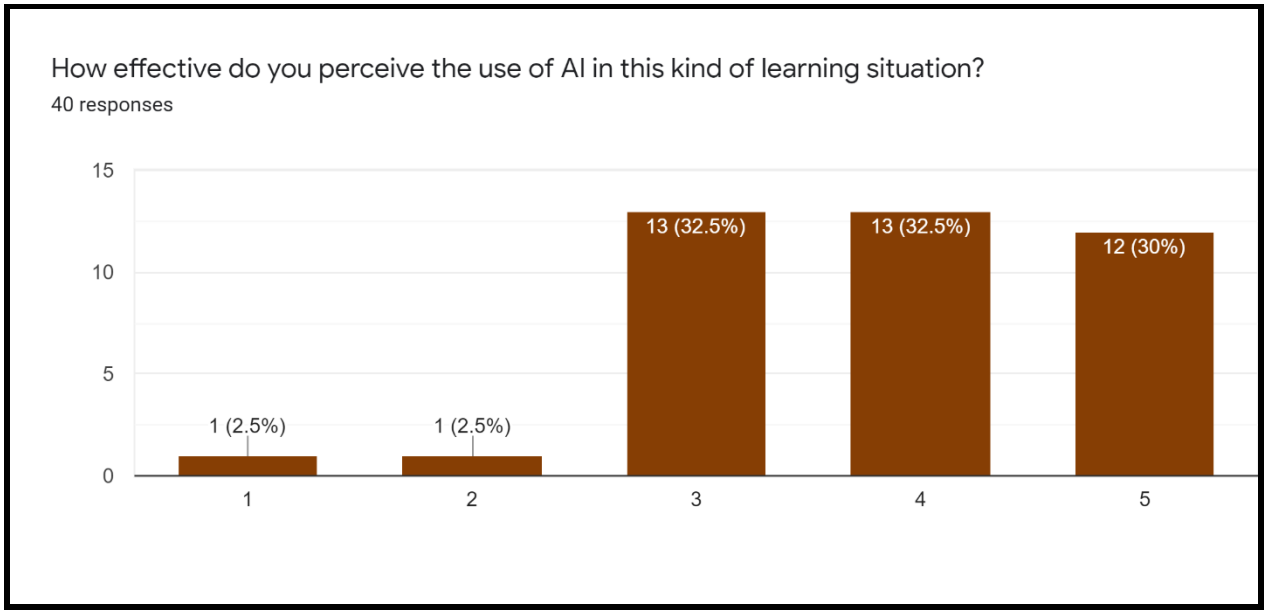

Figure 23. Graph Summary of Respondent's Rating of the Effectiveness of using AI in the PowerPoint Presentation Translator App for Learning

Table 23. Likert Scale Frequency Distribution Table of Respondents According to Rating of the Effectiveness of using AI in the PowerPoint Presentation Translator App for Learning

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Impact	1	2.5 %	3
2	Low Impact	1	2.5 %	3
3	Average Impact	13	32.5 %	1
4	Above Average Impact	13	32.5 %	1
5	High Impact	12	30 %	2
Total				

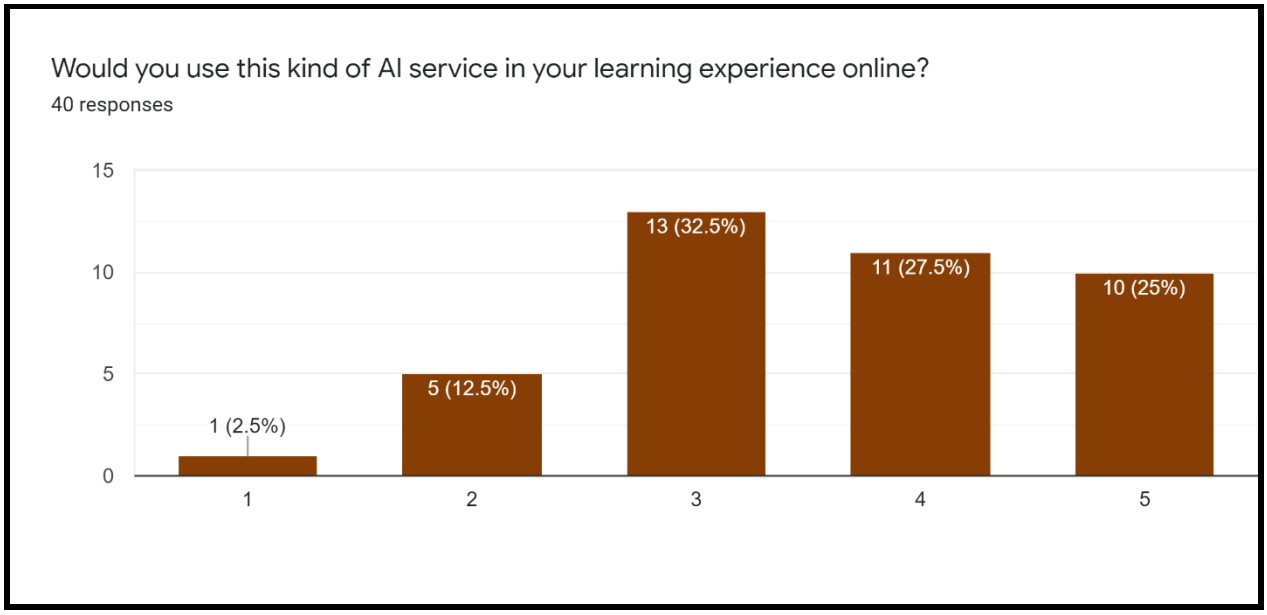

Figure 24. Graph Summary of Respondent's Rating of the Likelihood of Using an AI Service like PowerPoint Presentation Translator App for own Online Education

Table 24. Likert Scale Frequency Distribution Table of Respondents According to Rating of the Likelihood of Using an AI Service like PowerPoint Presentation Translator App for own Online Education

Likert Scale	Rating	Frequency	Percentage	Ranking
1	Minimal Likelihood	1	2.5 %	5
2	Low Likelihood	5	12.5 %	4
3	Average Likelihood	13	32.5 %	1
4	Above Average Likelihood	11	27.5 %	2
5	High Likelihood	10	25 %	3
Total				

Table 25. Weighted Mean and Verbal Interpretation Table of Respondents According to their Opinions on AI Use in Education Services

Opinions on AI use in Education Services				
AI-based Education Device		**Weighted Mean**	**Verbal Interpretation**	**Rank**
ELSA Speak	Impact	3.85	Above Average Impact	2
	Effectiveness	3.875	Above Average Impact	1
	Likelihood	3.625	Above Average Likelihood	3
Mean Total		3.783	Above Average Impact/Likelihood	1
Databot	Impact	3.925	Above Average Impact	1
	Effectiveness	3.8	Above Average Impact	2
	Likelihood	3.625	Above Average Likelihood	3
Mean Total		3.783	Above Average Impact/Likelihood	1
PowerPoint Presentation Translator	Impact	3.85	Above Average Impact	1
	Effectiveness	3.85	Above Average Impact	1
	Likelihood	3.6	Above Average Likelihood	2
Mean Total		3.767	Above Average Impact/Likelihood	2
Overall Mean Total		3.78	Above Average Impact/Likelihood	

*1.00 – 1.49 = Minimal Impact/Likelihood; 1.50 – 2.49 = Low Impact/Likelihood; 2.50 – 3.49 = Average Impact/Likelihood; 3.50 – 4.50 = Above Average Impact/Likelihood; and 4.51 - 5.00 = High Impact/Likelihood.

DISCUSSION

The results of the data gathering procedure provided data which can be divided into three parts, the demographic information, the overall online learning experience, and the opinions on AI use in education services. First, the demographic information included questions regarding the respondents' gender at birth, age, year level, and device used for online learning.

Table 1 indicates the respondent data on gender, displaying that the number of males that took the survey was 30 at 75%, whereas the number of females that took the survey was 10 at 25%. This highlights that most of the respondents for this study are male college students of DLSL. Table 2 displays the age of the respondent group, which is all around the ages 18 to 24, which is the expected age group for college students to be in. The year level is presented next through Table 3, which indicated that 31 at 77.5% of the DLSL college student respondents came from the 3rd year, followed by the 2nd and 4th year by both 4 at 10% each, and 1 at 2.5% for the 1st year. This outcome could have been influenced by the sampling method, as the convenience design allowed for the initial choosing of 3rd year students, and the snowball sampling approach caused the survey to be spread more among 3rd year students who are more likely to know each other, compared to other years. Lastly for the demographic, Table 4 displays the devices the respondents are using for online education, with 34 at 85% being laptop users, 27 at 67.5% being mobile phone users, 12 at 30% being PC users, and 3 at 7.5% being tablet users.

Next, the overall online education experience part of the study identified the respondents' level of satisfaction towards the quality of their learning, the methods used for their education, the engagement they had for online learning, the accessibility of online resources for learning, and their academic performance during online education. Alongside this, the causes of hindrances for each subtopic of the overall education experience were also identified.

Under the quality of learning subtopic, Table 5 displayed the distribution of the students' level of satisfaction regarding the quality of their current online education in DLSL. The frequency distribution indicated that 16 out of 40 (40%) student respondents feel that the quality of online learning they are getting or experiencing could be considered as average, followed by 11 (27.5%) respondents perceiving it as above average, 8 (20%) perceiving it as below average, 4 (10%) indicating that it gave them the least satisfaction, and only 1 (2.5%) student saying the quality of education was high. Considering the hindrances towards the quality of learning for students, Table 6 indicated that the top 5 reasons for the reduction of quality of learning are: (1) *"lack of motivation or push of responsibility"* with 33 (82.5%) out of 40 votes, (2) *"lack of focus/concentration"* with 28 (70%) out of 40 votes, (3) "*lack of social interaction while learning"* with 27 (67.5%) out of 40 votes, (4) *"distracted by non-school-related activities"* with also 27 (67.5%) out of 40 votes, and (5) *"current study methods are not fun/interesting"* with 26 (65%) out of 40 votes. These results state that the quality of education gets affected and remains mostly average, according to the students, due to the limitations of online education, which causes variables such as social interaction, motivation, and concentration to be lacking due to not being in a proper learning environment.

For the subtopic of methods for learning, Table 7 showcases the distribution of students' regarding their satisfaction with current methods used for online learning. The results indicated that 17 (42.5%) out of 40 students feel average satisfaction regarding what tools and methods used to provide them lessons, followed by 12 (30%) feeling above average satisfaction, 7 (17.5%) feeling low satisfaction, 3 (7.5%) feeling the least satisfaction of the methods, and with only 1 (2.5%) feeling high satisfaction regarding the teaching methods used. Looking at the reasons that hinders the current teaching methods are being affected by, the top 5 reasons as indicated with Table 8 are: (1) *"current study methods are not interesting, engaging, or fun"* with 28 (70%) out of 40 students, (2) *"lack of motivation to engage in such methods"* with 25 (62.5%) votes, (3) *"the methods does not provide enough satisfying details for learning"* with 23 (57.5%) votes, (4) the *"lack of constructive feedback in learning"* with 19 (47.5%) votes, and (5) a three way tie between *"learning through the current methods used by the school is difficult"*, *"internet connectivity issues"*, and *"the methods does not suit my studying style, making learning slow"*, with all having 17 (42.5%) votes. These results display that the students mostly think that the current methods of online teaching are average, and are hindered by either the lack of interesting and engaging teaching bits, lack of constructive feedback for student online learning, considering it is mostly self-paced, and the incompatibility of online teaching methods to students who are mostly used to face-to-face methodologies of learning.

With the subtopic of engagement on learning, Table 9 presented the distribution of the students' level of satisfaction with their engagement in online learning. The results show that 18 (45 %) out of 40 students had an average satisfaction with their online learning engagement, while about 9 (22.5 %) had an above average level of satisfaction, 7 (17.5 %) had a low satisfaction level, 6 (15 %) had a minimal satisfaction level, and none had reported having a high satisfaction level with the online learning engagement. By looking closer on Table 10, the top 5 reasons as to why the students experienced hindrances in their online learning engagement are as follows: (1) *"lack of motivation/focus"* with 33 (82.5%) votes, (2) *"consistently being distracted"* with 29 (72.5%) votes, (3) *"Lack of initiative to learn"* with 20 (50%) votes, (4) *"Learning through online does not feel worth it"* with 19 (47.5%) votes, and (5) *"Lack of social engagement or collaboration while learning"* with 18 (45%) votes. These show that most of the students think that the experience on their online learning engagement is only on an average level, citing reasons that they feel a lack of clear focus and motivation to engage in online learning, lack of initiative and incentive to learn online, and a lack of a social collaborative aspect in learning, leading to their engagement for learning being hindered. This indicates that the current system of online education is fairly inadequate towards providing the students the right amount of stimuli to be engaged, alongside being limited on the degree of social interaction students can have, compared to being in an actual classroom or school environment.

Following on to the subtopic of the accessibility of online learning resources, Table 11 shows that 18 (45 %) out of 40 students reported having an above average satisfaction level with their online learning resources' accessibility, 14 (35 %) had an average satisfaction level, 4 (10 %) had a low satisfaction level, 3 (7.5 %) had a minimal satisfaction level, and only 1 (2.5 %) had a high satisfaction level with the accessibility of online learning resources. Although there is a high number of above average satisfaction for this subtopic, there are still reasons as to why some students are experiencing hindrances with regards to this. As shown in Table 12, the main 5 reasons are as follows: (1) "*Oversight on designing online modules, such as locked files, images, modules*" with 26 (65%) votes, (2) "*Little content is present in some modules*" with 24 (60%) votes, (3) "*Content found in resource not fully explained or elaborated well*" with 21 (52.5%) votes, (4) "*Fragmented content in modules, missing parts of content*" with 20 (50%) votes, and (5) "*Inaccessible lessons behind assessments that require checking*" with 16 (40%) votes. Based on the results, the majority of the students thought that their satisfaction with the accessibility of the online resources were between average and above average, but it is apparent that the respondents do still get hindered when trying to access learning materials, due to technical issues and barricades in the learning medium used for online education, as well the quality and amount of the content being fairly inadequate for the learners.

The last subtopic for the overall quality of online learning is academic performance. From what can be seen from the frequency distribution in Table 13, there are 16 (40 %) out of 40 students who said that their academic performance were at an average satisfaction level, followed by 12 (30 %) who were at a above average satisfaction level, 8 (20 %) at a low satisfaction level, 4 (10 %) who were at a minimal satisfaction level, and none who reported having a high satisfaction level in their academic performance. In table 14, the top 5 reasons as to why there are hindrances in the academic performance of the students include: (1) "*Too many tasks to do in a difficult online learning setting*" with 29 (72.5%) votes, (2) "*Distracted by other activities*" with 27 (67.5%) votes, (3) "*Lack of motivation to excel academically in online class*" with 25 (62.5%) votes, (4) "*The current online teaching methods are not interesting, fun, or enjoyable*" with 24 (60%) votes, and (5) "*Difficult to perform collaboration work for group tasks online*" with 19 (47.5%) votes. From these results, the majority of the students reported that their satisfaction towards their academic performance is on an average level with reasons for encountering difficulties and hindrances include the overabundance of tasks, difficulties of doing certain tasks online, focus and distraction, and uninteresting teaching methods for online learning. This implies that students would excel more if the education that they are receiving are given in a not overwhelming manner, in a way that is interesting and fun, and designed to be collaboration friendly, considering online learning.

Table 15 displays the weighted mean values and verbal interpretations of subtopics under the overall online learning experience. Referring to the weighted mean values, the subtopics are ranked in the following order: "*Accessibility of learning resources*" with a mean score of 3.25, followed by "*Methods of learning*" with a mean score of 3.025, "*Quality of learning*" with a mean score of 2.925, "*Academic performance*" with a mean score of 2.9, and lastly, "*Engagement on learning* " with a mean score of 2.75. With reference to the Likert Scale interpretations on weighted mean values, all of the subtopics overall are deemed by DLSL college students to be average at best, with a weighted mean value of 2.97. The student respondents think that the accessibility of resources and the methods of learning are the best aspects in the current online education system, although still considered average. Students' satisfaction are most negatively affected regarding their academic performance and engagement on learning, which displays that the current online education system does not provide enough resources or procedures to ensure that students' engagement on learning and their capability to learn effectively are high.

The last part is the opinion on the use of AI in education, which identifies their perceptions towards given AI-based education services examples, considering their current online education. The 3 given AI examples for use in education are namely: ELSA Speak, Databot, and Powerpoint Presentation Translator. The services will be rated based on its impact as a service towards learning, the effectiveness of the AI used in the service in a learning environment, and student respondent's likelihood of usage for their own online education will be discussed.

The first AI is ELSA Speak. ELSA Speak is an education service that mainly performs its functions using AI concepts of problem solving by search. From Table 16, the students have given their rating on the impact of using it for learning. 24 (60 %) out of 40 students have given an above average impact rating, 7 (17.5 %) with a high impact rating, 6 (15 %) with an average impact rating, 2 (5 %) with a low impact rating, and only 1 (2.5 %) with a minimal impact rating for its impact on learning. For Table 17, the rating for the effectiveness of its AI concept on learning shows that: 23 (57.5 %) out of 40 students gave it an above average impact rating, 8 (20 %) with a high impact rating, 6 (15 %) with an average impact rating, 2 (5 %) with a low impact rating, and only 1 (2.5 %) gave it a minimal impact rating for its effectiveness in using it for learning. The likelihood of the student respondents using this AI service is shown through Table 18, wherein 16 (40 %) out of 40 students rated it with an above average likelihood of using it, 11 (27.5 %) rated it with an average likelihood, 8 (20 %) with a high likelihood, 3 (7.5 %) with a low likelihood, and 2 (5 %) gave it a minimal likelihood of using it for learning. With such results, ELSA Speak could be considered a service that has above average impact, leading to an above average likelihood that the respondents would use it for their own online learning. This also states that by ELSA Speak's design, the AI concept of problem solving by search and its application to provide quick feedback on user input and provide personalized learning lessons with reference to the user input is an effective way of educating students.

The next AI is Databot. Databot is an education service that serves as a virtual assistant, aiding the user in learning through having tools that the user can utilize to perform extensive research on topics. According to the impact of learning results in Table 19, 23 (57.5) out of 40 students rated Databot with an above average impact rating, 8 (20 %) gave it an average impact rating and another 8 (20 %) gave it a high impact rating, and only 1 (2.5 %) gave it a minimal impact rating for learning while no student gave it a low impact rating on its impact to learning. For the rating of the effectiveness of its AI concept on learning, Table 20 shows that 23 (57.5 %) out of 40 students gave it an above average impact rating for its effectiveness, 9 (22.5 %) gave it an average impact rating, 6 (15 %) with a high impact rating, 1 (2.5) with a low impact rating, and only 1 (2.5 %) gave it a minimal impact rating for its effectiveness in learning. The likelihood of the student respondents using this AI service for learning is presented in table 21 wherein 14 (35 %) out of 40 students gave it an above average likelihood of using it, 11 (27.5 %) gave it an average likelihood rating, 9 (22.5 %) with a high likelihood, 5 (12.5 %) with a low likelihood, and only 1 (2.5 %) gave it a minimal likelihood of using it for learning. Based on the results, Databot could also be considered an education service that has above average impact for the respondents, therefore leading to an above average likelihood that they would use it for online learning. With reference to this result, the Databot's AI design of providing extensive search on requested topics, as well as being able to provide appropriate learning tools as a virtual assistant is another effective way of improving the online learning experience of the students.

The last AI is the Powerpoint Presentation Translator. Powerpoint Presentation Translator is an AI functionality of the Microsoft Powerpoint application that assists the user in turning unfamiliar spoken and written language to comprehensible ones. The distribution of its impact for learning can be seen from Table 22 and from here, 15 (37.5 %) out of 40 students gave it an above average impact rating, 12 (30 %) with an average impact rating, 11 (27.5 %) with a high impact rating, 1 (2.5 %) with a low impact rating, and only 1 (2.5 %) with a minimal impact rating for learning. With regards to the rating of the effectiveness of its AI concept on learning, Table 23 shows that about 13 (32.5 %) out of 40 students gave it an average impact rating and another 13 (32.5 %) gave it an above average impact rating, while 12 (30 %) gave it a high impact rating, 1 (2.5 %) a low impact rating, and only 1 (2.5 %) with a minimal impact rating on its effectiveness in learning. Going to the likelihood of the student respondents using this AI service in learning, the results in Table 24 displays that about 13 (32.5 %) out of 40 students gave it an average likelihood of using it, 11 (27.5 %) gave it an above average likelihood, 10 (25 %) with a high likelihood, 5 (12.5 %) with a low likelihood, and only 1 (2.5 %) with a minimal likelihood of using it in learning. Referencing the results, Powerpoint Presentation Translator is an educational tool that has average to above average impact for the respondents, leading to an average to above average likelihood of them utilizing it for their own online learning. With this, the design of the Powerpoint Presentation Translator on performing Natural Language Processing (NLP) to convert unfamiliar language to comprehensible ones is also another effective way of improving the online learning experience of the students, albeit less impactful compared to the prior services.

In Table 25, the weighted mean and the verbal interpretation of the AI-based education services are shown within its three (3) criterias, corresponding to the service's impact for learning, effectiveness of its AI concept on learning, and likelihood of using it in one's own self learning. The scores and rating for the education services are as follows:

- ELSA Speak's impact and effectiveness criteria are considered above average impact, with mean values of 3.85 and 3.875, which are rank of 2 and 1 respectively. Its likelihood criteria has an above average likelihood rating with a mean value of 3.625 and a rank of 3.
- Databot has an above average impact rating for the impact and effectiveness criteria, with mean values of 3.925 and 3.8, which are rank of 1 and 2 respectively. Its likelihood criteria has an above average likelihood rating with a mean value of 3.625 and a rank of 3.
- The Powerpoint Presentation Translator has an above average impact rating for both the impact and effectiveness criteria, with mean values of 3.85 and a rank of 1 for both criterias, while its likelihood criteria have an above average likelihood rating, with a mean value of 3.6 and a rank of 2.
- The initial mean totals and rankings for ELSA Speak, Databot, and the Powerpoint Presentation Translator are 3.783, 3.783, and 3.767 and 1, 1, and 2, respectively. This concludes that all three services are considered above average on their own. The overall mean total for all three AI-based education services equates to an above average impact/likelihood rating, with mean value of 3.78.

From the data analysis and interpretations, it can be concluded that DLSL college students perceive the current overall learning experience to only give them average satisfaction for their own education. It is also drawn from this research that considering the average values given in the subtopics, the ones which are mostly negatively impacted by the current online learning system are the engagement and academic performance of students on learning. This conclusion is supported by Mahdy's 2020 study, Godber and Atkins' 2021 qualitative and collaborative autoethnography, Scherman's 2020 study, and Tan's 2021 quantitative analysis, which all indicate the negative influence of the sudden shift to online learning to students' motivation and academic performance.

It could also be concluded that DLSL college students have significantly positive perceptions towards the different AI-based educational services towards its purpose for learning and their acceptance of it for their own online learning use. This conclusion is supported by Chen P.'s 2020 solo study and Chen P., Chen L., and Lin's 2020 study on AI on education and the opportunities around it, stating that many learners do feel that AI-based learning services to be appropriate for them, especially in the online education scene, leading to the rise in popularity within recent years. The conclusions of respondents' opinion on AI-based education systems also displayed the applicability of the AI concepts for problem solving by search, and Natural Language Processing (NLP), as the respondents provided an above average perception of its impact, effectiveness, and likeliness for use.

From these conclusions, the researchers recommend that the overall online learning experience is serviceable, but needs significant improvement in order to provide higher satisfaction for students, especially towards encouraging them in learning and improving their academic performance. The research would recommend utilizing AI concepts of problem solving by search and NLP in creating future AI-based education services, considering that they are perceived positively by the respondents. The design of these education services should keep in mind the overall online learning experience of the students, in order to increase and maximize their satisfaction with online learning.

It has to be stated that the research has its own limitations that may have affected the quality of its results. The research data is not a complete representation of DLSL college students, as the restrictions of a snowball sampling made the respondents mostly involving 3rd year students. Alongside this, the time constraint for data collection has also been a significant factor in the results of this study, as the limited time only allowed for a number of forty (40) respondents. The research also only utilized a quantatitve approach, therefore the results are limited to generalized, numerical values. From such, it would be recommended by the researchers that future research that may reference the same methodology approach to perform snowball sampling evenly on all possible types of chosen respondents, as well as allot significant enough time to ensure enough respondents would participate in the study, which is also valuable in decreasing the margin of error of the study's results. It would also be recommended for future researchers to apply a mixed-method approach, assuming there is enough time, in order to provide a more in-depth analysis and interpretation of the results.

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