MINISTRY OF EDUCATION AND TRAINING

NATIONAL ECONOMICS UNIVERSITY

RESEARCH PAPER

"LAPTOP USE DEMAND OF NEU STUDENTS AND ITS IMPACT ON STUDENT'S STUDY."

Group 5

Member: Nguyen Khanh Toan

Nguyễn Quang Hung

Nguyễn Tien Tuan Thanh

Class: DSEB A3

Supervisor: M.sc Tran Minh Chau

Hanoi, 10th February 2023

I. Acknowledgment

This paper and the research behind it would not have been possible without the exceptional support of our lecturer, M.sc Tran Minh Chau. Her enthusiasm, knowledge, and exacting attention to detail have been an inspiration and kept our work on track from our first lesson about what a research paper is to the final draft of this paper.

We want to express our gratitude to our classmates in DSEB A3 at National Economics University for answering with unfailing patience numerous questions about the structure of each part of this research paper and introducing many valuable sources of information to do this research.

Finally, we greatly appreciate the enormous effort all our research team members have put into this our very first project. Although we hadn't collaborated before, we worked harmoniously together.

You can find the analysis code in here
https://github.com/hung20gg/eng_100_laptops

II. Abstract

Laptop use for undergraduate students is increasingly becoming commonplace and is often deemed necessary. Students are using laptops for academic as well as non-academic activities. Researchers want to know the laptop use habits of students and what they demand from a computer to meet their needs in learning and entertainment. We also want to examine the effect of this trend on students' educational processes. Thus, there is a need to investigate whether students have chosen suitable gadgets and if laptops harm studying. This is achieved by collecting data from a random sample of students learning inside and outside the National Economics University. The data are also analyzed to determine if students have good general knowledge of computer hardware and software knowledge.

III. Abbreviations

NEU: National Economics University

USD: United States Dollar

IV. List of tables and figures

Contents

CHAPTER 1: INTRODUCTION

1.1. Background

Laptops have played a key role in our daily lives since they were first introduced in 1981. Following the success of computers, Adam Osborne created the first mobile computer, the Osborne 1. This computer's weight was approximately 11 kg. It was priced at USD 1795 (equivalent to $5350 in 2021), a ridiculous amount for regular users. After decades of technological development, laptops started to have more handy designs: their shape was flattened and formed as a book, and a bigger screen was installed and tagged at affordable prices. Not to mention, with Moore's Law in effect, hardware and software compatibility improvements have skyrocketed. To be more specific, while the Osborne 1 can only operate simple functions, the most advanced laptop from Apple, the MacBook Pro M1 Max, can do anything from daily office work to professional workflows, namely editing 4K videos. Laptops are reaching more client files, especially students, who need a portable device that meets all their needs in the academic environment.

With the advanced technology mentioned above in recent decades, the laptop has been more powerful and affordable than ever. Therefore, the demand for mobile computers in Vietnam has accelerated dramatically. The COVID-19 pandemic outbreak has pushed such demand higher than ever (Vnexpress 2020). Numerous studies have been conducted about the importance of laptops in students' daily lives (James Cengiz Gulek and Hakan Demirtas, 2005), which can easily guide students in choosing suitable devices. However, the requirements for laptops for introductory economics students still need to be clarified. This study will demonstrate how economics students benefit from their devices and how they choose their laptops daily.

1.2. Rationale

The study will collect and analyze the data collected from students at NEU, regardless of their majors, to find out several common and specific requirements of NEU

students when choosing laptops. Furthermore, with so many options in the laptop market, the study could narrow the pool by identifying a set of critical factors that lead to the purchase of the laptop, as stated by NEU students. Specifically, we want to guide colleges in NEU that still need to own a portable machine to make the best decision that suits their needs during their participation in NEU. To those who have already gotten a laptop, their satisfaction, tips, and advice are proposed to maximize their benefits and meet their demand when using laptops.

1.3. Research questions

1. What is the student's primary purpose for using a laptop?

2. How long do students spend using their laptops per day?

3. What are the benefits and drawbacks of using laptops for study?

4. Is it essential to find a laptop that suits the student's learning demands?

1.4. The scope of the study

Due to the limitations of the researchers, the study was conducted among students with different majors at National Economics University. Data was collected by getting information on their basic needs, budgets, frequency, and satisfaction with their current and expected mobile computers.

1.5. Organization of the study

Chapter 1: *Introduction:* Illustrate the overview of the entire study: background, rationale, purpose of the study, research question, scope of the study, and finally, the conclusion of this chapter.

Chapter 2: *Literature review:* The researchers will state the theoretical framework that sets the foundation for the study. Then, the definition, characteristics, benefits, and

classification of laptops will be discussed, as well as possible benefits that might be achieved by having a computer. In addition, researchers will carry out common behaviors and impacts that students might have when using the laptop in previous studies on the computer in university life and their academic performance. We synthesize national and international articles and then present the limitations of those works in the research's target field.

Chapter 3: Methodology*:* In this chapter, researchers present the research methods that they have used, including quantitative and qualitative approaches.

Chapter 4: *Results and Discussion:* This chapter aims to introduce information graphically and analyze the collected data. From there, researchers reach conclusions about the questions mentioned at the study's beginning. Furthermore, researchers offer solutions to the problems encountered by students during the survey.

Chapter 5: *Conclusion:* Summarizing the critical points of the result, pointing out the study's shortcomings, and offering areas for future investigation

CHAPTER 2: LITERATURE REVIEW

2.1. Main purposes of using laptops of students

To answer the question of what students mainly use research for, researchers have to gather information from research already done by experts in related fields. According to McMahon, in a study about the impact of laptops on lifestyles in 2022, students indicated that laptops have become integrated into their lifestyles and, as expressed by one student, are used for everything, from entertaining things to working and studying.

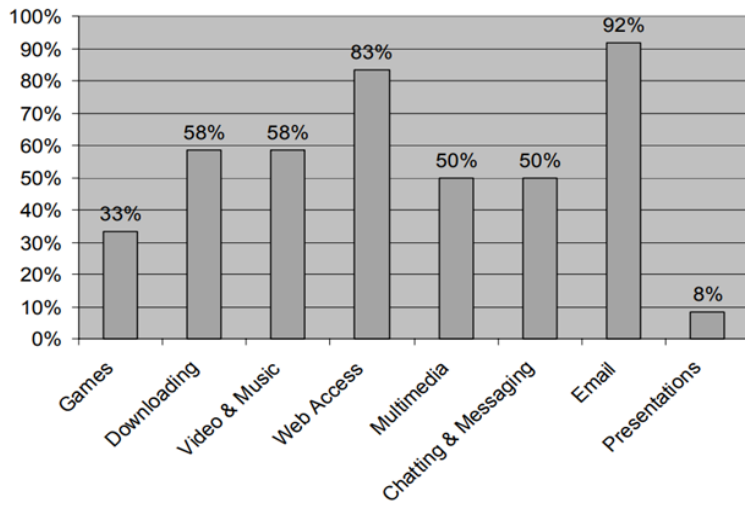


Figure 2.1.1. Students' use of wireless laptops

Laptops and the internet give them access to many kinds of media and ways to entertain, unlike their parent's generation, which only has radio and newspapers. And they also mentioned that having a laptop is an advantage when studying since it saves time. However, students identified activities such as watching videos, network gaming, and downloading as their main activities besides studying and working. Since wireless computers are applied to studying, many new trends exist in using laptops to learn. One of them is using a computer for note-taking. Unfortunately, the author gives reasons to prefer taking notes by hand to writing on a computer. (Imed Bouchrika, 2022). Moreover, students use online libraries or digital books on their laptops instead of carrying heavy bags with thick physical books to class daily. (Falah Awwad, Ahmad Ayesh, 2013). Because of the popularity of computers in the educational environment, we should take a structured approach to make more productive use of laptops inside the classroom. This approach will eliminate destructive behaviors such as note-taking and academic-related tasks. Furthermore, time spent on off-task laptop behaviors, such as sending personal emails, instant messages, and playing games, was significantly less with a structured approach. (Robin Holding Kay; Sharon Lauricella, 2011)

2.2. The amount of time students use laptops

There needs to be precise data on the average time a student uses a laptop. According to marketing charts from 2009, college students spent approximately 12 hours weekly with media and gadgets. On the other hand, the Mirror newspaper reported that students spend about 40 hours per week on their laptops—for coursework, classes, gaming, and social media. From that, we can notice that laptops are now an inevitable piece of kit in a student's life, and it is not surprising to know that more than six in ten (63%) students say they couldn't live without their laptops. You don’t need to be an expert; we all know that burning these enormous amounts of time on a laptop is not ideal for students' lives. The question is how much time they should spend on the computer. A survey by Kate Schimel from "K-12 DIVE" pointed out that parents and the general public say the average student should receive about 30% time. While blended learning experts said that percentage should be around 40% of the time, teachers, on the other hand, said it should remain about 20% of the time.

2.3. The benefits and drawbacks of using laptops for study

The study "Examining the effects of students multitasking with laptops during the lecture" by Kraushaar and Novak at the University of Vermont, USA, found that those engaged in multitasking have non-course-related software applications open and active about 42% of the time. On average, students open 65 new active windows, and 62% are classified as distractive. They also found that students with a high frequency of software multitasking during lectures or a long duration of multitasking will exhibit lower academic performance than students with a low frequency of software multitasking or a shorter period of multitasking. And that does also apply to the ratio of distractive software. However, the study needs to show more connection between the duration of productive software and academic performance.

Kay, Holding, Lauricella, and Sharon in the Canadian Journal of Learning and Technology have published a paper: "Investigating the Benefits and Challenges of Using Laptop Computers in Higher Education Classrooms." This investigation targets the benefits and drawbacks of using laptops in higher education, both during and outside class. The study found that, on average, students spend 7.9 hours daily on their laptops. Benefits and challenges were reported equally often outside the classroom. Students can earn passive and active benefits from laptops through research, learning focus, and collaboration. Web research and educational software were used most frequently, followed by online tools and collaboration. Web search itself can be the biggest challenge, with a reported three-fourths of those searches being for non-academic purposes, most commonly social networks. 10% of students frequently watch videos and play video games during class. The study can state the benefits and drawbacks of students' laptops. However, the study does not mention any link between the advantages and disadvantages students may have with the advancements of those laptops.

2.4. The importance of finding the right laptop for students' needs

There is a newspaper article by Scott Gilbertson, posted on January 21, 2023, about how to choose the right laptop. The writer recommended choosing the preferred operating system between Windows, macOS, ChromeOS, and Linux. Following that, buyers should consider CPUs, including the two major CPU suppliers and various CPU generations, based on their daily usage. Other components such as RAMs, graphics cards, storage, ports, and webcams should also be considered. This analysis, however, does not target any specific group of people, instead providing general advice based on the specifications of those laptops' components. The authors' range of options may confuse rather than help students.

CHAPTER 3: METHODOLOGY

3.1. Sample

As mentioned in the title of the research paper, researchers want to research the laptop use and consumption behavior of economics students inside and outside of the National Economics University. Therefore, researchers collected data from two groups of students studying at those universities and their colleagues. The first group of samples includes students from 4 different academic years: "64," "63," "62," and "61" at the National Economics University, while the second group includes economics and related majors learners from other universities.

3.2. Tool

Due to a lack of time and personnel, researchers only conducted an online survey on a platform called "Google Forms" to acquire data. There is also "laptop name and models," "satisfaction level with laptops," "laptop use purpose and its impact on studying," "budget for buying laptops," "laptop use skills," and "conclusion." In these parts, there are 23 questions with different forms: multiple choices, short answers, checkboxes, and checkbox grids. The address of this online survey will be spread through private messages, group messages of our class and club, and student union social media pages.

This data-collection method will give us the fastest and the most considerable quantity of responses compared to other methods in the same amount of time. Furthermore, the way survey-conducting platforms illustrate the results will make the data synthesis process less complicated. However, besides the advantages of this method, online surveys cannot obtain precise results like direct interviews since many surveyors need to choose more carefully or give relevant answers.

3.3. Research problem

As mentioned, there are 23 survey questions, each of which will provide the necessary evidence for our research team to analyze the laptop demand of students. These questions are divided into six different parts. Firstly, researchers want to know basic information about the surveyor, so questions about name, gender, university, and notable appearance are included in this part. This also provides information about the habits of people of various genders, majors, etc. The second and third parts are about the laptops of surveyors and their evaluation. We ask respondents about their laptop's brand, model, and general satisfaction with their device. Moreover, a table of different laptop parts lists and five stages of satisfaction in detail ("Disappointed," "Unsatisfied," "Normal," "Partly satisfied," and "Satisfied") is created to understand the feelings of students about their personal computer in depth. In the next part, survey respondents provide answers about how much time they spend with their laptops and what tasks they do in that time. The last three questions in this part examine the impact of laptops on study effectiveness and the concentration of students during lecture and self-study time. In the fifth question, we got to find out how much students are willing to pay for an electronic device like a laptop. And they have to choose from five different price ranges that we have already divided based on different laptop segments. Researchers also ask them which model they would select again if they had the chance. In the final section, we want to learn more about computers by utilizing user skills and allowing them to rate their abilities.

3.3. Unprocessed outcome

The survey was conducted from 27 December 2022 through 10 January 2023. After two weeks, we received 66 responses from students inside and outside National Economics University. All the responses are automatically demonstrated in three charts: a pie chart, a bar chart, and a list. Overall, the results are varied enough for our research team to analyze and conclude objectively about the laptop demand of our research subjects.

CHAPTER 4: RESULT AND DISCUSSION

4.1. Finding

We collect the data from different students by using Google Forms. Google Forms has built-in functions that analyze some of the returned data automatically. However, to deeply understand the insights, we decided to use Jupyter Notebook, the most common tool for data analysis. The data is loaded in.csv format, and researchers then use Python, a programming language, to extract and find the connection in the data.

The research mainly analyzes the data to find the following:

The collection of laptops and how they were used for academic purposes

The group between laptops and their retail prices

4.2. Overall information

Firstly, there are 66 responses in the survey, and most of them are first-year students at NEU.

Figure 4.2.1. The ratio of students in courses inside NEU and students outside NEU

And 40% of the answers came from men.

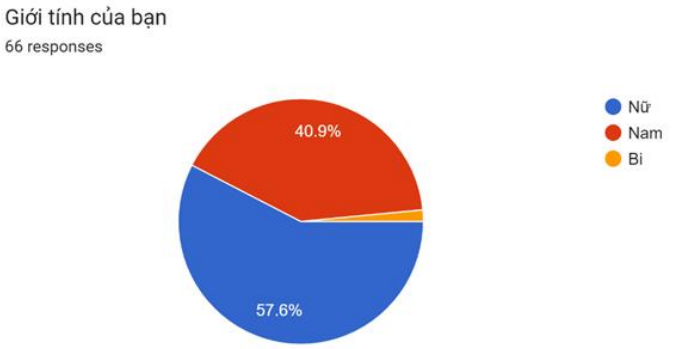
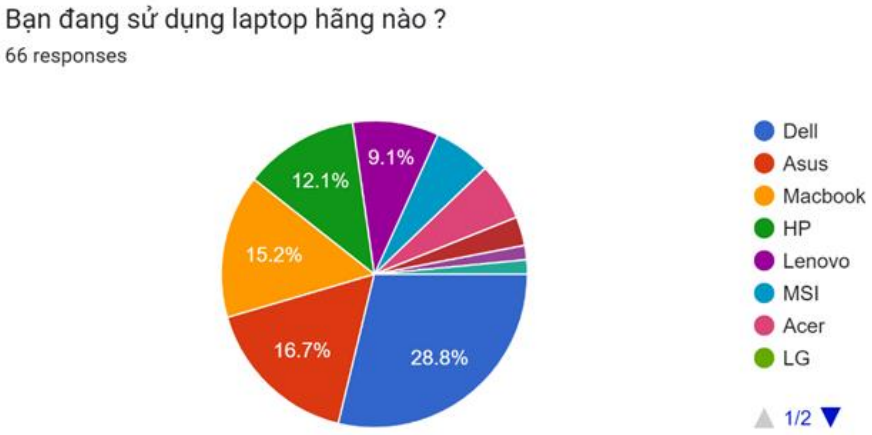


Figure 4.2.2. Genders ratio of survey respondents

Interestingly, we do not expect to have such variety in the number of brands among NEU's students' choice. This accidentally led to the lack of data on so-called 'uncommon' brands, such as Alienware, Microsoft Surface, and Tongfang, so this research will not deeply analyze these brands.



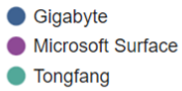


Figure 4.2.3. Percentage of laptop brands

As can be seen from the pie chart, the figure for Dell took the most significant proportion at more than a quarter of the total researched laptops. Asus' laptops and Macbooks' popularity was similar at around 15-16% of the total market share. HP and Lenovo's data was slightly lower, at about 12% and 9.1%, respectively. Overall, brands that are famous for gaming, such as MSI and Acer, were not a popular choice, while brands that mainly produce laptops for office take the majority share.

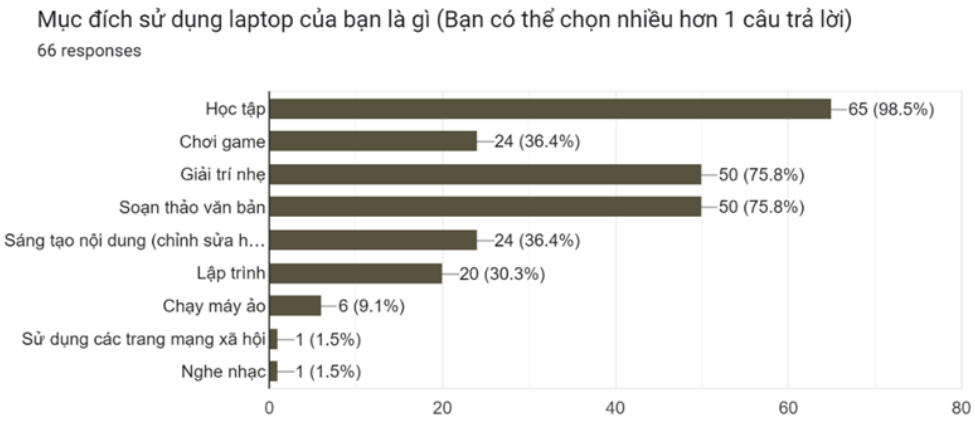


Figure 4.2.4. Purpose of using the laptop

Most students use laptops for multiple purposes. Almost all users used laptops for learning purposes (98.5%). 75% was the data for daily activities such as text editing and entertainment. Different from our prediction, only a third of people respond to games with their laptops. For more specific purposes, 30% of laptops were used for programming, and 36% were used for creating content. Less common applications, such as virtual machines, only took up to 9%.

4.3. The impact of laptops on students' performance.

Since NEU is a top-tier national university, it would require more work for the research teams to point out the differences in individual academic performance. Therefore, it would be more practical if we collected data on how students feel when they apply the advance of a laptop in their learning.

To extract the insight, most of our findings will answer the following questions:

- How did they evaluate their laptop daily?
- How long did students spend their time learning with laptops?
- The connection between price tags and laptop usage behavior.
- The connection between genders and laptop user behavior.
- The connection between majors and laptop-using behavior.

<u>General analysis:</u>

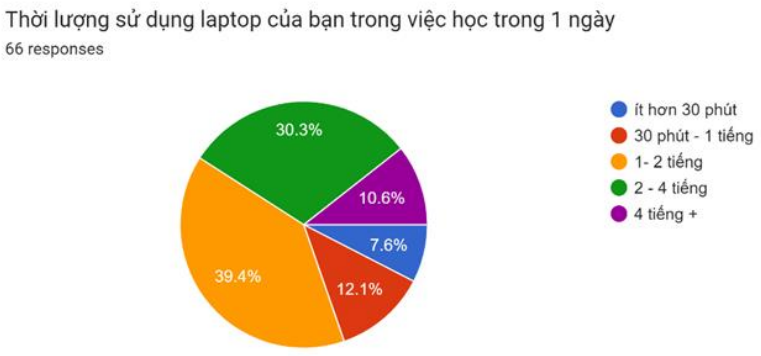


Figure 4.3.1. The amount of time students use wireless computers for study

From a learning perspective, most students studied with their laptops for 1 to 4 hours. Less than 10% of them learn with laptops in under 30 minutes, and around 11% of students' duration was less than 1 hour or more than 4 hours.

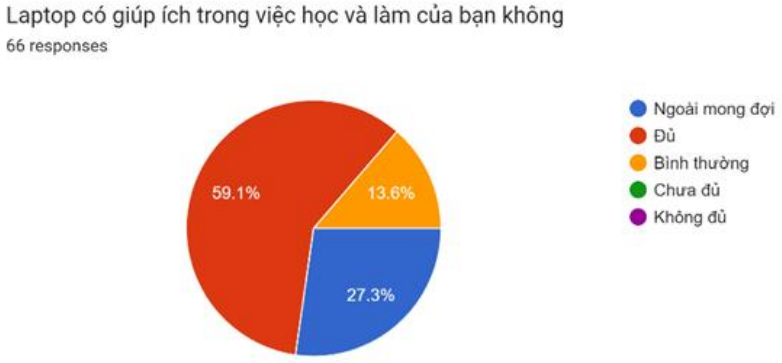


Figure 4.3.2 Evaluate the effectiveness of using the laptop for studying and working.

So do laptops have any effect on either learning or working purposes? All of the responses return positive answers. 60% of them found their computer is suitable for them, and 27% consider their laptop 'out of expectation.'

Students' evaluation of their laptop in learning

To be more specific, we use more variables to calculate the efficiency of laptops in learning, like general usefulness, time used in class, for study, daily use, and distraction rate. The variable 'Learn_rate' was based on the percentage between time for everyday use and time for analysis (in share). The differences in answers will be converted into numbers. For valuing time, we use the median value of time: under 30 minutes is 0.25, from 1 to 2 hours is 1.5, etc., and more fantastic than four is 5. For valuing options from best to worse, we map each value based on answers on a scale of 1 to 5: 1 is Never, and five is Always.

Table 4.3.3. The impact of laptops on study

Count	Useful	Class_use	Time_study	Time_usage	Distraction_rate	Learn_rate
1	4.244167	3.59325	2.423504	3.76843	3.569753	62.168646

Overall, laptops were helpful to students. They usually brought laptops to classes. The average time that NEU students spend on laptops was 3.7 hours, and 62% was for learning. However, laptops could easily distract them from learning, and this happens typically at 60% (Distraction_rate-1/4)

The number of students using laptops to study

Table 4.3.4 Laptop brands' users count and their effect.

Brand	Useful	Class_use	Time_study	Time_usage	Distraction_rate	Learn_rate	Count
MSI	4.75	3.25	2.25	4.00	3.75	56.25	4
Lenovo	4.67	4.33	3.08	5.00	3.67	61.67	6
HP	4.12	4.12	1.72	3.22	3.50	53.40	8
Acer	4.00	3.75	2.06	4.00	2.50	51.56	4
Asus	4.00	4.36	2.55	4.07	3.45	62.57	11
Dell	4.00	3.21	1.75	2.95	3.53	59.38	19
Macbook	3.90	4.40	1.82	2.95	3.30	61.86	10

According to the findings, MSI's laptop was the most useful, with a 4.75/5 rate. Surprisingly, the only brand with a unique operating system, MacBook, has the lowest usefulness score even though the average budget for an Apple machine is the highest among all brands. MacBook and Lenovo users tend to attend classes with laptops more, and we find those two brands are also in the top 2 of overall user satisfaction and built quality. The data for Lenovo in time spent for study and daily activities was significantly larger than other competitors, with 3.08 and 5, roughly 3 hours and more than 4 hours,

respectively. In contrast, MacBook, HP, and Dell- the most common choice- had the lowest data for study time, at around only 1.7. The learning ratio of all brands was quite similar at around 55 to 62, with Acer being the lowest at 51.56 and Asus being the highest at 62.57.

The connection between price tags and laptop user behavior.

Table 4.3.5. Laptop at different price ranges users count and their effect

Budget	Useful	Class_use	Time_study	Time_usage	Distraction_rate	Learn_rate	Count
30.0	4.36	3.93	2.66	4.12	3.36	64.50	14
7.5	4.00	3.33	2.42	3.83	3.67	63.04	3
22.5	4.08	4.25	2.19	3.58	3.17	61.05	12
17.5	4.05	3.76	2.11	3.68	3.62	57.28	21
12.5	4.12	3.50	1.64	2.81	3.50	58.33	16

When it comes to price tags, if not including 7.5s' data due to lack of answers, we can see the pattern that the higher the price tag, the more useful their owners feel, the longer time they spend on learning, and the higher the learning rate. This might be because powerful and expensive laptops make multi-tasking more convenient, or the better experience with laptops inspires students to spend more time on them. (Table x)

The connection between genders and laptop user behavior.

Table 4.3.6. Laptop use behavior of different genders

Gender	Useful	Class_use	Time_study	Time_usage	Distraction_rate	Learn_rate
Men	4.33	3.78	2.24	3.76	3.52	59.61
Other	4.00	5.00	5.00	5.00	5.00	100.00
Women	4.00	3.79	1.99	3.37	3.37	59.18

Since there was only one result for gender besides male and female, we will only analyze the difference between male and female. There was not much difference between males and females in time spent in class and learning rate. Men found laptops more useful in academic performance, which might result from longer study duration. Overall, men and women had no significant difference when using laptops.

The connection between majors and laptops using behavior.

Table 4.3.7 Laptop use behavior of students with different information technology skills

Skill	Useful	Class_use	Time_study	Time_usage	Distraction_rate	Learn_rate	Count
2	4.40	4.40	1.55	3.40	3.60	45.59	5
3	4.10	3.39	1.85	3.05	3.45	60.58	31
4	4.12	4.12	2.27	4.02	3.33	56.48	24
5	4.17	4.17	3.62	4.42	3.83	82.08	6

From a skill perspective, it is surprising that people with low computer skills find laptops more useful and bring laptops to class more frequently than other groups. However, the actual time spent learning is the lowest. There is a clear trend that the higher the skill, the longer the time spent learning and the higher the learning rate.

Students in different majors will be divided into two groups: Technology-related majors (Tech_related) and Technology not related (Tech_not_related).Table 4.3.7. List of technology-related and technology, not related majors

Technology related major	**Technology is not associated with the major.**
Computer science Data Science in Economics and Business Information Technology Management Information and Systems	International Business International Business Economics Auditing Logistics Laws Marketing Language Business Analysis Mathematical Economics Finance Business management

Field	Useful	Class_use	Time_study	Time_usage	Distraction_rate	Skill	Learn_rate
Tech_not_related	4.0	3.82	2.11	3.32	3.41	3.64	63.70
Tech_related	4.2	3.75	1.96	3.59	3.42	3.35	54.53

Table 4.3.8. Laptop use behavior of students from tech and non-tech majors

The data for students in either technological or not-related majors had no stand-out point. Students in majors that are supposed to use computers more, such as Computer Science or Data Science in Economics and Business, had lower computer skills and learning rates than other majors.

4.4. Laptops at different prices have different quality

It is common to believe that the higher the price, the better the quality. We let students grade their machine on a scale of 1 to 5 on four main categories: Overall satisfaction, the build quality of the laptop, its appearance, and its battery life (1 is Disappointed, and five is Very satisfied. We will analyze five major price ranges, and for better calculation, we will use the medium of those ranges. And those less than 10 million would be 7.5, and those more than 25 million will be 30 (in a million VND)

To extract the insight, most of our findings will answer the following questions:

- The connection between price tags and the user experience.
- The connection between brands and the user experience.
- The market share of familiar brands.
- Recommendation for a suitable choice.

The connection between price tags and the user experience.

Budget	Overall_satisfaction	Build_quality	Design	Battery_life	Count
7.5	3.00	3.00	3.33	2.67	3
12.5	2.94	3.50	3.56	3.06	16
17.5	3.71	3.81	3.90	3.10	21
22.5	4.25	4.42	4.58	3.42	12
30.0	4.36	4.14	4.57	3.79	14

Table 4.4.1. Impact of laptop price on using experience

It is clear that the prediction: ‘the higher the price, the better the quality,’ is somehow correct. Along with the rise in budget, all four criteria were also increased. The most common price range is 15 to 20, and its users’ overall satisfaction seems interesting,

with 0.8 points higher than the previous price range and only 0.5 points lower than the following price range. The difference between products in the range 20 to 25 and 25 and above was minor, with only a 0.1 increase in overall satisfaction points and 0.28 fewer points in built quality. The key to increasing satisfaction with luxury items might come from noticeably better battery life. The same pattern can be seen in the 15 and below price range.

The connection between brands and the user experience.

Brand	Overall_satisfaction	Build_quality	Design	Battery_life	Budget	Count
Macbook	4.30	4.60	4.90	4.40	26.25	10
Lenovo	3.83	4.00	4.17	3.17	24.17	6
Acer	3.75	4.00	4.50	3.50	20.62	4
Asus	3.73	3.73	4.00	2.91	17.05	11
Dell	3.68	3.74	3.89	2.95	17.37	19
MSI	3.25	3.50	3.25	2.75	16.25	4
HP	3.00	3.75	3.50	3.62	13.75	8

Table 4.4.2. Impact of laptop brand on using experience

Regarding brands, MacBook has kept its reputation as ‘the most expensive brand’ with an average of 26.25 per unit. Unlike other brands, which follow the same pattern of price and quality, HP in battery life is considered pretty good by users, and it only came behind MacBook, which is well known for its long battery life.

The market share of familiar brands.

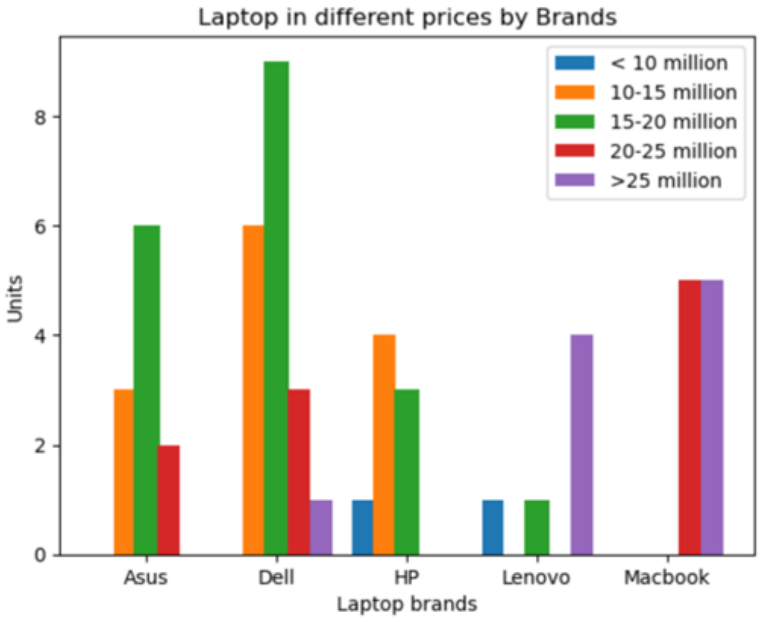


Table 4.4.3. Laptops in different prices by brands

MacBook dominated its competitor in 20 and above market share with the above analysis. For window laptops, Lenovo's laptops were mainly high-end machines and in the lower price range; the three most popular brands were Asus, Dell, and HP.

Recommendation for a suitable choice.

Tech_not_related

Acer Nitro 5	Asus	Lenovo Legion 5	MacBook Pro	Macbook	Rog Strix	lenovo thinkbook	slim 7 pro
1.0	1.0	1.0	1.0	3.0	1.0	1.0	1.0

Tech_related

Acer Nitro 5	Asus	Dell	Dell XPS	Lenovo	Macbook	Macbook M2	Macbook Pro	Mình chưa cân nhắc	Thinkpad p52
1.0	1.0	1.0	1.0	2.0	7.0	1.0	3.0	1.0	1.0

Table 4.4.4 and 4.4.5. Desired laptops of the students of tech and non-tech majors

Those tables were the data of the user's dream laptop in 2 main major fields, most of which were MacBooks. The proportion for majors that were not computer-demanded was 40%, and that in computer-demanded majors was around 60%.

The MacBook can be a good choice for two reasons. With long battery life, MacBook can survive through most classes before it needs to be recharged. And the MacBook has the finest quality. A MacBook might be suitable for those who have the budget and love the overall convenience, especially if they are familiar with macOS.

More aspects must be considered for those who favor the Windows operating system. Lenovo seems great with outperforming results compared to competitors, but it comes with a costly price tag. This can be an obsolete choice for students with little restriction on finance. In the lower price range, Asus and Dell are relatively similar and competitive in most benchmarks. For those with a tight budget, MSI and HP are excellent choices with impressive capability and long battery life for classes. The differences, in reality, do not significantly impact students' learning but rather their satisfaction with the finish of the product and how it can work with different tasks.

Most students in majors that relate to technology often choose gaming laptops because of their high performance. However, some wish they could choose a MacBook after using those laptops. This is because they have a long battery life and an operating system that works well with different development tools. In contrast, gaming laptops have a critical pain point of low battery life and can last for a short time before recharge. Those who follow this field consider adding an Apple machine on the consideration seriously.

CHAPTER 5: CONCLUSION

This study set out to consider the extent to which aspects of laptops affect the learning of university students in NEU. Laptops are practical tools for them to deal with everything in daily life, from learning entertaining, and working. The study aims to point out how effective laptops are and give recommendations for having a suitable laptop for NEU's students.

The investigation results show that laptops positively impact learning among NEU students. Students spend much time using laptops to study. Still, students found themselves needing to be more focused when using laptops. Most students use laptops for multiple purposes besides looking, and some have used laptops to do professional work. NEU's students have spent 60% of their time on laptops for learning. Dell's laptops were the most popular choice, and MSI was the ideal laptop brand for education, with a great score in every category. By contrast, even though the MacBook was considered the most famous laptop choice, with its state-of-the-art design and high retail price, it is not that suitable with low learning hours and low valuable scores.

Another significant finding related to laptop behavior is that besides learning, prices do have a noticeable impact on how students use their laptops. The higher the price, the more benefits they gain from them. The same pattern can be seen in the ability of computers. In contrast, both genders have the same benefit from using laptops, and surprisingly that is also applied to the differences of majors' fields.

In terms of choices, research teams will divide them into different categories. Since there is little difference for learning purposes across brands, the consideration will only depend on overall performance and prices. Lenovo and MacBook would be the solid choice for those who love convenience and quality regardless of price. MSI and HP will surely be worth every penny for students with a low budget. Students can also have laptops from competitive brands such as Asus or Dell.

V. Reference:

Awwad, F., Ayesh, A., & Awwad, S. (2013). EFFECTIVENESS OF LAPTOP USAGE IN UAE UNIVERSITY UNDERGRADUATE TEACHING. *TOJET - The Turkish Online Journal of Educational Technology*, *12*(2), 77–88.

Bouchrika, I. (2022, September 26). *Digital notes vs. paper notes: Benefits of taking notes by hand*. Research.com. Retrieved December 2022, from https://research.com/education/digital-notes-vs-paper-notes

Gilbertson, S. (2023, January 21). *Everything you need to know before you buy a laptop*. Wired. Retrieved December 14, 2022, from https://www.wired.com/story/how-to-buy-the-right-laptop-for-you/

Hamdani, R., Laksmi, A. C., & Hardinto, W. (2021). Learning methods for accounting students: Explore the effectiveness of traditional and laptop-based Active Learning. *JURNAL AKUNTANSI DAN BISNIS : Jurnal Program Studi Akuntansi*, *7*(1), 62–70. https://doi.org/10.31289/jab.v7i1.4409

Jack, A. (2017, June 15). *What should I consider when buying a laptop for university?* The Guardian. Retrieved December 14, 2022, from https://www.theguardian.com/technology/askjack/2017/jun/15/buying-laptop-for-student-university

James , K.M. and David, N.C. (2010) "Examining the Affects of Student Multitasking with Laptops During the Lecture," *Journal of Information Systems Education*, 21(2), pp. 241–252.

James, G. C., & Hakan , D. (2005). Learning With Technology: The Impact of Laptop Use on Student Achievement. *THE JOURNAL OF TECHNOLOGY, LEARNING AND ASSESSMENT*, *3*(2), 1–39. Retrieved 2022, from https://ejournals.bc.edu/index.php/jtla/article/view/1655/1501.

Lauricella, S., & Kay, R. H. (2014). Investigating the Benefits and Challenges of Using Laptop Computers in Higher Education Classrooms. *Canadian Journal of Learning and Technology*, *40*(2), 25. Retrieved 2022, from https://eric.ed.gov/?id=EJ1030425.

Mark, M. M., Pospisil, & Romana. (2005, January 1). *Laptops for a Digital Lifestyle: Millennial Students and Wireless Mobile Technologies*. ResearchGate. Retrieved 2022, from https://www.researchgate.net/publication/49280225_Laptops_for_a_Digital_Lifestyle_Millennial_Students_and_Wireless_Mobile_Technologies

Robin , K., Sharon, L., & Executive , S. (2011, January 1). *Unstructured vs. Structured Use of Laptops in Higher Education*. ResearchGate. Retrieved December 2022, from https://www.researchgate.net/publication/236133990_Unstructured_vs_Structured_Use_of_Laptops_in_Higher_Education

Sarah, L. (2022) *Students spend 40 hours a week on laptops - for coursework, classes, and gaming*, *Mirror*. Reach plc. Available at: https://www.mirror.co.uk/tech/students-40-hours-week-laptop-27506582 (Accessed: December 14, 2022).

Schimel, K. (2015) *How long should students spend on computers?*, *K-12 DIVE*. Industry Dive. Available at: https://www.k12dive.com/news/how-long-should-students-spend-on-computers/405996/ (Accessed: December 14, 2022).

Victoria (2013) *College students spend 12 hours/day with media, gadgets*, *Marketing Charts*. Marketing Charts. Available at: https://www.marketingcharts.com/television-11195 (Accessed: December 14, 2022).