

THESIS TOPIC

BYOD implementation at HAMK
Requirements & simplifying the process for new students.



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TIIVISTELMÄ

Tämän opinnäytetyön tavoitteena oli selvittää ensimmäisen ja toisen vuoden BCA- ja BEEA-opiskelijoiden kokemuksia ja haasteita Bring Your Own Device (BYOD) -toteutuksessa ja ehdottaa ratkaisuja toteutusprosessin yksinkertaistamiseksi.

Opinnäytetyön teoriatausta koostuu BYODin hyödyistä ja haasteista ja erityisesti Hämeen ammattikorkeakoulussa (HAMK). Opinnäytetyö tehtiin laadullisena tutkimuksena ja aineistonkeruumenetelmänä käytettiin Microsoft Office Form- alustalla luotua sähköistä kyselylomaketta. Kysely lähetettiin sähköpostitse ja mukana oli saatekirje. Vastausaika oli kolme viikkoa. Kyselyyn vastasi 28 opiskelijaa. Kyselyn tulokset osoittivat, että vastaajien käyttämällä tietokoneen muistilla tai käyttöjärjestelmällä ei ollut suoraa yhteyttä kohdattuihin haasteisiin. Useimmiten asennetut ohjelmat olivat Visual Studio Code, Git ja GitHub, Java ja MySQL. Eclipsen ja MySQL:n kanssa oli kohdattu eniten asennushaasteista. Ensisijaisia havaittuja ongelmia olivat ristiriidat muiden ohjelmistosovellusten kanssa, kokoonpanoasetukset, puuttuvat laajennukset ja JDK-ristiriidat.

Opinnäytetyön perusteella toteutusprosessin yksinkertaistamiseksi voi suositella selkeiden ohjeiden ja tuen antamista haastavien ohjelmien asentamiseen ja konfigurointiin sekä vaihtoehtoisten ratkaisujen antamista haastavien ohjelmistojen asentamiselle. Nämä ohjeet voivat auttaa toteutusprosessin yksinkertaistamisessa, vianmääritykseen kuluvan ajan vähentämisessä ja antamaan opiskelijoille mahdollisuuden keskittyä opintoihinsa.

Avainsanat BYOD, BCA, questionnaire, qualitative research

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ABSTRACT

The aim of this thesis was to find out the experiences and challenges faced by first- and second-year BCA and BEEA students in implementing Bring Your Own Device (BYOD), and to propose solutions to simplify the implementation process.

The theoretical background of the thesis includes a discussion of the benefits and challenges of BYOD in general and specifically at Häme University of Applied Sciences (HAMK). The thesis was conducted as qualitative research, with data collected via a survey prepared using Microsoft Office Form. 28 students completed the survey, which was sent to them via email with a cover letter. The response period for the survey was three weeks.

The results of the survey indicated that the computer memory or operating system used by the respondents did not have a direct correlation to the challenges encountered while using the most installed programs such as Visual Studio Code, Git, GitHub, Java, and MySQL. Installation challenges were most frequently reported with Eclipse and MySQL, and the primary issues encountered included conflicts with other software applications, configuration settings, missing plug-ins, and JDK conflicts.

To simplify the implementation process, the thesis recommends providing clear instructions and support for installing and configuring these programs and suggesting alternative solutions to challenging software. These guides can help to simplify the implementation process, reduce time spent on troubleshooting, and enable students to focus on their academic pursuits.

Keywords BYOD, BCA, questionnaire, qualitative research

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1 Introduction

The corona pandemic drove most educational sectors to transform teaching and learning rapidly and develop innovative and creative ways to keep learning in the disruption. Most higher education institutions at that time had adopted emergency remote learning, teaching, and strategies to overcome the effect of the corona pandemic. (Masilo et al., 2022)

At the beginning of the autumn of 2021, Häme University of Applied Sciences (HAMK) began to require all students to bring their personal computers (HAMK, 2021). This is an operating model called Bring Your Own Device (BYOD). This operating model is utilized in educational institutions and companies. One of BYOD's most important ideas is to enable you to study and work with your device, regardless of time and place. BYOD in students' perspectives means that the student uses their own devices such as laptops for their studies. BYOD's benefits for the student include a more personal learning experience, professional expertise including the management of equipment and software, and the student knowing his or her own tool best. (Janssen & Phillipson, 2015, pp. 2-3)

The thesis focuses on the implementation of BYOD in the bachelor's degree program in Computer Applications (BCA). In the BCA degree program, students have specific requirements and use of special applications in their studies. The primary goal is to explore the experiences of students when it comes to installing applications, as well as any potential challenges they may have faced in this process.

In this thesis, structured survey was used as a data collection method and will be implemented as qualitative research. The structured survey will be used to identify the possible challenges faced by first and second-year students in installing software on their laptops or devices. The survey will be conducted anonymously. This thesis aims to respond to the challenges faced by students by simplifying the installation processes. In addition to the survey, this thesis complies with the requirements of BYOD to help new students prepare for their studies.

The thesis topic is based on the authors personal experience in installing the software needed for BCA studies and the challenges experienced. In addition, BYOD can be simply integrated across

working life. Therefore, in this thesis, the author has wanted to expand the understanding of BYOD.

This thesis responds to the following research questions:

1. What are the challenges faced by new students when implementing BYOD?
2. How can these challenges be addressed to simplify the implementation of BYOD?

2 BYOD (Bring Your Own Device)

Before the 1990s, organizations utilized the traditional office setups through close-up or face-to-face environments. The operational equipment consists of devices such as phones, pc, scanner, and printers. (Mamaghani, 2006, p. 845)

The innovation and recent developments in technologies over the years such as mobile devices have allowed organizations to be adaptable. A technological development led to the development of BYOD. BYOD occasionally called Bring Your Own Technology (BYOT), or "IT Consumerization" is the idea to permit employees to bring their own devices to a work environment that provides internet access. Some of these devices include Notebooks, Tablets, Cell Phones, etc. (Madzima, Moyo & Abdullah, 2014)

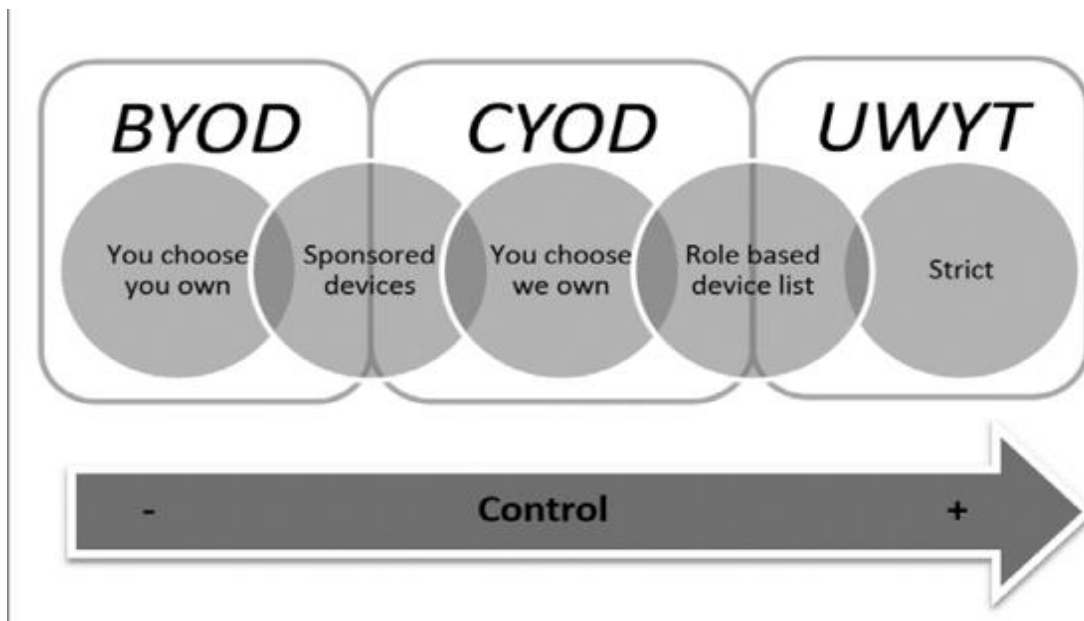
Bring Your Own Device or BYOD strategy was officially proposed by Intel and introduced in 2009. This allows employees to work with their personally owned technology, devices such as laptops, and smartphones to access or complete a task for their organizations. It has been highly implemented by various bodies and organizations. Most of the employees bring their own devices on the job, instead of getting concerned about the loss of data security and employee productivity, proposed a policy to embrace this trend and use it as a means of cost-cutting and improved productivity. (Malcom, 2009)

According to Song, Sun and Jong (2016) 1 –year study in a BYOD/BYOT conducted by science inquiry-based classroom in Hong Kong indicates that the use of mobile technology can both advance and promote ownership of learning. They found that when using mobile technology, coupled with integrating various applications using mobile technology, both students' knowledge and ownership of learning advanced.

Figure 1 represents alternatives to BYOD such as Choose Your Own Device (CYOD) and Corporate-owned, Personally Enabled (COPE). CYOD as the name suggests gives the user a choice over a lot of devices he or she wishes to use as work devices with some restrictions the company may have set beforehand, but which are paid for by the company. The benefits of CYOD are like BYOD in that it

allows for flexibility, work outside of office hours and giving the option to work from any location. The biggest concern with it is the lack of control over who can sneak peek or, “shoulder surf” the device when it is being used for work in public places. (Brodin, 2015, pp. 1-12)

Figure 1. Strategies for devices and the amount of control from the organization. (Brodin et al., 2015)



Without certain technologies or solutions, BYOD cannot be fully established or realized. To provide a true BYOD environment, some technologies/solutions are essential. Using information more efficiently is made possible by virtualization technology. The use of this technology in the education system has several academic advantages, such as setting up desktops and teaching systems. There is no real change to software itself or hardware when desktop virtualization is used, but there is a change to methodologies and culture from the user's point of view. (Makoviy et al., 2017, pp. 178-183)

The virtual desktop infrastructure (VDI) is a desktop virtualization technology that runs and manages Windows operating systems. With VDI, users work with their usual applications and data from anywhere using tablets, phones, and laptops. BYOD is technically possible without an application virtualization solution; it is completely unsustainable and would be too expensive to scale when using desktop virtualization. The delivery of Windows application to Windows devices can be carried

out anywhere on phone, tablets, and laptops. This leads to realize a perception of BYOD. (Makoviy et al., 2017, pp. 178-183)

2.1.1 BYOD Benefits

This chapter will focus on the benefits or advantages of its introduction or implementation of it. Students utilizing their own devices at school or in the classroom were banned because of distractions these devices may have caused but in recent times, they have begun to offer a real resource to the educational sector. The need for a good BYOD policy in place is particularly important in many organizations within the educational sector. BYOD adaptation in schools or organizations is not only beneficial for users, but also for organizations. First, it provides both flexible working hours and a working environment for users. (Zulkefli et al.,2015)

A study conducted by Cheng (2016) investigated user acceptance of BYOD involving forty-four undergraduate students and two teachers at the Hong Kong Polytechnic University. Participating students were asked to complete pre-and post-user acceptance questionnaires at the beginning and at the end of a 13-week semester. Focus group interviews were also conducted for a deeper understanding of student and teacher views on BYOD. The results of this study showed that the participants supported the implementation of BYOD though several concerns were raised. One of the concerns was the possible distraction caused by digital devices as described above. It was also mentioned that educational institutions should include BYOD-related activities or practices in the curriculum and support the professional development of teachers. As such, it is suggested that BYOD-related policy should aim to reduce the distraction of learners and foster the pedagogical practices of teachers.

2.1.2 Cost Savings

One of the benefits of BYOD implementation is cost savings. Enabling students to use their own devices both within the classroom and outside the classroom ensures that all students have the same access to the relevant systems, software, and applications, but without the cost of consistently updating technology within the organization. Computer labs are often expensive to run and

maintain which is why so many organizations are looking to move away from them and implement different solutions whilst providing students with the same high level of education. (McLean, 2016)

Many schools and universities deal with out-of-date equipment as it can be very costly to update entire computer labs regularly. In contrast, many students are likely to keep up with the latest technology in their personal lives, resulting in the use of faster, more intuitive devices, and less time spent figuring out how to use them. Allowing students to use their own devices for their studies also helps to eliminate the cost of updating entire IT suites to ensure the technology is kept up-to-date and usable. (Cheng, 2016)

2.1.3 Flexibility

In addition, providing students with continuity of education particularly in the higher-level institution is very essential. During the Coronavirus pandemic, many universities were forced to implement remote study facilities almost overnight. The need for students to work on their own devices both on and off-campus, enables them to be more flexible about where and when they decide to complete their studies. This allows students to complete their coursework and studies in any location and provides them with access to the materials and software they need without being tied up to campus computer labs. In the classroom, BYOD helps to simplify the flow of work between the classroom and homework. Students have everything they need on one device so there are fewer issues with saving work across several devices and networks. (Abowd et al., 1997, pp. 421-433)

The likeliness for students to be more productive depends on the use of their own devices. These are the devices they have chosen to use and are familiar with therefore enjoy using them alongside the operating system. Time spent switching across devices is also reduced when allowing students to use their own devices across all aspects of their lives, which means more time spent studying. (Disterer & Kleiner, 2013)

2.1.4 Reduce IT Support Load

Another benefit of BYOD reduces the load for IT support Investing in systems in campus labs and schools is not only costly to initiate the setup of the equipment, but also requires costly maintenance

and support. In many cases, a full-time IT department is required to maintain the equipment and answer students' and staff's queries. With a BYOD policy in place, the need for this support is minimized as students are more familiar with the devices they are using. Students also bring up-to-date devices with them which helps to reduce the load on IT departments which must spend huge amounts of time reimaging devices on campus outside of term time. (Coston-Scott, 2020).

2.2 BYOD Challenges

Many organizations have faced challenges in the implementation of BYOD despite all its advantages. The advantages and disadvantages should be given some consideration when implementing a BYOD policy. These are a few challenges faced during the implementation of BYOD. (Weeger, et al., 2018)

A study conducted by Weeger, et al. (2018) highlights undergraduate students' perceptions of BYOD in the workplace. It involved 476 students from European, Asian, and American universities in their final year of undergraduate studies with relevant work experience. Through an online survey, this study analyzed students' intentions to join a BYOD program at work and examined how they perceived the benefits and risks associated with it. The results showed that the intention to enroll in a BYOD program was driven by perceived benefits while the risks were widely neglected. The perceived risks included financial, security, privacy, safety, and performance risks. According to the study, it is evident that the upcoming generation of employees will be supportive of BYOD implementation at workplaces regardless of potential risk factors. This implies the necessity of developing new BYOD strategies or policies suitable for so-called digital natives as these future employees do not fall into the categories of classical perceived risk theory.

2.2.1 Security Risk

Security risk is one of the potentials for losses as information security incidents therefore, the networks of the institution should be properly secured. The major concern for a secured network pops up when too much data in the BYOD area can result in its theft. It is important to keep in mind that allowing BYOD in an organization can increase the risk of security and cyber threats. Most students access the school and university networks, other software, and resources across the same

devices they use daily, organizations are then more vulnerable to students sharing sensitive data and open to hackers especially when devices are stolen from users. Educational sectors should give proper attention to ensure that a strict BYOD policy is structured, and devices are equipped with anti-virus software and security apps to prevent attacks or unauthorized access to school networks. (Gartner, 2013)

Ineffective password management is another security issue that requires attention. Setting up a strong password is the first line of defence against data breaches and other cybersecurity threats. BYOD, therefore, makes it harder to make sure that students use stronger passwords and most of them do not change their passwords often as they should. Challenges of this kind can compound into larger network security issues. (Gartner, 2013)

According to Cappelli et al. (2012), the use of password-protected screen savers is essential to decrease information security incidents in electronic devices. They reduce the likelihood of unauthorized users accessing sensitive information stored on devices and use of organization applications. They also maintained that BYOD information security procedures must enforce password robustness, changing passwords periodically, activating automatic screen savers after an inactivity period, and not disclosing device passwords with third parties.

The loss of control over hardware also makes it difficult to manage the level of security risk incidents. The implementation of BYOD reduces hardware costs and lowers some of the burdens from IT support when it comes to maintaining student devices. This is true and that will mean that students will have total control over using their devices and that the IT support or department may or can't control what apps, and files are downloaded, or what security measures are taken place on their devices. This is difficult to control and mitigate data breaches when devices are not under control by the IT department. (Morrow, 2012)

2.2.2 Implementation

Despite several advantages of BYOD, distraction is seen as one of the challenges in its implementation. Allowing students to bring in their own devices for their studies leaves them the freedom and opportunity to use their devices such as laptops for other personal purposes. This is a

concern for most BYOD in the classroom where electronic devices can be used to multitask like surfing the internet Facebook, WhatsApp and Instagram. Multi-tasking with technology has been found to negatively affect academic performance. However, the cost and pressure on IT personnel or department, as well as the increase in students' device usability and productivity level, outweighs this. (Wood et al., 2012)

There are other security models for BYOD implementation, the hands-on and the hands-off security models. Hands-on security models take control over the device including installing management software to monitor and trace the device. The hand-off performs differently, and it is done by IT departments creating a platform that mobile device users can access to perform their work. This is usually done through virtualization desktop or application virtualization. (Pell, 2013)

3 BYOD at HAMK

All students in HAMK have been required to bring their devices such as laptops at the beginning of autumn 2021. The schools' computers are still in use; however, students can choose to utilize them depending on the tasks or the use of special software tools and other requirements for their studies. Apart from the students' personal computer use, there is a requirement for a headset (for video listening) and a wireless mouse (to aid in using applications). It is important to note that students are responsible for their computer security and application settings. This is to guide students to be able to use HAMK IT services and manage the information security of their computers. (HAMK, 2021)

There are several ranges and requirements of laptops to be used for studies in HAMK depending on the use for it. Computer requirements for BCA and equivalent degrees are very important to note when implementing BYOD. BCA requires an operating system to ensure compatibility with the required course software. Students must have the ability to install software on their own devices (laptops). In this degree program, students are strongly advised to use Windows instead of Mac, however, students can run the Windows Operating System and office on Mac in order to support the software required for this course. (HAMK, 2021)

Table 1 describes the range of laptop categories recommended by HAMK for all students. Category 1 is recommended for general software users for example smart organic farming, and bachelor of natural resources. HAMK recommends Category 2 and 3 for BCA students and Category 3 laptops are highly recommended for BEEA students. (HAMK n.d)

Table 1.The Minimum PC Requirements (HAMK n.d)

LAPTOP CATEGORIES	1 BASIC SOFTWARE USE	2 BASIC-LEVEL GRAPHIC DESIGN TASKS (BCA)	3 CAD AND 3D MODELLING AND HEAVY-DUTY GRAPHIC DESIGN TASKS (BCA AND BEEA)
PROCESSOR	Intel i3 or an equivalent AMD option	Intel i5 or AMD Ryzen 5	At least Intel i5 or Intel i7 or AMD Ryzen 5 or AMD Ryzen 7
RAM	At least 8 Gb	At least 8 Gb (16 Gb recommended)	At least 16 Gb
GPU	No special requirements	At least Intel HD/UHD Graphics or similar	A powerful NVIDIA Quadro or NVIDIA GeForce GTX/RTX GPU or an equivalent AMD option
DISPLAY RESOLUTION	1920 x 1080 recommended	Minimum 1920 x 1080	Minimum 1920 x 1080
DISPLAY SIZE	No special requirements	No special requirements	15.6 inches recommended
STORAGE SPACE	At least 250 Gb	At least a 500 Gb SSD	At least a 500 Gb SSD
HDMI PORT/ADAPTER	Type A/type A	Type A/type A	Type A/type A
WINDOWS	10 or 11 64-bit	10 or 11 64-bit	10 or 11 64-bit

4 Thesis Implementation

The main objective of this thesis was to find out the requirements and challenges encountered by first and second-year students who are enrolled in BCA or BEEA degree programs. These requirements include understanding complex software, hardware, or programming concepts, as well as determining acceptable devices, operating systems, hardware specifications, and necessary software for students. Due to the corona pandemic, it was not possible to conduct in-person interviews on school premises. Therefore, the use of a survey became necessary as a means of gathering data. To ensure the success of the survey, the author conducted extensive research on the best tool or form to outline my questions.

In this thesis, the Microsoft Office Form was found to be the best option for conducting a structured survey due to its comprehensive features and ability to be sent via email. This allowed me to gather data from a large number of students, providing a broad and representative understanding of their experiences and challenges.

The results of the survey were analysed using qualitative research principles, which involve examining and interpreting data to gain insights into experiences and perspectives. The qualitative research approach is well-suited for exploring complex and nuanced issues, such as the challenges faced by new students in the implementation of BYOD. By using the Microsoft Office Form and following qualitative research principles, the thesis aimed to gather rich and in-depth data about the experiences of new students with BYOD implementation, allowing for a more nuanced understanding of the challenges they face and how they can be addressed.

In May 2022 I completed my questionnaire and sent it out to students to respond. In the cover letter sent to the respondents, I introduced myself and explained the purpose of the questionnaire. I informed the respondents about the nature of the research and why their experiences were important. Additionally, I emphasized the importance of anonymity and how I would handle the responses received, ensuring that the information they provided would be kept confidential and used solely for the purpose of the research. By explaining the purpose of the survey and how the responses would be used, I was able to build trust and encourage the respondents to provide honest

and valuable insights. The covering letter served as an important tool for establishing communication with the respondents and ensuring the success of the survey. These questions consisted of close and opened-ended questions. The whole survey was made so simple, and clear and time spent on answering on average six minutes and anonymously made to have greater disclosure of sensitive information which tells the facts are more accurate than other forms of survey methods. The outcome of the survey was used to analyse the challenges, experiences faced, and workable solutions to these problems.

To analyse the data obtained from the survey, I utilized a spreadsheet to organize the responses. I then created a summary of statistics, charts, and graphs to better understand patterns and gain a clearer picture of the data.

4.1 Quality Research

This chapter relates to the methods and steps that were used to collect, process, and analyse data to answer the research questions. Mouton (2002) indicates that a scientific inquiry is driven by the search for the “truth” or at least “truthful knowledge”. The main purpose of a research is to obtain results that are as close to the truth as possible or has the most valid findings. Based on the research questions posed, a qualitative research method was used in the study.

Qualitative research focuses on interpreting a phenomenon in its natural settings to make sense in terms of the meanings people bring to these settings. It purports to project the meaning people bring to the daily things around them, in their own minds and in their words. Patton considers it as an effort to understand situations rather than to either support or disprove a relationship. It does not present a hypothesis that is to be tested, neither does it seek the degree of impact of two or more variables nor the presence of a control group. Data is collected from a small purposive sample which may or may not represent the larger population. (Lopez & Whitehead, 2013) The objective of the study should be to select the persons from whom the information is collected have experienced or know as much about the phenomenon under investigation. The researcher must also be aware of the research meanings, experiences, or perceptions. (Sutton, & Austin, 2015).

This thesis focuses on the BYOD policy at HAMK, with emphasis on challenges and viable solutions. The research is a purely qualitative one since it presents students the opportunity to express themselves on the challenges they experience with the policy. It seeks to bring meaning to students' individual experiences with the policy. A group of students were sampled to represent the whole student population, specifically, first, and second-year students of BCA and BEEA. Both groups are students of HAMK who inadvertently experience the BYOD policy in the university. Their responses were collected anonymously and analysed to extract information through a questionnaire which measures its validity. Validity is the extent to which an instrument, a survey, measures what it is supposed to measure. In short, it is about measurement accuracy (Ghauri, & Gronhaug, 2005).

The survey was conducted by distributing questionnaires with both open-ended and close-ended questions. The qualitative analysis takes the form of survey responses. For example, qualitative analysis means going through each participant's response and mapping them to produce innovative ideas or patterns as they emerge. It also included very straightforward and background questions regarding BYOD's implementation policy in HAMK. The introduction of BYOD in HAMK (2021), which required students to bring in their own devices for their studies also put a lot of strain and challenges on new students as they begin their first academic year.

4.2 Questionnaire

Questionnaire is a structured survey with close and open-ended questions for the data collection (Dillman, 2000). In this thesis some questions provided respondents the opportunity to comment in their own words, what they thought of a particular idea. Others also presented respondents with options to choose from. The purpose was to give respondents enough room to express themselves while guiding them to the objective of the theses.

Both open and closed questions are often used in surveys. Open-ended questions provide information on why, what, and how. Open-ended questions cannot be answered with yes or no, but the respondent is expected to answer the question asked in their own words. The good things about open-ended questions are the freedom of the respondent to tell in their own words, the opportunity to get unpredictable answers and more in-depth knowledge of the topic. The downsides of open-

ended questions are slower data analysis, comparison between respondents is challenging or impossible, and errors may occur in the interpretation of the answers. (Bradburn, Sudman, & Wansink, 2004)

Closed questions often contain answer options from which the respondent chooses the right option(s) for themselves. When drafting closed questions, it is worth being careful that the questions do not lead or direct the respondent in the desired direction. The advantages of closed questions are the ease of analysing the answers, the comparability of the answers and the quick answering of the questions. The downsides are the limited number of answer options, the answer options can be introductory, and the correct answer cannot be found. (Bradburn et al., 2004)

To make sure that all answer options are included, both open and closed questions can be used in the survey. This allows the respondent to add their own option and does not have to choose the least bad option from the list. After a closed question, the respondent may be asked to refine their answer with an open text. In this way, the open text combines and refines the closed answer given. (Bradburn et al., 2004)

In another words, a questionnaire is a list of questions or items used to gather data from respondents about their attitudes, experiences, or opinions. Questionnaires can be used to collect quantitative and/or qualitative information. The questionnaire enables responses to be gathered from large numbers quickly, and cost-efficiently. (Bradburn et al., 2004)

The data collection method for this thesis is qualitative and therefore, it will focus on collecting qualitative information from the student groups. There were about twenty-one questions asked from students which will help in identifying the research objectives. The Microsoft 365 form was used as a tool to set questions for the first- and the third years of bachelor's degree programs. The main contact for this survey was generally by email / internet-based questionnaires. The statistical tool used for the data analysis are the percentages, pie chart, bar chart and other types been used in this research. The questionnaire was created to be interesting for respondents to read completely to give a better response rate. To achieve this, logical sequence and relevant questions to respondents were asked which they find interesting to read and answer.

According to Jenn (2006) a good questionnaire should be valid, clear, interesting, and succinct.

The validity of the thesis is based on the questionnaire. The questionnaire was used as way of get valid responses from the respondents. The questions were very short, clear, and uniformly designed to make it easier to read and understand. The estimated time for answering was about 6minutes long. The data collected from respondent were anonymously held and indicates that there are no revealing values that can link to the respondent in anyway.

In this thesis the questions Questionnaire were logically constructed and that leaves the student to read and develop or construct their answers, a choice to select one or more from pre-listed answers. There were not too many open questions which allows respondents to freely express themselves and options to choose from. It was guided with instruction alongside so to know how many to choose from and empty box to write or express something that weren't found from the list. A required field was used in most questions to make it an easy way to ensure the use of the form and more data.

In the survey, a technique called "Branching" was used. This involved creating a questionnaire that guided respondents to the next question based on their previous answers. For example, a list of challenges was created related to each application, and when a respondent chose a specific application, they were directed to the corresponding list of challenges. This approach ensured that respondents were only presented with relevant questions, which helped to improve the accuracy and completeness of the data collected.

A Likert scale was used in some of the closed-ended questions to provide series of answers, for example, "I strongly agree" and ends with "I strongly disagree" with other less choice in the middle. Most questions were asked about the personal experiences of respondents which basically makes it easier for them to answer and eventually gives valid responses (Jenn, 2006).

In addition, the questions should aim to answer only to the objectives of the research. Usually, research focuses on getting more data, regardless of its importance or not. This occurs when the researcher has not properly checked the research objectives. Asking too many questions eventually leads to respondents being reluctant. Therefore, a succinct questionnaire should be precise, on

point, and only aim to answer the research objectives to derive a high completion rate and overall better data quality. (Bradburn et al., 2004)

There are several reasons for the low response rate from a survey or how many people respond to the survey. According to Dillman (2000), a survey question is biased if it is phrased or formatted which leads people to certain answer. If questions are difficult for respondents to understand they tend to be bias. The result of the survey questionnaire becomes unreliable and missed opportunity to understand respondent's experience. To achieve accurate results, it is very necessary for the researcher identifying and fixing biased survey questions.

According to Dillman (2000), there are some ways to avoid bias in survey questions:

When conducting research surveys, it's important to ask questions that don't lead respondents to answer in a certain way. Avoid using leading questions that may influence them to fill in with details and suggestions. Instead, ask objective questions that allow respondents to rate the item without any bias. To eliminate confusion in the respondents' minds, it's important to identify jargon in the survey questions. Most people find it hard to understand jargon words, so use simple and specific language for better data quality. Double-barred questions can cause confusion for respondents, leading to inaccurate feedback. It's best to split up the questions to get a better interpretation of the result. Instead of asking complex questions, ask simple and clear questions that produce valid feedback. The use of poor answer scale options can lead to bias in the survey results. It's important to proofread the options to ensure they are not overlapping, and the positive ends are always on the right. By following these guidelines, you can produce high-quality survey results that accurately reflect the respondents' opinions.

5 Results

The following sections describe the planning and implementations of data collection as well as the main result of data collected in this thesis. The purpose was to look out for experiences been faced by first- and second-year students in their studies in HAMK and ways to making it simpler as BYOD is concern. It was carried out by sending out questionnaire to these year groups through email. A total of 28 first- and second-year BCA and BEEA students at HAMK, first and second year responded to the survey and the average respond time was 04,45 minutes. Most of the responses came from first year students. Significantly, more BCA first year students responded and only few respondents from BEEA.

Table 2. Background Questions

	BCA (FIRST YEAR)	BCA (SECOND YEAR)	BEEA (FIRST YEAR)	BEEA (SECOND YEAR)
Degree Program	8 students (29%)	12 students (43%)	3 students (10%)	5 students (18%)
Device Type	Laptop 8 students (100%) Desktop Tablets Other	8 students (67 %) 3 students (25%) 1 student (8%)	3 students (100 %)	5 students (100%)
Operating System	Windows10 6 students (75%) Windows 11 Linux Mac OS 2 students (25%) Android iOS Other	12 students (100%)	2 students (67%) 1 student (33%)	5 students (100%)
Ram	2gb or less 4gb 6gb			1 student (20%)

	8gb	3 students (38%)	3 students (25%)	1 student (33%)	1 student (20%)
	16gb	4 students (50%)	6 students (50%)	1 student (33%)	1 student (20%)
	32gb	1 student (12%)	3 students (25%)		
	Other			1 student (33%) (12gb)	2 student (40%)
Hard drive	500gb and above	4 students (50%)	9 students (75%)	1 student (33%)	3 students (60%)
	500gb -128gb	3 students (38%)	2 students (17%)	2 students (67%)	1 student (20%)
	128gb and below	1 student (12%)	1 student (8%)		1 student (20%)
	Other				
Processor	>2.4ghz	6 students (75%)	6 students (50%)	1 student (33%)	3 students (60%)
	<2.4ghz		2 students (17%)	1 student (33%)	1 student (20%)
	2.4ghz	2 students (25%)	3 students (25%)	1 student (33%)	1 student (20%)
	Other		1 student (8%)		

As it shows in Figure 2, majority of students who responded were second year students which constituted about 61%, leaving 39% to first year students. Most BCA students from second year did respond more to survey compared to that of the BEEA.

Figure 2. Year Group



From figure 3, most of the respondents who answered to this question are students studying in BCA. It shows that twenty (20) students 71% out the total number of respondents. Indicating that 8 students 29% from BEEA also took part this survey.

Figure 3. Degree Program

2. What program are you studying?



According to figure 4, students were asked about the type of devices they have for their studies. The answers were such that most of them had laptops, desktop, and other devices. It clearly shows that 23 students did use laptop in their studies at 83%, 4 students with 15% and 2% of which represent another student respectively.

Figure 4. Device type for Studies

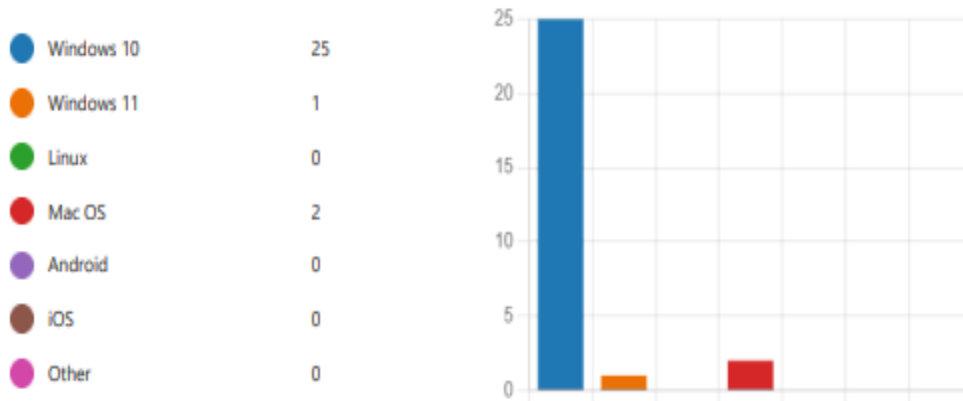
3. What kind of device do you have for your studies? Please choose one.



From the Figure 5 describes the Operating Systems been used by students on their devices. Windows 10 is widely used by 25 Students (89%), a student (4%) responded to using Windows11 and 2 students (7%) using Mac Os for their studies.

Figure 5. Operating System Installed

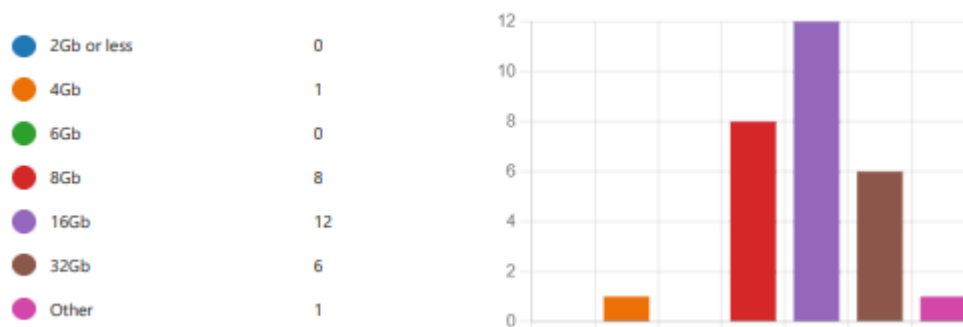
4. What is the operating system of your device? Please choose one.



From figure 6 when students were asked about size of RAM they used in their systems or devices, the majority answered 12 students (43%) for with 16gb, followed by eight students (29%) for 8gb, six students (22%) with 32gb, one student (3%) with 4gb and a student (3%) with other RAM size. which unclear or be measured to be 12gb.

Figure 6. Size of RAM Used

5. What is the RAM size of your device? Please choose one.



From figure 7 ,17 Students (61%) responded to this question with storage size five hundred giga bytes(500gb) and above. Those who choose 500gb -12gb were eight students at 29% and three responded choosing 128 and below representing 11% of total respondents.

Figure 7. Device Storage Size

6. What is your Hard drive storage size ? Please choose one.



Students were also asked if they had prior knowledge or familiar with BYOD. Most answered “No” at 61% (17 students) and 10 students (36%) answered “Yes”. Other answered “Maybe” to mean not so sure at 4% of overall total respondents.

According to figure 8, out of the total number of respondents ,17 students answered that they were not familiar with BYOD when they were asked about it prior to their studies. This may have implications for how technology is Integrated and experiences they may face during the use of their own devices for their studies.

Figure 8. Familiarity with BYOD

8. Before your studies in Hamk, were you already familiar with BYOD?

[More Details](#)



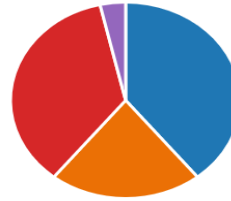
According to figure 9, responses from the survey, wireless area network 11 students (39%), wireless wide area network 10 students (36%) and local area network 6 students (21%) seems to be the networks mostly provided to students in HAMK for their studies. Other (4%) answered using Wi-Fi: DDD as network source for their studies.

Figure 9. Type of School Network

9. Which wireless network does your school provide you with for your studies?

[Lisätietoja](#)

● Wide Area Network(WAN)	11
● Local Area Network (LAN)	6
● Public Access Network(PAN)	0
● Wireless Wide Area Network(W...	10
● Muu	1



From figure 10, almost half of the students (46%) who answered to this question find that the speed of the school network is sufficient for their studies. Some answered (32%) that they strongly agree and 21% answered choosing neither agree nor disagree to the school's network speed.

Figure 10. School Network Suitability

10. The school's internet access speed is sufficient for my needs.

[Lisätietoja](#)

● Strongly agree	9
● Agree	13
● Neither agree nor disagree	6
● Disagree	0
● Strongly disagree	0

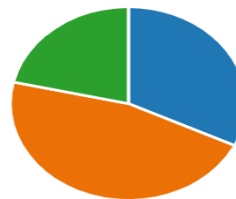


Table 3 shows what the students answered about what software application they have installed on their devices.

Table 3. Software Application Installed

Software applications	Number of Students
Eclipse	18
MySQL	19
Workbench	13
Git & GitHub	22
Python	15

Anaconda	12
Visual studio code	26
Java	21
Docker	18
Node.js	12
Brackets	1
other	2

Figure 11 describes what kind of software has been used or installed by students for their studies. Most students 26 (83%) out of the total respondents who answered this question have installed visual studio code on their devices. This shows how these two groups BCA and BEEA utilize visual studio.

Figure 11. Histogram of Software Application Installed

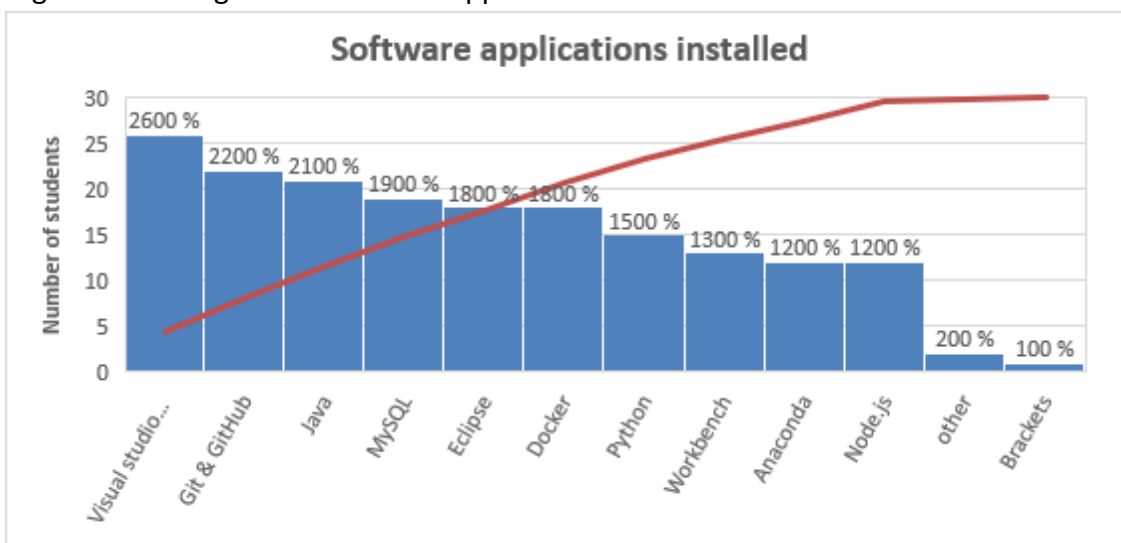


Figure 12 shows that students were asked to list any other software applications that were not included in the above Table 3, to ensure that they did not leave out any software from their responses. Seven respondents (25%) answered VMware for this question which indicates that VMware is widely used in their degree programs.

Table 4 provides a detailed description of several software installation challenges, including those related to the software listed in the survey and other challenges that may be encountered during software installation. The table outlines common challenges such as compatibility issues, technical difficulties, security risks, licensing and activation requirements, and user experience challenges.

Table 4. Software Installation Challenges

Challenges	Eclipse	MySQL	Workbench	Git	Python	Android	Visual Studio	Java	Docx	Notepad	Brackets	Others
I had proxy /firewall enabled		1										
I was required to have administrative privileges	1		1									
I had older version of windows operating system (windows 7 or lower version)												
I had other software applications conflict	6	2	1					1				1
I had configurations settings required	4	3										1
Network connection problems						1						1
I had anti-virus enabled				1								
I had missing plug-in	4											
I had windows features settings												
I had virtualization disabled												
I had a Jdk conflict	4											
Other								1	2	1		2

Figure 14 shows that students were asked to identify the most challenging software installation, and most students responded with 'Eclipse' as the most challenging software installation. Students were

again, asked to tell which challenges they faced during installation of eclipse which makes it most challenging installation software.

Most students, 6 (29%) answered this question had other software application conflicts during the installation of the eclipse. Four (19%) respondents also answered that they had configuration settings required, had a missing plugin, and had a JDK conflict respectively during the installation of the eclipse. One (5%) respondent answered it is required to have administrative privileges to install eclipse. Three students also responded to MySQL having had configuration settings required, two students had other software application conflicts, and one student had proxy/wall enabled as a challenge during the installation of MySQL.

One student explained that Workbench required the enabling of administrative privileges and another student had other software application conflicts.

Git & GitHub was one of the most challenging software application installations. For example, one student reporting that having an anti-virus enabled caused the blocking or improper installation of the application. Network connection problem was one of the challenges that one student had during the installation of the anaconda.

The installation of Docker was a challenge for two students who had other software application conflicts and others had to update OS as a challenge not listed in the list of challenges. Two students did answer this question by choosing node.js as the most challenging but they provided their own challenges. One of them said "Just problems finding the right software to install" and the other "The installation process got stuck" aside the list provided.

When students were asked about the most challenging software application installation one selected Brackets. Again, when the student was asked to answer about the challenges faced during the installation of brackets, the student answered by "I don't know sorry" which could be that the student didn't know what the challenge was and why couldn't get it installed.

The last question was answered by students who chose Other as an option from the list of challenges listed. They were asked which of the challenges they faced during the installation of Other selected

from the most challenging software application installations. 5 students answered that "I had other software applications conflict", "I cad (sic)Matic on my desktop and then my laptop. The license got moved exclusively to my laptop and my laptop can barely run the program.", "Network connection problems", "none", and "I had configurations settings required".

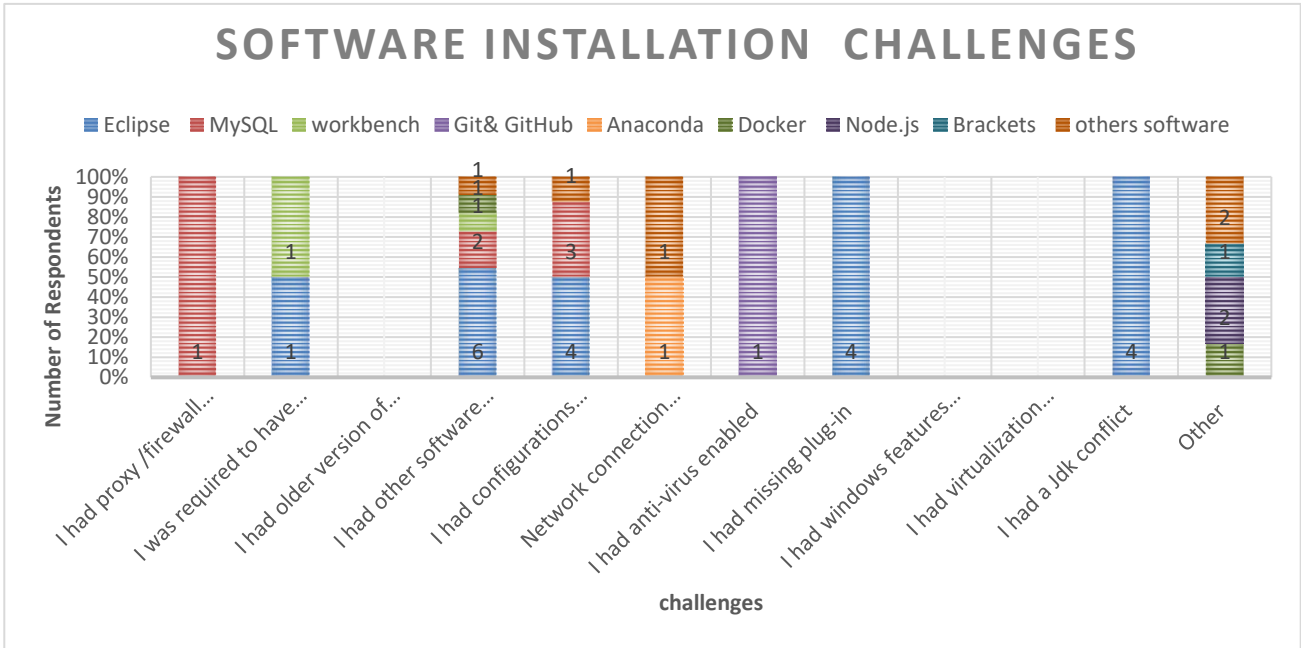
According to the list of challenges faced during the installation of these software applications Eclipse, MySQL, Workbench, Docker, and Other, "other software applications conflicts have a common challenge for most students.

From the answers, there were no noticeable difference between the size of the computer's memory and the challenge of installing the program. Eclipse had caused most of the challenges. respondents who had a large-capacity computer also experienced some challenges. Only one of the respondents had access to a computer, which does not meet the laptop category recommendations (1) in Table 1. The challenges with this respondent were essentially related to the computer's performance capacity. Students must consider the minimum computer requirements recommended by HAMK so that their studies go as smoothly as possible.

Most of the respondents had Windows as their operating system. Only one of the respondents said that they use the macOS operating system. The answers show no difference between the most challenging installation and the operating systems. It can be observed from the responses that the students in the BEEA program faced more difficulties with the specialized software they were required to use. The results do not directly show license problems. Only one of the respondents related his problem to the license and its transfer from one machine to another. Moreso, from the

results, the internet connection speed offered by HAMK is sufficient. None of the respondents experienced any inconvenience when using the school's Internet connection.

Figure 14. Software Installation Challenges



6 Simplifying the Installation Process

This chapter discusses better ways or options to install required apps without hassle. The thesis focused on Microsoft Windows Operating System for purpose of simplifying the process for new students implementing BYOD. To simplify can be defined as reducing or diminishing in scope or complexity. This decision is based on the results from a survey where it was found that 90% of the respondents had Windows 10 or 11 installed on their devices. Furthermore, HAMK recommends the use of the Windows operating system, as many of the professional programs used at the university are Windows-based.

Process Simplification will involve a systematic and thorough step to minimize complexity and optimize the process. For these to be possible certain tools and technologies are required, step by step guide on simplified process of software installation will be demonstrated.

6.1 Chocolatey Packages

Chocolatey is a PowerShell-based software management tool or solution as opposed to all you have ever experienced on Windows. It provides a set of tools that can be used to package standalone binaries, scripts, or installers into a unified format that can then be installed, uninstalled, or upgraded through their command-line utility (Chocolatey Software, 2021).

The chocolatey script would be created using PowerShell to make readily for installing Chocolatey and all chocolatey packages easily. The steps below explain how to install various number of programs or apps that are used in various modules in HAMK, as specified in chapter 6, using the chocolatey package manager for Windows.

Step 1: Install CHOCOLATEY

Requirements

- Windows 7 or newer version of Windows Operating System (Recommended Windows 10 or 11)
- PowerShell v2+

- .NET Framework 4+

Installation Process (with PowerShell)

- Click and open PowerShell with Administrator rights (Run as Administrator)
- Run the following command in PowerShell to install CHOCOLATEY.

Set-ExecutionPolicy Bypass -Scope Process -Force; iwr
<https://community.chocolatey.org/install.ps1> -ss | iex

Figure 15. Chocolatey Successfully Installed

```

Administrator: Windows PowerShell
The item at C:\ProgramData\chocolatey has children and the Recurse parameter was not specified. If you continue, all
children will be removed with the item. Are you sure you want to continue?
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): y
PS C:\WINDOWS\system32> Set-ExecutionPolicy Bypass -Scope Process -Force; iwr https://community.chocolatey.org/install.ps
1 -UseBasicParsing | iex
Forcing web requests to allow TLS v1.2 (Required for requests to Chocolatey.org)
Getting latest version of the Chocolatey package for download.
Not using proxy.
Getting Chocolatey from https://community.chocolatey.org/api/v2/package/chocolatey/1.2.0.
Downloading https://community.chocolatey.org/api/v2/package/chocolatey/1.2.0 to C:\Users\BALLY\AppData\Local\Temp\chocol
atey\chocoInstall\chocolatey.zip
Not using proxy.
Extracting C:\Users\BALLY\AppData\Local\Temp\chocolatey\chocoInstall\chocolatey.zip to C:\Users\BALLY\AppData\Local\Temp
\chocolatey\chocoInstall
Installing Chocolatey on the local machine
Creating ChocolateyInstall as an environment variable (targeting 'Machine')
Setting ChocolateyInstall to 'C:\ProgramData\chocolatey'
WARNING: It's very likely you will need to close and reopen your shell
before you can use choco.
Restricting write permissions to Administrators
We are setting up the Chocolatey package repository.
The packages themselves go to 'C:\ProgramData\chocolatey\lib'
(i.e. C:\ProgramData\chocolatey\lib\YourPackageName).
A shim file for the command line goes to 'C:\ProgramData\chocolatey\bin'
and points to an executable in 'C:\ProgramData\chocolatey\lib\YourPackageName'.
Creating Chocolatey folders if they do not already exist.
WARNING: You can safely ignore errors related to missing log files when
upgrading from a version of Chocolatey less than 0.9.9.
'Batch file could not be found' is also safe to ignore.
'The system cannot find the file specified' - also safe.
chocolatey.nupkg file not installed in lib.
Attempting to locate it from bootstrapper.
WARNING: Not setting tab completion: Profile file does not exist at
'C:\Users\BALLY\Documents\WindowsPowerShell\Microsoft.PowerShell_profile.ps1'.
Chocolatey (choco.exe) is now ready.
You can call choco from anywhere, command line or powershell by typing choco.
Run choco /? for a list of functions.
You may need to shut down and restart powershell and/or consoles
first prior to using choco.
Ensuring Chocolatey commands are on the path
Ensuring chocolatey.nupkg is in the lib folder
PS C:\WINDOWS\system32>

```

Step 2: Installing Programs/Apps

The following contains list of some of the basic programs/apps that are going to be installed:

powershell-core, git, vscode, node.js, workbench, python, MySQL, anaconda, eclipse, zoom, sudo, vmrc, brackets, vmware-horizon-client, github-desktop, docker-desktop & obs-studio.

Run the script below to install the previously listed apps. If more application software needed to be installed should be added accordingly.

```
choco install powershell-core git vscode node.js workbench python mysql anaconda
eclipse zoom sudo vmrc brackets vmware-horizon-client github-desktop docker-desktop
obs-studio curl -y
```

This is an overview of some software applications which seemed challenging to some students when asked during the survey. These software packages were successfully installed without or less challenges by using chocolatey. With any application of your choice and need again updating the script to suit your need.

Figure 16. Programs /Apps Installed Successfully

```
Administrator: Windows PowerShell
Note: To confirm automatically next time, use '-y' or consider:
choco feature enable -n allowGlobalConfirmation
Do you want to run the script?([Y]es/[A]ll - yes to all/[N]o/[P]rint): y
File appears to be downloaded already. Verifying with package checksum to determine if it needs to be redownloaded.
Hashes match.
Installing vmware-horizon-client...
vmware-horizon-client has been installed.
vmware-horizon-client may be able to be automatically uninstalled.
The install of vmware-horizon-client was successful.
Software installed to 'C:\Program Files\VMware\VMware Horizon View Client\'
Progress: Downloading github-desktop 3.1.2... 100%
github-desktop v3.1.2 [Approved]
github-desktop package files install completed. Performing other installation steps.
The package github-desktop wants to run 'chocolateyinstall.ps1'.
Note: If you don't run this script, the installation will fail.
Note: To confirm automatically next time, use '-y' or consider:
choco feature enable -n allowGlobalConfirmation
Do you want to run the script?([Y]es/[A]ll - yes to all/[N]o/[P]rint): y
Installing github-desktop...
github-desktop has been installed.
The install of github-desktop was successful.
Software installed to 'C:\Program Files\GitHub\'.
Progress: Downloading docker-desktop 4.14.1... 100%
chocolatey-dotnetfx.extension v1.0.1 [Approved]
chocolatey-dotnetfx.extension package files install completed. Performing other installation steps.
Installed/updated chocolatey-dotnetfx extensions.
The install of chocolatey-dotnetfx.extension was successful.
Software installed to 'C:\ProgramData\chocolatey\extensions\chocolatey-dotnetfx'
dotnetfx v4.8.0.20220524 [Approved]
dotnetfx package files install completed. Performing other installation steps.
The package dotnetfx wants to run 'ChocolateyInstall.ps1'.
Note: If you don't run this script, the installation will fail.
Note: To confirm automatically next time, use '-y' or consider:
choco feature enable -n allowGlobalConfirmation
Do you want to run the script?([Y]es/[A]ll - yes to all/[N]o/[P]rint): y
Microsoft .NET Framework 4.8 or later is already installed.
The install of dotnetfx was successful.
Software install location not explicitly set, it could be in package or
default install location of installer.
docker-desktop v4.14.1 [Approved]
docker-desktop package files install completed. Performing other installation steps.
The package docker-desktop wants to run 'chocolateyinstall.ps1'.
Note: If you don't run this script, the installation will fail.
Note: To confirm automatically next time, use '-y' or consider:
choco feature enable -n allowGlobalConfirmation
Do you want to run the script?([Y]es/[A]ll - yes to all/[N]o/[P]rint): y
File appears to be downloaded already. Verifying with package checksum to determine if it needs to be redownloaded.
```

6.2 Uninstalling the Programs Previously Installed

Once already installed programs are installed using chocolatey, it is also possible to manage all aspects of environment easily. To uninstall a program managed by chocolatey there are two ways to do so, either by PowerShell command or Chocolatey GUI (graphical user interface).

First, open PowerShell by right-clicking to run as administrator. The command that could be used for uninstalling is: *Choco uninstall* which allows uninstalling of a program quickly and easily. This can be done for example, by removing a single program: `Choco uninstall python` or selected programs could be uninstalled by: `Choco uninstall python docker-desktop`. It is particularly important to double check list of installed programs managed by chocolatey before deciding on what to uninstall by using the command: `Choco list -local-only`. Moreover, uninstallation everything by chocolatey could be done by single command: `Choco uninstall all` and by all uninstallation prompts with “-y” (yes) as choice will complete the uninstallation process for example, `Choco uninstall python -y`.

7 Summary

The results of the research suggest that new students have significant difficulties when implementing a Bring Your Own Device (BYOD) policy. The respondents reported facing the most challenges with two specific tools, Eclipse and MySQL. The difficulties they experienced included a lack of prior experience with the tools, issues with setting up the tools on their personal devices, and compatibility problems with different operating systems. Additionally, the respondents reported facing difficulties in obtaining technical support and finding resources to learn how to use the tools effectively. In conclusion, the results highlight that new students face a variety of challenges when implementing BYOD, especially when it comes to using specific tools like Eclipse and MySQL. These challenges can affect their ability to successfully use technology in their academic work.

Another research question was “how challenges can be addressed by simplifying BYOD implementation”. In this thesis, a simple way to install applications is presented. Chocolatey package manager for Windows integrated with PowerShell was used to simplify the installation process even further for new students. It allows administrators to manage software installations and updates on a large number of computers, making it easier to deploy and manage applications and tools, such as Eclipse and MySQL. By using Chocolatey, the installation process can be automated and streamlined, reducing the time and effort required to set up each device.

The approach proposes simplifying the installation process by providing a step-by-step guide and a centralized management console, allowing administrators to monitor and control software installations and updates, ensuring that each device is up-to-date and in compliance with security policies. The goal of this approach is to make the BYOD implementation process easier for new students, thus reducing the barriers to effectively using technology in their academic studies. By implementing this process, it is expected that students will be able to overcome the challenges faced in BYOD implementation and effectively utilize technology to enhance their learning experience.

The topic of this thesis is relevant to new students. This can already be demonstrated by the fact that the respondents have faced challenges in the implementation of BYOD. By introducing a simplified way for BYOD implementation, new students will help with BYOD implementation. The

survey also asked whether the respondents were already familiar with BYOD. Based on the responses, more than half of the respondents were not already familiar with BYOD.

In the thesis, one challenge was the timing of submitting the questionnaire. The broadcast took place in late spring when the semester was ending. For this reason, BEEA students were also included in the survey. The number of responses remained quite low compared to the number of emails sent. Although the number of responses remained low, the principles of qualitative research have been followed in the thesis, and the answers thus obtained are relevant. The credibility of the results obtained is also enhanced by the fact that the survey provided answers to the first research question of the thesis. Due to the number of responses, the income competition received cannot be generalized to all BCA and BEEA first- and second-year students. Due to scheduling reasons, it was not possible to renew the survey in autumn 2022. Certainly, this might have increased the number of responses and thus provided an opportunity for generalizability of the results.

Writing this thesis was important for the author in terms of learning experience. The process of writing the thesis itself was important in terms of learning. Without a schedule, it is likely that the author would not have been able to complete the thesis within the intended timeframe. In addition, the author acquired valuable skills in reading scientific texts and extracting important information from them which enhanced their ability to write factual and informative content. Conducting the survey was also an educational endeavour. In addition to other considerations, the author had to carefully contemplate the formulation of questions that would yield answers directly pertinent to their thesis.

The topic of this thesis is work-related as BYOD is also widely used in different organizations. This thesis could be continued by repeating this survey at the beginning of the semester to guarantee enough responses. The next step from this thesis could be a deeper look at the BYOD challenges that caused the problems. The nature of the challenges could be included in the review, and HAMK staff could also be included.

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Annex 1: Cover Letter

BYOD challenges experienced by first and second-year students survey.

I am Mathews a third-year student in Hamk, and pursuing a Bachelor's Degree in Computer Applications.

My thesis aims to find out the BYOD challenges experienced by first and second-year students. The outcome of this survey will help in simplifying the arisen challenges.

The survey will take approximately 6 minutes to complete and your responses are completely anonymous.

You can only take the survey once. The survey closes on 30.05.2022 at 11:59 pm.

Questions marked with an asterisk (*) are required.

Annex 2: Questionnaire

1. I am a *

- 1st year student
- 2nd year student

2. What program are you studying? *

- Bachelor Degree Computer Applications(BCA)
- Bachelor Degree Electrical and Automation Engineering (BEEA)

3. What kind of device do you have for your studies? Please choose one. *

- Laptop
- Desktop
- Tablet
- Other

4. What is the operating system of your device? Please choose one. *

- Windows 10
- Windows 11
- Linux
- Mac OS
- Android
- iOS
- Other

5. What is the RAM size of your device? Please choose one. *

2Gb or less

4Gb

6Gb

8Gb

16Gb

32Gb

Other

6. What is your Hard drive storage size ? Please choose one. *

500Gb and Above

500Gb - 128Gb

128Gb and Below

Other

7. What is the speed of your processor? Please choose one. *

>2.4GHz

<2.4GHz

2.4GHz

Other

8. Before your studies in Hamk, were you already familiar with BYOD? *

- Yes
- No
- Maybe

9. Which wireless network does your school provide you with for your studies? *

- Wide Area Network(WAN)
- Local Area Network (LAN)
- Public Access Network(PAN)
- Wireless Wide Area Network(WWAN)
- Other

10. The school's internet access speed is sufficient for my needs. *

- Strongly agree
 - Agree
 - Neither agree nor disagree
 - Disagree
 - Strongly disagree
-

11. Which of the software(s) below have you installed on your device? *

- Eclipse
 - MySql
 - Workbench
 - Git & Github
 - Python
 - Anaconda
 - Visual studio code
 - Java
 - Docker
 - Node.js
 - Brackets
 - Other
-

12. Which other software have you installed on your device during the first and second years which are not listed above? *

Enter your answer

13. Which was the most challenging software installation ? Please choose one. *

- Eclipse
 - MySql
 - Workbench
 - Git & Github
 - Python
 - Anaconda
 - Visual studio code
 - Java
 - Docker
 - Nodejs
 - Brackets
 - Other
-

14. Which of these challenges did you face installing Eclipse? *

- I had proxy /firewall enabled
 - I was required to have administrative privileges
 - I had older version of windows operating system (windows 7 or lower version)
 - I had other software applications conflict
 - I had configurations settings required
 - Network connection problems
 - I had anti-virus enabled
 - I had missing plug-in
 - I had a Jdk conflict
 - Other
-

15. Which of these challenges did you face installing MySQL? *

- I had proxy /firewall enabled
 - I was required to have administrative privileges
 - I had older version of windows operating system (windows 7 or lower version)
 - I had other software applications conflict
 - I had configurations settings required
 - Network connection problems
 - I had anti-virus enabled
 - I had missing plug-in
 - Other
-

16. Which of these challenges did you face installing Workbench? *

- I had proxy /firewall enabled
 - I was required to have administrative privileges
 - I had older version of windows operating system (windows 7 or lower version)
 - I had other software applications conflict
 - I had configurations settings required
 - Network connection problems
 - I had anti-virus enabled
 - I had missing plug-in
 - Other
-

17. Which of these challenges did you face installing Git & Github? *

- I had proxy /firewall enabled
 - I was required to have administrative privileges
 - I had older version of windows operating system (windows 7 or lower version)
 - I had other software applications conflict
 - I had configurations settings required
 - Network connection problems
 - I had anti-virus enabled
 - I had missing plug-in
 - Other
-

18. Which of these challenges did you face installing Python? *

- I had proxy /firewall enabled
 - I was required to have administrative privileges
 - I had older version of windows operating system (windows 7 or lower version)
 - I had other software applications conflict
 - I had configurations settings required
 - Network connection problems
 - I had anti-virus enabled
 - I had missing plug-in
 - I had a Jdk conflict
 - Other
-

19. Which of these challenges did you face installing Anaconda? *

- I had proxy /firewall enabled
 - I was required to have administrative privileges
 - I had older version of windows operating system (windows 7 or lower version)
 - I had other software applications conflict
 - I had configurations settings required
 - Network connection problems
 - I had anti-virus enabled
 - I had missing plug-in
 - I had windows features settings
 - I had a Jdk conflict
 - Other
-

20. Which of these challenges did you face installing Visual studio code?

*

- I had proxy /firewall enabled
 - I was required to have administrative privileges
 - I had older version of windows operating system (windows 7 or lower version)
 - I had other software applications conflict
 - I had configurations settings required
 - Network connection problems
 - I had anti-virus enabled
 - I had missing plug-in
 - Other
-

21. Which of these challenges did you face installing Java? *

- I had proxy /firewall enabled
 - I was required to have administrative privileges
 - I had older version of windows operating system (windows 7 or lower version)
 - I had other software applications conflict
 - I had configurations settings required
 - Network connection problems
 - I had anti-virus enabled
 - I had missing plug-in
 - I had a Jdk conflict
 - Other
-

22. Which of these challenges did you face installing Docker? *

- I had firewall enabled /settings
 - I was required to have administrative privileges
 - I had older version of windows operating system (windows 7 or lower version)
 - I had other software applications conflict
 - I had configurations settings required
 - Network connection problems
 - I had anti-virus enabled
 - I had missing plug-in
 - I had virtualization disabled
 - Other
-

23. Which of these challenges did you face installing Node.js? *

- I had proxy /firewall enabled
 - I was required to have administrative privileges
 - I had older version of windows operating system (windows 7 or lower version)
 - I had other software applications conflict
 - I had configurations settings required
 - Network connection problems
 - I had anti-virus enabled
 - I had missing plug-in
 - Other
-

24. Which of these challenges did you face installing Brackets? *

- I had proxy /firewall enabled
 - I was required to have administrative privileges
 - I had older version of windows operating system (windows 7 or lower version)
 - I had other software applications conflict
 - I had configurations settings required
 - Network connection problems
 - I had anti-virus enabled
 - I had missing plug-in
 - Other
-

25. Which of these challenges did you face installing the software. Please choose one or more. *

- I had proxy /firewall enabled
- I was required to have administrative privileges
- I had older version of windows operating system (windows 7 or lower version)
- I had other software applications conflict
- I had configurations settings required
- Network connection problems
- I had anti-virus enabled
- I had missing plug-in
- I had virtualization disabled
- I had a Jdk conflict
- Other

26. If you would be happy to share more of your thoughts about any other software installation challenges related to BYOD that you have not already identified in this survey? Please write your comments below.

Enter your answer

Section 2

...

Thank you so much for completing this survey.

Please submit your response by clicking the button.