

Will You Bring Your Laptop? Investigating Students' Attitudes Towards BYOD

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Abstract: *The paper investigates students' attitudes towards introducing BYOD (Bring Your Own Device) in teaching of Information Technology (IT) related subjects. Many advantages in having BYOD are reported, but no general benefit can be taken for granted as there are specific circumstances in different technological and socio-economical environments. We examined group of senior students of IT study program, which heavily use computer labs for various subjects and part of them had already experienced usage of their own portable computers in class. Results indicated a great willingness of using own computers. A vast majority of students do have a portable computer and virtually no obstacle in introducing BYOD was indicated. These findings may encourage faculty management to start thinking in this novel way of facilitating the study process.*

Keywords: *students; learning; BYOD; teacher; education*

1. INTRODUCTION

The evolution of IT proved to be an extremely rapid one. Over three decades after PC breakout that established its place in homes, the world faced with outage of IP addresses over huge number of networked devices. Internet architects could not in their most vivid dreams anticipate what the global network would become. The economy shift followed and the need for IT experts is nowadays a hot topic worldwide.

Education system had to suffer changes. E-learning stopped to be an auxiliary method and became a mainstream. Moreover, the paradigm of e-learning itself went through a huge metamorphosis, striving towards MOOCs [1], mobile learning [2] and augmented reality [3].

Millennials were raised in IT-equipped environment and generation Z is even more involved with computers and Internet. Nowadays, kids have at least one large screen device in their pockets (cellphone, tablet). Researchers and practitioners made effort in order to utilize that fact and instrument pupils' cellphones in education [4].

Schools are trying to keep pace with technologies. With urge of "producing" fresh IT working force, there is also a pressure to equip schools and universities with up to date computers and software. Having a well-equipped computer lab is recognized as a prerequisite needed in order to use modern programming tools and new software suits. It is also considered to be a competitive advantage which will attract new students.

However, things have been changing in past few years. Number of sold laptops surpassed number of sold desktop PCs years ago and it is forecasted that in 2021 it will reach ratio of 2:1 in favor of laptops [5]. Virtually every student has a PC and many of them own portable computers as well. That brought a new possibility, that is utilized both in academic and corporate environment: bringing own computer to classes and office. A paradigm in its widest form become known as Bring Your Own device - BYOD and also may include tablets and phones. It is pretty straightforward what it means: people bringing their own portable devices and doing their work on them, decreasing or totally cutting the need for institution or company to have stationary computers or similar devices on the site and boosting users' efficiency and flexibility. Talking about education, that brings various possibilities, not limited only to computer-related subjects, but applicable to virtually any matter. Teacher can, for instance, set an online quiz, that students are supposed to attempt at the end of the lesson taught in class.

However, bringing own laptop does not mean the institution is done with its responsibilities. Many prerequisites are up to be taken care of in order for BYOD to succeed, like defining policies of usage and preparing more robust infrastructure, with special attention put on security [6].

This paper focuses to possibilities and obstacles that BYOD brings to lab exercises in IT related subjects. We investigated the students' perspective of their potential usage of own laptops over faculty's desktop PC-s in context of various subjects that require intense usage of computers.

First, we examined related literature. Then a student-survey is made, based on the work in the field, reported examples of best practice and our own experience. We conducted a survey among undergraduate IT students and discussed the results. At the end, we presented conclusions and directions for future work.

2. RELATED WORK

Since slogan "Bring Your Own Devices" was first associated to IT companies, many studies concentrate on opportunities and risks that it brings. The most recognized advantage of BYOD is the user satisfaction and productivity. On the other hand company's security is threatened by unauthorized parties obtaining access to sensitive private information or confidential company information [7]. Since traditional risk management is not suitable for BYOD mobile working environments, attempts are made to find new kind of HCI for risk and trust management [8]. Also, bringing BYOD policies to companies emerges as an important issue [9].

Parallel to IT organizations, increasing number of studies have attempted to investigate how mobile learning can be leveraged to increase student engagement and teacher productivity through BYOD model. Researches focus on various aspect of BYOD, such as BOYD pilot projects [10], guidelines [11], policies [12], applications in primary schools [13], higher education [14], students perceptions [15], teachers impressions [16] of its impact., etc.

Author Song conducted one-year case study on the project "Bringing Your Own Device (BYOD) for seamless science inquiry" in a primary school in Hong Kong. Findings show that young learners made important advancement of content knowledge in science inquiry, supported by their own mobile devices. She concluded that students developed a positive attitude toward using BYOD for seamless science inquiry, but emphasised that educators have to help students to further increase their capability in perceiving the affordances in seamless learning environment in order to make optimal use of BYOD [13].

Through investigation of ActiveClass system Barkhuss came to indirect findings concerning BYOD. Students were not provided with any devices by the university and had to bring their own laptop or PDA with a wireless connection. Author reported that although majority of students owned laptop or PDA, many students chose not always to bring their laptops to class because their laptops were too heavy to carry around all day. They also worried that would run out of battery at inconvenient times [17].

Research conducted by Ragan et al. revealed that even when students bring their laptops, during the

class period that is too long (2h and 50 min) they often surf the web, keep up with the latest social media, or even play online games. Through laptop-use survey and laptop-use classroom observations this research indicates that students tended to be off-task in using their laptop almost two-thirds of the time if the lecture is too long. An analysis of the various laptop frequency activities over time showed that engagement in individual activities varied significantly over the duration of the class [14].

In their research, Benham et al. concentrate on students' impression of how using mobile computing devices in the classroom would likely impact their learning. They examine several questions such as types of mobile computing devices students are using, why students wouldn't bring them to class, and what kind of expectations do students have concerning BYOD. Survey shows that most of the students use smartphones and laptops and the fear of loss or theft, the fact that the devices are either not allowed or not required, the inability to get a wireless network connection, and a lack of appropriate software applications for a business curriculum appear repeatedly. One of the main problems students noticed is instructors inability or unwillingness to actively engage mobile computer devices in the classroom [15].

On the other hand, through one-year study Song investigated the affordances and constraints of BYOD from teachers' perspectives in higher education. Study showed that some teachers considered using BYOD in class time-consuming and inappropriate for certain learning contents and thus, teacher professional development is needed in this regard to empower teachers in pedagogical practices with new technologies [16].

The latest research done by Castillo-Manzano et al. implicates several issues that has to be aware of when promote BYOD to universities, such as improvement of physical infrastructure e.g., more sockets and better wi-fi networks, but also restricting access to internet leisure content over the university wi-fi network, at least during class time. Integration of these devices into instructors' teaching activities is also one of the main issue that has to be further developed [18].

3. RESEARCH

The research target group consisted of third and fourth (final) year IT students at Faculty of Technical Sciences in Čačak. We chose these students for the following reasons:

- A substantial deal of their classes is held in computer lab.
- Being on senior years of study makes them more experienced, so their attitude is fully built in the matter of learning technologies.

- These students recently faced a situation where the computer lab they were supposed to use was (as consequence of shipment delay) not equipped with PC-s for three weeks, so they were advised to bring their own laptops, if possible. Therefore, they could test their attitudes in practice, which might bring more reliable questionnaire data.

Students were asked to fill the questionnaire, set on the official e-learning platform (Moodle). First of all, students were asked if they had a laptop. Answering "no", would end the survey, while "yes" would proceed with questions.

Answers were defined in form of Likert scale with five orders of response. (Grade 5 - fully agree, 4 - mostly agree, 3 - ambivalent, 2 - mostly disagree and 1 - fully disagree.)

77 students answered, 16 were females and 55 males. The gender structure represents the whole population well, as there are more male students enrolled in this study program.

The first question was eliminating, as it was pointed towards discovering if students have laptops at all. About 91% of students confirmed they have their own laptops. These are ones who proceeded with the questionnaire. We wanted to gather answers from students who can easily set themselves in situation of bringing their own laptops, so we can get more representative data, as much possible close to real case that would occur. Therefore, students not having laptops did not proceed with the questionnaire. That made total of 71 students filling the complete questionnaire.

Questions regarding usage of own computer was put into two main categories: potential benefits and potential shortcomings. Also, an optional field was set for observation to be written.

Thirteen students added optional comments. These can be sorted in three categories:

- Faculty's computers are more convenient for use and there is no need to bring own computers.
- Faculty's computer lab should have better performance and faculty requires more labs.
- One should bring his own computer.

Analyzing the results, flexibility, as expected is showed up to be important for potential acceptance of BYOD. Students know their machines and have familiar programs, can easily keep their work and take it home, where they can further work on it. This factor is very important for students. On the other hand, among potential obstacles there is lack of comfort: students are not eager to carry additional burden every day and end up with smaller screen. The most ambivalence is provided in answer regarding the issue of "who should provide computers".

Students are not sure if they have the right to claim that Faculty must provide the computers. On one hand, if students already have the laptop (which is by definition a mobile PC), they are willing to carry it and to use it for everyday work, including in class usage. On the other hand, shouldn't Faculty provide everything for the study process? This matter is obviously not clear for many students.

Table 1. Benefits of bringing own computer

	1	2	3	4	5
I think working on my own computer eases completing examples, because I can finish them at home.	3	6	6	20	36
When using my own computer, it is easier to do my tasks, because I know well my system's settings and installed programs.	1	3	14	15	66
It suits me to use my own computer, because I can use some of my programs.	6	4	18	24	48
It suits me to use my computer, because then I can utilize fast Internet and download great amounts of data.	15	18	20	23	24
It suits me to use my computer, because there are no restrictions: I can install whatever I want and run any application I want.	7	15	10	24	44
It suits me to use my computer, because then I can work on it alone.	4	6	15	28	46
It suits me to use my own computer, because its performance is better than Faculty PCs'	8	11	23	23	35

Students are somewhat intimidating by potential programs they should install in order to use it in class. That may indicate that certain programs are used exclusively in computer labs and student do not install, nor use these programs at home.

Table 2. Shortcomings of bringing own computer

	1	2	3	4	5
I would not like to use my own computer, because the Wi-Fi connection is unstable.	28	25	20	17	10
The Faculty is supposed to provide me with computer, not to require me to spend my own.	14	17	39	11	18
Physically carrying a laptop is a significant effort for me.	24	15	28	18	14

There are not enough electric outlets for charging laptops.	42	21	13	13	11
Desktop PCs are far more comfortable for work (larger screen and keyboard).	24	17	15	25	18
I am afraid I could infect my computer on Faculty network.	42	18	23	11	6
I would not feel comfortable bringing my computer, as someone (colleague or teacher) might jeopardize my privacy by seeing something personal on my computer.	44	21	20	11	4
It does not suit me to use my own computer, as I would have to install too many programs.	24	13	28	20	15

4. CONCLUSION

Assessing users' attitudes towards acceptance of specific technology is important part of introducing changes in learning infrastructure. BYOD is often reported as a viable and efficient approach in teaching and this presumption was tested in a particular case at Faculty of Technical Sciences. Students of Information technologies showed high level of readiness for acceptance of BYOD. No potential obstacle was reported as significant one. Also, high percentage of students could participate in BYOD, as 91% of them have their own laptop.

As the number of students on this study program is increased compared to previous years (130 students starting in 2017/2018 school year), Faculty should consider introducing BYOD by forming "BYOD groups" for lab exercises, that is i.e. two groups, consisted of students having laptops, can be instructed to carry their own laptops and have lab class in non-PC classroom, relaxing the Faculty capacities. Then BYOD groups and computer-lab groups could be examined and compared in order to investigate is their success related to what computer they use.

In future work, other features and challenges of BYOD will be investigated, such as teacher perspective of BYOD and security challenges, as well as study efficiency in BYOD case.

ACKNOWLEDGEMENTS

This work is partly supported by Ministry of Education, Science and Technological Development through project III47003, Infrastructure for electronic supported learning in Serbia.

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