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ORIGINAL SCIENTIFIC PAPER

Analysis of Students' Approach to the Study of Informatics During Pandemic Quarantine

Dana Palová[1]
Miroslava.Nyulasziova[2]
Martin Vejacka[3]
Faculty of Economics, The Technical University in Košice, Košice, Slovakia

A B S T R A C T

The COVID-19 pandemic and the subsequent quarantine measures to stop its spread in particular states have significantly affected the educational process at all levels of the educational system. Almost instantly, teachers and students were forced to change their common practices in education, access to information and its sharing, including our educational institution. Although the Learning Management System (LMS) Moodle was previously actively used in the educational process of our course, in order to streamline studies in state of emergency, it was necessary to change the approach in its environment. It was required to implement and actively use multiple tools of LMS which have not been used before and to change the rules of implementation and evaluation of the students. Our course is dedicated to the informatics for the students of the economic studies. In Slovakia, still persists the general opinion that information and communication technologies (ICT) should be the domain of men, because of its technical background, although there is a gradual improvement in the view of women in the field of ICT. Given the above facts, it was interesting to investigate, how this awareness of the need for active use of ICT and its knowledge will reflect in students' activity during the studying of the subject. Therefore, during the pandemic quarantine, the activity of our students was

[1] Corresponding author, e-mail: dana.palova@tuke.sk
[2] E-mai: miroslava.nyulasziova@tuke.sk
[3] E-mail: martin.vejacka@tuke.sk

monitored and their opinions and feelings were compared between the genders. The paper will show the description of the implementation and adjustment of the educational process during the pandemic quarantine and the subsequent evaluation of the data obtained from different perspectives, especially focusing on the different approaches of both genders in the study.

KEY WORDS: *COVID-19, education, women in IT, students' approach, gender comparison*

Introduction

The spread of the COVID-19 virus and the following quarantine of particular states have also significantly affected the educational process at all levels of the educational system. From one day to another, teachers and students were forced to change their regular practices in education, access to information, and their subsequent sharing. The same happened in the case of the Faculty of Economics, Technical University of Košice. Even though we have previously actively used Learning Management System (LMS) Moodle in the educational process, in order to streamline education in this unprecedented situation, it was necessary to change the approach in the environment. Primary use of the LMS Moodle, especially for the full-time students, was a repository of study material. In this new situation was necessary to implement and actively use the other available tools offered by this platform to enhance the full experience of education process of the individual subjects. At the same time, it was necessary to change the rules of implementation and evaluation of progress of students.

Even though in the field Finance, Banking and Investment does not directly fall under the field of Information Technology, to operate in this field is not possible without knowledge of new technologies and their possible practical implementation. In Slovakia, despite the gradual improvement in the given area, the persisting opinion still is that ICT is of men because of the technical background. This fact is also supported by the relatively low value of the Woman Digital Index (only 42.8 points in 2018) and the relatively low percentage of women working in the field of ICT (in the year 2019 there were just 13.7% worked as ICT specialists). However, the young generation of women is aware of the importance to attain the knowledge of working with ICT and the need of knowledge that will enable them to automate solution to various practical problems. To support the development of women in the ICT field, the Office of the Deputy Prime Minister of the Slovak Republic for

Investments and Informatization developed the "Action plan for the digital transformation of Slovakia for 2019 - 2022" (Ministry of investment, regional development, and informatization of the Slovak Republic, 2019), accompanied by several initiatives (e.g. ('You too in IT'))

Given the above facts, we were interested in how this awareness of the need for active use of ICT and knowledge in the field of ICT of our students of Informatics II will reflect in their activity during the study of the subject. Therefore, during the pandemic quarantine, we monitored the activity of the female students and compared their opinions, experiences, observations and feelings with the male students.

Research Background and Motivation

The spread of information technologies and its penetration into all parts of human life is indisputable. The development of digital society and the sustainability of the EU competitiveness measures “Human Capital – Digital Inclusion and Skills” (European Commission, 2020). Digital Economy and Society Index (DESI) for Slovakia reached 45.2 points. One component of this index is Human capital development, especially concerned by the level of Internet user skills and advanced skills (European Commission, 2019). Galyani Moghaddam (2010) stated, that there is about 10% of the people with no digital skills, and 35% of the people who do not have the least basic digital skills. The main problem seems to be, that they are not able to manipulate the content (almost 30%), solve the problems using ICT (about 10%). What is important nearly 60% of employees at the Slovakian labour market need a computer or computerized equipment at their work.

In the times of rising Industry 4.0, it is no longer sufficient to be a specialist in only one field, but it is necessary to have higher than basic skills and knowledge in the information technologies (IT) field and to be able to monitor changes around us. In 2017, in the EU labour market has already worked 8.4 million people as IT specialists. This still does not cover all demand on this part of the labour market. In 2018 alone, 53% of companies operating in the IT sector declared not having enough workforce to fill their missing capacities (Velšic, 2019). Therefore, the graduates from other fields of studies will also find the employment in the IT sector, where the automation of processes and the use of ICT intersects with other areas (e.g. finance).

For a long time now, Slovakia struggles with a shortage of people with sufficient advanced digital skills and competencies, which are essential for the development of society in the period of Industry 4.0. To move the Slovak Republic forward to the 21st century and start fully using the benefits of available technologies, there is designed the "Action plan for the digital transformation of Slovakia for 2019 - 2022" (Ministry of investment, regional development, and informatization of the Slovak Republic, 2019). This action plan is part of the 2030 Digital Transformation Strategy for Slovakia, which aims to transform Slovakia into a successful digital country. Within these documents, besides the others, this was identified as one of the important pillars of this transformation development in the area of society and education. The objective of this field is to "*support the digital transformation of schools and education to improve the quality and preconditions for employment and acquisition of digital skills and competencies necessary for the digital era*". This will be done in close cooperation with a specialized Digital Coalition. Digital Coalition (Slovak National Coalition for Digital Skills and Jobs) is the initiative to mobilize across a range of public, private, academic, and civic organizations and institutions in Slovakia to improve the digital skills of citizens, IT specialists, all employees, and also in education. It is expected this cooperation to result in providing different opportunities helping Slovak citizens to develop their digital skills and competencies to be more successful in the digital age labour market. Also, to be active in setting up broadly applicable profiles of graduates and their competences across all sectors and qualifications with the potential of adaptation to changes in the process of digital transformation.

When considering the area of digital literacy, multiple studies (e.g. Galyani Moghaddam, 2010; Herbert, 2017) have detected gender inequalities with lower women digital literacy scores. Results of Bannier et al. (2019) suggest that the digital gender gap might be present also in the implementing of novel ICTs such as cryptocurrencies. Similarly, were also formulated conclusions by Henry et al. (2018). Digital skills gaps between genders in EU countries were identified by Martínez-Cantos (2017), especially in the area of more complex IT skills. According to Gilchrist (2018), gendered life patterns and socialization may negatively affect women's confidence in using digital technology, particularly older women with lower socio-economic status. In the case of the developing world, empirical studies clearly show that women have significantly lower technology participation rates than men; the result of deeply rooted socio-cultural beliefs about the role of women in society (Antonia & Tuffley, 2014).

However, several indicated results that counter many empirical research studies show males generally perform better with ICT skills and have overall better approach towards computers than their female counterparts. For example, Hohlfeld et al. (2013) detected that in the group of students of eight grade in public schools in Florida that females had significantly higher digital literacy scores than males. Likewise, Hatlevik et al. (2017) detected in the similar age group significantly better results of Norwegian females in comparison with their male peers. Comparably, Siddiqa and Schererb (2019) indicated that girls perform better than boys on performance-based ICT literacy assessments. All these results may be suggesting that situation in gender inequality in digital skills is diametrically different between developed and developing countries.

Slovakia reached 26th rank in the EU on the Gender Equality Index in 2019. Our country achieved 54.1 points (from 100) and it presents just a 1.7 points increase in connection with the level in the year 2015. This points to the fact, that Slovakia proceeds more slowly than the other EU Member states (European Institute for Gender Equality, 2020).

While comparing data the gap between men and women remains. Although the numbers have increased (comparing to 2005), the size of the gap still remains at the level of 15 percent. The disadvantage of women to men is probably in all areas of life - work, money, knowledge, time, power, and health (Department of Gender Equality and Equal Opportunities of the Ministry of Labour, Social Affairs and Family of the Slovak Republic, 1995). In Slovakia, the government is trying to solve this problem with the measures contained in the National Strategy for gender equality for years 2014 - 2019 ("the strategy") and a related Action plan for gender equality for years 2014-2019 ("the action plan") (Ministry of Labour, Social Affairs and Family of the Slovak Republic, 2014). In the document, the main factors of the disadvantageous position of women were identified:

- the traditional distribution of gender roles and related ideas about men's and women's work
- the gender unequal distribution of childcare, household and dependent members and family members
- the lack of balancing and proactive measures such as measures to promote women's career advancement and measures to a reconciliation of family and working life, in particular the lack of flexible forms of work for mothers of young children or the

unavailability of childcare and dependent members and family members.

The problems start already at a young age when girls choose their future studies and carrier. Unfortunately, they still have to face the opinion, especially in more catholic based and less developed regions, that entering the science, technologies, and IT by the girl is unnatural and artificial. The elimination of this important negative point of view is one of the objectives of the national strategy. It is provided by published positive images of successful women in these areas and by different kind of activities supporting women in the IT sector, e.g. vocational education and workshops just for women and girls provided by IT professionals organized by "You too in IT" ("Aj Ty v IT") initiative. Thanks to these activities, the number of women studying IT in Slovakia rose from 5% in 2012 to 10-12% in the present (Ministry of Labour, Social Affairs and Family of the Slovak Republic, 2013).

The research done by the Institute for Public Affairs "Women in the World of Information Technology" (Velšic, 2019) resulted the reasons of unattractiveness of the IT world for the women: stereotype about study difficulty, low self-esteem, but also lack of information about career opportunities in IT and negative influence of parents on girls' decision about the future life. On the other side, the research tried to find out also the factors which attract and interest women in the field of IT. For the 49% of asked it represents the communication and contact with other people (i.e. social networks, chatting, content sharing and communicating, especially with peers, friends, classmates, etc.) followed by the immediate and easy access to information, a wide range of interesting information available in different areas (mentioned by the 32% of women) and the opportunity to study, learn (e.g. use ICTs to prepare projects and tasks within the school, etc.), what was mentioned by 14% of women. But generally from the research follows, the most positive aspect, that 75% of young women have a positive attitude to subjects connected to IT in the school.

Unlike men, most young women claim to have acquired their IT skills in school as part of their teaching (up to 62%), compared to only 50% of men. The current level of computer skills of young women is lower than that of young men. The expert level (programming, analysis, modeling, development, and other creative activities in IT) is achieved by only 3% of women, among men, it is 12%. On the contrary, more women (56%) than men (30%) reach only the basic – user level (work with PC, office applications, internet, e-mail, etc.). However, it is interesting to see that 5.2%

of women are involved in the category "Doing an online course" comparing to 3.7% of men. What could mean that women are aware of the need to increase their IT skills or more actively use IT in their further education (European Commission, 2019).

The high quality, supporting creativity and innovative education are the cornerstones of the country's future. In Slovakia, the current education needs transformation into the digital age. The COVID-19 tested the readiness of our educational system in this respect as well. As it turned out not only students but also teachers are not ready for online education. The education of the current young generation provided so far has hardly developed their digital skills.

In connection to the mentioned above, the motivation to do the presented research can be covered by three levels: the social need for transformation of the education suitable for the age of Industry 4.0. – how to do it in the best way; current differences in perception of ICT and the possibilities to use ICT between women and men; different approaches to on-line study between genders.

This paper will present a description of the implementation and adjustment of the educational process during the pandemic quarantine and the subsequent evaluation of the data obtained from our subject of Informatics II and investigate if there is difference in the approach to studies between female and male students.

Changes in the Educational Process Induced by COVID-19

The main objective of the education at the Faculty of Economics is to provide education corresponding as much as possible to the requirements of the current marketplace and its continuing changes in the connection with Industry 4.0. The educational process accomplishes the objective of the European Union (defined in European Digital Competence Framework for Citizens), e.g. to educate digitally literate citizens with higher and specialized skills for Internet of Things, data science, artificial intelligence, programming, for the needs of science, technology, engineering and mathematics, teamwork and collaborative and co-creative procedures employable in creative designing and trading as well as in other fields of economy and public administration (Ministry of investment, regional development, and informatization of the Slovak Republic, 2019).

Following the previous, our graduates achieve the theoretical knowledge and the practical experience in the field of ICT in each year of their studies. The ICT basis is built up via obligatory subjects like Informatics I and Informatics II, which are followed by optional subjects where the ICT is applied to the specific field of Economy, for example, Electronic bank services, Application for fundamental data processing, Data visualization, and presentation, and Economic Information Systems. The obligatory subject of Informatics I allows to unify the level of knowledge of students (coming to the university with different levels of knowledge from various high schools) in the field ICT and prepare them for the study of more advanced and novel topics in the subject of Informatics II (Révészová, 2017).

The ICT knowledge and skills basis are built on the ICDL (International Certification of Digital Literacy) standard (ICDL Foundation, 2020) and extended by understanding the data analysis and processing integrated into the topic of the business processes and business informatics and its applications in practical life. The content builds on the basics acquired in the subject Informatics I and it could be described by the following topics:

- *Fundamentals of business informatics* cover the history of business informatics, the introduction into different information systems used in enterprises like ERP (enterprise resource planning), CMS (content management systems), SCM (supply chain management), BI (business intelligence), eBusiness applications, etc.
- *Business process modeling* (BPM) explains the processes in the business itself and ways how and what kind of data management need to model and improve business processes.
- *Business data analysis* introduces different types of data used in the business environment and for what purposes they are or could be used.
- *Tools for business data processing* illustrate how various ICT tools are used for data modeling, analysis, and processing itself. For that part of the subject, we describe and use a tool like ARIS Express, MS Excel, and MS Access.
- and finally - *The trend of business informatics* is aimed to show the upcoming technologies and their benefits for companies and human life.

Before COVID-19 quarantine the subject was executed by regular style usually provided at the universities. Students could attend the Face-to-Face

lectures, where the theoretical background of the subject's topics were presented and PC Labs, where by solving predefined tasks they achieved practical skills needed for the work with data. To enhance their involvement in their education and discovering new knowledge and skills we employed project-based learning (Sam Houston State University, 2018), and we acted as guides who helped the students in case of any problems. Finally, in the end of the term, students had to present their semestral project a "mini IS", which covers the small business process analysis and modeling, business data analysis, design and development of a small database, which can support the analyzed business processes.

To motivate students to study also the published materials and enhance their involvement in the educational process itself, we did a special offer to them at the beginning of the semester – the "Jokers". Every "Joker" could be, based on the student's decision, used as a replacement for their attempt at the final exam or its part. "Jokers" are different kinds of activities and tasks, connected to the aims of the subject, and students' participation in the solution is voluntary. Under normal circumstances, students could achieve these points for cooperation in lectures, e.g. if they posted the word that best describes their feelings after the lecture (Fig. 1) through the Mentimeter application, or if they participated in a professional discussion during a lecture by practitioners from international IT company.

Figure 1: Example of the Joker 1 results; the most frequent words were: I'm excited; It will be interesting; I'm curious

Source: own

At the time of the COVID-19 quarantine, we completely moved to the online environment. In addition to the classic applications MS Word, MS Access, MS Excel, and ARIS Express, which students would be usually using during Face-to-Face learning, and LMS Moodle, which we used as a source of study materials, it was necessary to expand the options with other tools or platforms that supported our real-time contact with students.

For example, as a support platform served Facebook (FB) group, as a tool for notifications about what is currently being prepared for the students in the course. It acted as a fast feedback tool, where students gave direct feedback about whether the given activity attracted them or not by their like or dislike icons.

The second newly used tool was MS Teams. It supported direct online communication and enabled both content and active screen sharing, as well as online video conferencing. One of the advantages of this application was that students could use notifications to monitor the news, changes, and possible communication calls via notifications at their mobile devices.

Since not all students, despite our efforts, attended online lectures or exercises, it was necessary to activate other types of tasks, which we, as teachers, did not have the opportunity to use during personal interaction. Therefore, we introduced addition, the so-called "Random activities", thanks to which we tried to achieve more regular attendance of the students in the course. These activities had different content and objectives, while the students had to use mainly the applications with which they learned to work during the semester. Among simpler ones can be included e.g. entering the most suitable word into the Mentimeter application, participating in the discussion using the sli.do application. However, the most successful were recorded tasks such as hangman and puzzles, where the student searched for the given task to enter the password for the exercise test.

Among the more complex tasks in the category "Random activities" were e.g. creation of a dynamic graph for the spreading of COVID-19 in individual countries, a model of the process of repatriation of Slovak citizens during quarantine, etc. These tasks motivated students to monitor what was happening in their surroundings and at the same time enabled them to process the issue in their familiar IT environment. What is important to note, these tasks never had the correct solutions published when they were assigned. The solutions were created thanks to the active approach of the students. Afterwards, the best solutions were published with the appropriate

commentary of the teacher. In this way, the educational base was expanded even for students who did not enter into these activities.

As can be seen from the previous, during the COVID-19 pandemic quarantine, we underwent major changes in the approach to the education, to the preparation of the study materials as well as in the framework of communication with students. Immediately after entering the quarantine, we created a questionnaire, where we asked students for their opinions about online teaching and tried to adapt the form to their needs in a given situation. At the same time, we asked them to evaluate the course at the end of the term. Especially, we were interested, whether there are some important differences between genders. Based on the almost daily connection with the students, as we expected, women were more active during the time of social isolation. The results of our main findings are elaborated in more detail in the chapter Results and Discussion.

Research Methodology

Research Sample

The data were collected from 17th February 2020 to 31st May 2020. For the first three weeks of the course, face-to-face teaching took place. Then state of emergency was declared (on 9th March 2020) and the teaching took place in distance online form since then. Data for the intended research were collected from students' activity logs, task scores in LMS Moodle and by the electronic questionnaire survey. Subsequently, the data were prepared and processed using R software. Together, data contained information on 167 students, representing 187 251 records in total and 9 attributes. Data preparation consisted of removing unnecessary data, the transformation of data types to another, data cleaning (removal of missing and inconsistent values) and data reduction. Afterwards, the table carrying information about the daily number of Moodle events by individual students was created. The table contained information about individual students and their actions within the LMS and was split into two tables according to gender.

Other available data represented learning outcomes and student activity during the semester. These were attributes such as whether the student obtained the credit for the first or second attempt, his or hers score in credit test, if the student solved voluntary activities, attributes related to the semester

project, the score in the exam, and the overall result for the subject with the final grade.

Furthermore, the feedback from students on the subject Informatics II was gathered using an electronic questionnaire. The questionnaire survey can be used to collect data for an inter-gender comparison (Ferencová et al., 2015). The questionnaire aimed to find out the students' opinion about the area of business informatics as well as about the teaching of the subject Informatics II as a whole, especially during a state of emergency. Only students who successfully met the conditions for granting the credit answered the questionnaire. Therefore, in further analysis, only students who passed the exam were considered (140 records: 92 women and 48 men). The number of logins of women and men in the LMS Moodle on individual days was gathered. Based on this, the average daily number of logins in each of the 13 weeks of the semester was calculated.

Data about women and men were split into gender groups and compared with each other. The data were further processed and analyzed using IBM SPSS statistics software. Standard descriptive statistic measures were collected. Multiple statistical methods were used to evaluate the statistical significance of detected differences in answers between males and females. Pearson's Chi-square test was used for data from categorical answers in the questionnaire. This is a standard statistical test when comparing two groups' categorical answers (Weiss, 2008). Cramér's V was calculated to illustrate the effect size on detected differences in Pearson's Chi-square test, while it might serve for this purpose (Sheskin, 1997).

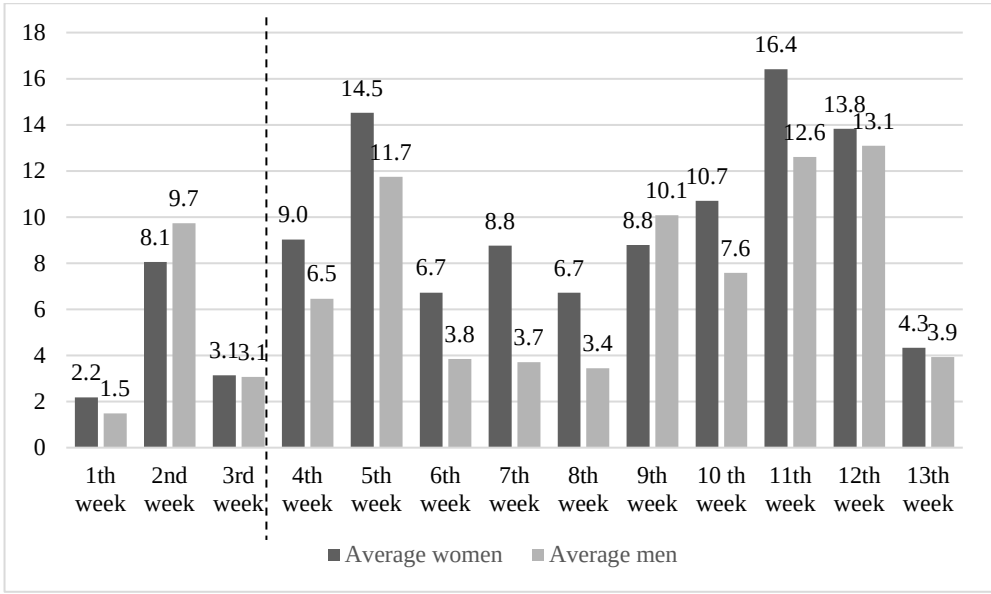
Furthermore, the Mann-Whitney U test was conducted to verify the statistical significance of detected gender differences in overall nominal scores for the whole course. Mann-Whitney U test is a nonparametric method used to perform a hypothesis test (Weiss, 2008). Statistical significance of all conducted tests was evaluated at the statistical significance level of $\alpha = 0.05$.

Results and Discussion

The Figure 2 shows the average number of visits by gender during the individual weeks of the semester. On average, women visited Moodle more often than men. From the 4th week of the semester when the online form of teaching started, the average number of visits increased for both genders. Looking at the graph, however, several facts are important to note: During the first week and the last week of the semester, there is significantly lower

activity value present. The first week's attendance is influenced by the fact that students who were in the lecture do not need to visit the LMS Moodle immediately. Also, the 13th week represents the last week of the semester, when some of the students already finished the credit tests, went through the assignments, and performed the exam, therefore the activity of students in this period decreases again. However, from the research's point of view, we were most interested in weeks 4 - 12, when online teaching took place during the COVID-19 quarantine.

Figure 2: Average number of visits in the LMS Moodle course by gender



Source: own

One of the questions asked in the feedback questionnaire was the question "How often did you visit the course in LMS Moodle?" was asked.

Respondents replied as follows:

Table 1: Visits to the course in LMS Moodle by gender

Visits to the course	Female	Male
Daily	59.78 %	35.42 %
More than once a week	36.96 %	56.25 %
Once a week	1.09 %	4.17 %
Irregularly, if possible	2.17 %	4.17 %

Source: own

Based on the answers provided by students, there is a statistically significant (Pearson Chi-square=8.171, p=0.043, Cramér's V=0.242) difference in the number of LMS Moodle visits for men and women at level $\alpha = 0.05$. Women visited LMS Moodle on the daily basis in almost 60 percent of answers in comparison to 35 percent of men.

The average grade acquired for the whole course was 76.70 points by women who attended Moodle on daily basis. The grades achieved by men who visited Moodle daily were slightly worse, they scored 71.88 points. This suggests greater effort by female students in online study. Almost 37 percent of women visited the course multiple times a week, while a little over 56 percent of men (this result excludes the daily visitors, of course). Again, the female students in this group scored slightly better grades on average (71.88 points) than male students (70.40 points). In total, the average grade of women was 73.38 points and 56.9 points for men, what was significantly lower (at p=0.004). In this case of overall course scores, the Mann-Whitney U test was executed to investigate, if the difference in the results between genders is significant.

When investigating which thematic unit of the course was the most interesting for respondents, it was found out that the MS Excel part clearly dominated in answers by men, while the results by women were more diverse. There is a statistically significant difference between genders (Pearson Chi-square=8.31, p=0.040, Cramér's V=0.244). Thematic units of the course were equally interesting for women, except the unit devoted to enterprise information systems.

Table 2: Most interesting theme in the course by gender

Topic	Female	Male
Data management in MS Excel	32.61 %	56.25 %
Data management in MS Access	31.52 %	25.00 %
Business process modeling	31.52 %	14.58 %
Enterprise information systems	4.35 %	4.17 %

Source: own

During the state of emergency of the country, students had several types of communication channels available. The results show that the students used primarily emails to communicate with the teachers. Female students used a private conversation or group chat in MS Teams significantly more often (27.37%) than male students (8.11%) to communicate with the teacher. Women were more determined in this communication and they used it up to three times more often than men. The differences between genders were statistically significant (Pearson Chi-square=14.094, p=0.015, Cramér's V=0.327) in this case. The frequency of communication with teachers was also higher in the case of women.

Table 3: The preference of communication channel in the course by gender

Communication preference	Female	Male
e-mail	57.89 %	62.16 %
messages in MS Teams	27.37 %	8.11 %
call (Cisco Webex, MS Teams)	7.37 %	10.81 %
Facebook messages	7.37 %	10.81 %
another form	0 %	8.11 %

Source: own

Furthermore, the obtained results of the questionnaire survey show that women were more active during the state of emergency. They participated in "Random activities" more often (54.34%) and acquired higher scores (with average score in random activities of 10.4 points) in comparison with men (over 30% with average scores at level of 5.6 points). This result was statistically significant (Pearson Chi-square=5.59, p=0.018, Cramér's V=0.200).

Even if the subjects were not compulsory, up to 85 percent of women would recommend to study this subject to their younger peers, in comparison with 68 percent of men. Exact 25 percent of men would not recommend this

course to others. This result shows that there is a significant difference between genders in willingness to recommend the study of the subject to the others (Pearson Chi-square=8.455, p=0.046, Cramér's V=0.246).

Table 4: Willingness to recommend the course by genders

Recommendation willingness	**Female**	**Male**
Definitely yes	29.35 %	16.16 %
Probably yes	56.52 %	52.08 %
Probably no	6.52 %	20.83 %
Definitely no	4.35 %	4.17 %
I do not know	3.26 %	6.25 %

Source: own

Also, female respondents seemed to be more satisfied with the content of the course, when up to 59 percent of women rated the content of the subject excellent or very well, while men did the same in only in 45 percent of the answers. However, this result was not detected as statistically significant (p=0.133). The satisfaction of women in online education was similar to men's, what is illustrated the following table.

Table 5: Satisfaction rate with the course content by gender

Satisfaction rate	**Female**	**Male**
At 100 %	11.96 %	8.33 %
At 75 – 99 %	60.87 %	58.33 %
At 50 – 74 %	22.83 %	25.00 %
For less than 50 %	4.35 %	6.25 %
The subject did not meet expectations	0.00 %	2.08 %

Source: own

The year 2020, when considering the Informatics II course was specific, when students had to switch to the online studying of IT, what intensified demands on their study discipline and skills. However, the transition into online studying form did not cause serious problems in the study process for both genders. Female students did not prefer a specific part of the course, unlike the male students, who preferred the part dedicated to MS Excel. Women were more eager to use messaging in MS Teams to contact lecturers and also recommend the course to other students. Both genders were similarly

satisfied with the course content, but women's overall scores were on average higher than men's.

These results suggest that women approached the study in our informatics course more actively and seriously and had better results overall. This is in line with multiple studies conducted in various age groups abroad (e.g. Hatlevik et al., 2017; Siddiqa & Schererb, 2019) investigating digital literacy by gender. On the contrary, other studies (e.g. Henry et al., 2018; Martínez-Cantos, 2017; Bannier et al., 2019) recorded different results indicating the digital gender gap in favor of men.

Conclusion

During the state of emergency due to the COVID-19 pandemic, it was necessary to transform the educational process of the Informatics II course to the online form and adapt our education accordingly. The main goal of the article was to find out how the students (especially female) reacted to this fact. Therefore, during the pandemic quarantine, the activity of our students was monitored, and their opinions and activity compared between genders.

The data collected for the investigation were obtained from the LMS Moodle educational system. The data were processed into the required form using data processing packages in R software. Other data were collected from electronic survey and feedback to the course and the scores of students during the semester.

The obtained results were verified on statistical significance using statistical tests. The difference in the number of the course log-ins between men and women showed a statistically significant difference in favour of women. Also, the overall average score of female students was higher than males'. Furthermore, female students would more likely recommend the Informatics II course than male students would.

The results of analysis of the collected and processed data suggest that women were more active during the state of emergency, more often engaged in voluntary (random) activities, more often visited the LMS Moodle, communicated and achieved better scores than men. And as the results of our research show, even at the time of quarantine, they were just more active group of students, who became more involved not only in the discussion but also more actively helped the team, e.g. creating video tutorials, supporting lectures, instructions. This suggests that if women overcome possible

aversion to studying IT, they outmatch their male peers and are more active and successful students.

The results of our research insinuate that it is necessary to take into account the difference in the approach of men and women to education when choosing the form and tools used during the educational process. One of these might be the usage of a tool like above described "random activities", which offers wide range of tasks, that can strengthen natural characteristics of individual groups of students, i.e. for women it might be the tasks focused on communication, collaboration, creativity and support of their peers.

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