Information technology in teaching and learning process at higher education institutions in students' opinions

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Abstract— **The article analyzes the opinions of students of The. Maria Grzegorzewska University on the use of information technologies in the teaching and learning process. In the diagnostic survey 139 students took part. The results indicate that students appreciate technologies for facilitating access to teaching materials, effectiveness of communication and opportunities for self-education, especially in the context of the pandemic, but they are not perceived as a remedy for all educational problems. The key challenges are providing appropriate infrastructure, teachers' competences, and students' self-regulation skills. Statistical analyzes have shown differences in the level of IT competences of students at various stages of studies, with a noticeable increase in these competences as they progress in education. The study emphasizes that technology should be a support in education, not a purpose in itself.**

Keywords—**IT in teaching and learning; higher education; students; AI in education**

I. INTRODUCTION

EDUCATION is often characterized as maintaining tradition and being rooted in the past. It is perceived as resistant to change and not very flexible in relation to innovations, including technological ones. Therefore, emerging new technical solutions can be treated thoughtlessly and implemented quickly, based on momentary fascinations and novelties [1]. Meanwhile, technologies expand the learning environment and enable greater interactivity compared to traditional forms and methods of work [2]. The use of hardware, software and digital content can help achieve educational goals [3]. Hence, universities are actively incorporating various information technology solutions due to the fact that they are beneficial in the process of communication and adaptation of students. Universities, as institutions, decide to include modern and innovative solutions in education and allow the use of technologies for self-education or distance education [4].

But technology cannot be treated as a remedy for all educational problems. It is intended only as a support measure [5]. In particular, skills and self-regulation in learning as well as metacognitive competences are important, which support the effective use of technology in education. However, for people who do not know how to learn effectively or are easily distracted by stimuli, technology may be an obstacle rather than an enhancement [1]. Moreover, the use of new technologies in education requires access to infrastructure, space, and reliably operating equipment [5]. Equally important is the level of teachers' understanding of the possibilities and limitations of technology - their competences must include skills related to understanding how to use and design materials, use them in classes, and assess students' progress. Although technology alone will not improve education, it can support and compensate for the work of teachers who have limited resources [5].

For students, new technologies are used to communicate and obtain information, they are the means to an end and not a remedy itself, because students value direct contacts with other people [6], although technologies can make communicating using mediated means more efficient [7]. Technologies in education enable the creation of educational support networks, connecting students and teachers, facilitating cooperation, providing content, providing access to information, and strengthening informal learning opportunities. On the other hand, longer time spent in front of the screen has consequences for physical and mental health, including wasting time, addictions [1], negative effects on the level of well-being [8], and disturbances in students' relationships with other people [9], and exposes users to threats related to the Internet, both in terms of security and limiting interpersonal contacts [6].

In the context of technology-based exams, including online exams, students express concerns about the quality of the Internet connection, time pressure [10], the unreliability of technology but also the lack of honesty of examinees (especially since students are more likely to cheat in online exams [11] and unreliability [12] and lack of trust on the part of the examiners [13]. Another challenge is the need to deal with technical and psychological challenges [14] and the ambivalent attitude of students towards the solutions used by the university using technology in education [15, 16].

II. PURPOSE OF THE STUDY AND METHODOLOGICAL ASSUMPTIONS

The study concerned the experiences and opinions of students of The Maria Grzegorzewska University related to the use of information technologies in the teaching and learning process at the higher education level.

The aim of the study was to learn the students' perspective on information technologies and their use in the teaching and

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learning process at The Maria Grzegorzewska University. The subject of the research was, among others, IT competences and ways of improving them, solutions emerging during teaching classes, university support for the computerization of education, the use of artificial intelligence in the teaching and learning process, the use of experiences acquired during the pandemic and the assessment of their usefulness in education, as well as the use of information technologies to meet special educational needs. An attempt was made to assess the perception of the presence of information technologies in the educational process and the degree of their use, taking into account the opinion of students.

Research problems such as: what are the IT competences of the surveyed students? What IT tools are used by academic teachers when working with students? What support does the university provide in terms of computerization of education? How do students assess the importance of new technologies for the teaching process? were formulated.

The diagnostic survey method was used. A survey questionnaire was prepared. Responses from respondents were collected using Google Forms. The statistical analysis of the research results was performed in IBM SPSS Statistics 29 and jamovi 2.3.28. The analysis of respondents' statements and their categorization was carried out by two competent judges.

Data was collected in the period from November 27, 2023, to January 15, 2024. The survey questionnaire was sent to all students of The Maria Grzegorzewska University via internal mail. To answer the question about the level of students' IT competences, the results of a similar question from surveys conducted in 2020-2022 were used.

III. THE SAMPLE

139 people took part in the study, which constitutes 3.3% of students. The youngest respondent was 18 years old and the oldest was 55 ($M = 24$; $Me = 22$; $Mo = 21$). The majority of respondents were women (115 people; 83%), and a minority were men (16 people; 12%) and people who did not want to answer the question about gender (8 people; 6%).

Most respondents were first-year students (54 people; 39%). Second-year students accounted for 31% (43 people), third-year students 16% (23 people each), fourth-year students 8% (11 people) and fifth-year students 6% (8 people). More than four fifths of respondents (114 people; 82%) were full-time students, and one fifth (25 people; 18%) were part-time students. The survey was completed by one person from the Doctoral School.

IV. THE RESULTS

A. The level of IT competences and how to improve them

Students asked to rate their IT competences on a scale from 1 to 5 declared them at an average level of 3.35 ($Min = 1$, $Max = 5$, $Me = 3$, $Mo = 3$, $Ske = 0.01$, $K = -0.03$).

Levene's test indicates that the variances in the compared groups are not homogeneous ($F(3, 1510) = 5.55$; $p < 0.001$). Due to the significant result of Levene's test, the analysis of variance was performed with Welch's correction. There are statistically significant differences between four subsequent measurements of the level of students' IT competences, although the observed effect is weak ($F(3, 537.72) = 15.35$; $p < 0.001$; $\omega^2 = 0.027$). The level of students' IT competences from the first

measurement is significantly lower than the level from the third measurement ($p = 0.021$; $d = -0.19$; 95%CI$_{difference}$ [-0.35; -0.02]), but significantly higher than the level from the fourth measurement ($p < 0.001$; $d = 0.42$; 95%CI$_{difference}$ [0.16; 0.63]). The level of students' IT competences from the second measurement is significantly higher than the level from the fourth measurement ($p < 0.001$; $d = 0.57$; 95% CI $_{difference}$ [0.28; 0.74]). The level of students' IT competences from the third measurement is significantly higher than the level from the fourth measurement ($p < 0.001$; $d = 0.65$; 95%CI$_{difference}$ [0.34; 0.82]).

TABLE I
DECLARED LEVEL OF STUDENTS' IT COMPETENCES
DEPENDING ON MEASUREMENT

Date of measurement	N	M	SD
June 2020	515	3.75	.98
February 2021	496	3.86	.87
February 2022	364	3.93	.88
January 2024	139	3.35	.91

When asked whether and how students improve their IT competences, 25 people answered that they did not improve their IT competences (among others because it was beyond the interests of the respondents), one said that they wanted to improve them, and one did not answer at all.

TABLE II
TYPE OF ACTIVITIES UNDERTAKEN BY STUDENTS
AIMED AT IMPROVING IN NEW TECHNOLOGIES

Type of activity	Number of indications
University education	59
Using the Internet	46
Self-education	44
Other people as a source of knowledge	14
Professional activities	8
Other activities	6

For students, an important element of improving the knowledge of new technologies is the university (59), including classes conducted there (49), performing tasks and projects (9) and the need to frequently use the computer while studying (1).

Students also pointed out the role of the Internet in expanding their skills (46): looking for information, solutions to problems and instructions on the Internet (19), using courses, training, and webinars (11), using various online communities (6), using guides and YouTube videos (5 people each). As one person comments, "only when I encounter a problem do I look for a way to solve it on the Internet and this is how I learn to deal with it in the future."

Other activities aimed at independently acquiring knowledge and skills in the field of new technologies (44) include: practice (11), various forms of self-education (8), independent problem solving (7), reading and following new information (4 each), learning new programs (3), learning new tools, learning programming and using workshops (2 each), using books (1).

Students also benefit from the help of other people (14), including: more experienced users (7), friends (5), and a form of peer tutoring and children (1 person each). Professional activities are also a way for students to improve themselves (8).

Other activities include (6): expanding one's own interests (3) and additional activities, purchasing a laptop, helping friends (1 each).

B. Solutions used in teaching

Communication between the lecturer and the student takes place mainly via chat, e-mail and instructions describing issues and tasks sent by the lecturer. MS Teams functionalities are often used, mainly in the organization of work during classes and communication with lecturers. Recording lectures and making them available to students occurs but is not common. Individual telephone calls and individual virtual meetings between a lecturer and a student are low in popularity. Virtual meetings with a group of students are much more common than individual meetings. Few students have encountered the frequent use of MS Forms as a tool for evaluation, survey or preparation of the so-called entrance tests and the frequent use of file sharing with the supervisor when writing a diploma thesis or with the team when working on a final project. MS Teams tasks are also not a frequently used solution.

When asked what other solutions that had not been mentioned appeared in the teaching process, 23 people did not answer, 40 people believed that all of them had appeared (or there were no other solutions), and 33 people were unable to indicate other solutions.

TABLE III
OTHER ACTIVITIES OCCURRING IN THE EDUCATIONAL
PROCESS MENTIONED BY STUDENTS

Type of action	Number of indications
Using specific software	23
Various forms implemented by lecturers	18
Use of Apps and Software (General)	16
Other activities	7

Among the software used by lecturers in the teaching process (27), students mentioned: Kahoot (13), Mentimeter (4), MS Excel (2), and Canva, MAXQDA, SPSS, Slido (one indication each).

Students also wrote generally about software or applications that are used in classes (16): quizzes (4), videos (3), e-books (2) and online whiteboards, interactive whiteboards, virtual mind maps, educational websites, activity pages, graphic programs, and MS Office (one indication each).

Lecturers also carry out forms of teaching work not mentioned in the previous questions (18), which include: recording and sharing presentations/materials/recordings (6), classes and lectures conducted in a hybrid form (3), communication using Internet applications (MS Teams, Messenger) (2), and testing exercises in the form of games, recording students' tasks, creating a team for the entire student group including everyone studying particular field, e-learning tasks, interactions during lectures with listeners via telephone, seminars and working with the supervisor online, lecturers sharing their own pages, presenting new equipment (one indication each).

Among other activities at the university (7), students mentioned: making classes more attractive, creative work, electronic ordering of book rentals, scanning of materials for the entire group by a representative, role-playing, multimedia presentations made by students, and the possibility of using their own equipment (one indication each).

Among the student voices, there was one statement that referred to the fact that the offer of technological solutions lacks those that would support teamwork.

C. University support for the use of ICT in learning

Students' answers to the question about university support in the above-mentioned areas indicate that in many cases students do not know what the university can offer them. The readiness to purchase software and hardware and the possibility of renting equipment are rated the lowest, but these are also the categories in which the most frequent indication was the lack of knowledge on this subject. The same applies to assessing the care taken to update software. Almost half of the respondents have no knowledge on this subject, and in the case of the rest, the answers are distributed relatively evenly. It can be concluded that the equipment of rooms and the availability of software are rated the best, as in these cases over 50% of responses indicate good or very good support. Maintaining the efficiency of computer equipment in classrooms and solving technical problems on an ongoing basis are also rated good or very good by over 40% of respondents. On the other hand, students' lack of knowledge about the support offered by the university and a negative view of the situation are visible.

To the open question what support would students expect from universities regarding the use of information technologies in learning, 11 people did not answer, 12 said they had no expectations, 8 were unable to indicate any, 7 said that it is currently OK, 2 people would like to have sufficient support, and one would like better support.

TABLE IV
STUDENTS EXPECTATIONS CONCERNING SUPPORT FROM
UNIVERSITY IN THE USE OF IT TECHNOLOGIES IN LEARNING

The type of support expected	Number of indications
Access and quality of equipment and Internet connections	55
Organizational and technical solutions	35
Software related issues	20
Competences and attitude of lecturers	12
Access to training and scientific sources	11
Providing support to students	8

The surveyed students indicated the importance of university support in increasing access to good quality equipment and Internet connections on campus (55). In this category, the most important thing was to improve the range and speed of Wi-Fi (28), followed by well-equipped IT rooms (larger, more of them at the university, without problems with the network or system updates) (6), the purchase of modern devices, including computers (6), access to rooms - places with computers, e.g. to the reading room open during regular hours (8 a.m. - 6 p.m.) (7), access to equipment in the rooms (adapters, cables, sockets, extension cords to connect the equipment to electricity/projector) enabling the connection equipment (4), permanent connection to Wi-Fi after logging in to the university (3) and generally access to equipment (1).

Students also indicated specific organizational and technical solutions (35) that would be important to them. These include: mandatory recording and sharing of materials and lectures delivered in an orderly manner, including speeches by university guests (13), the possibility of using remote lectures

(6), more frequent and mandatory use of the MS Teams application (including office hours online and communicating) (4), providing books and textbooks in PDF format and consent to participate in classes remotely for those who cannot travel (two indications each), and providing more instructional videos, support in taking notes on electronic devices, imposing an obligation on lecturers to respond to e-mails within a specified time, lending laptops to students, distance learning weekends for part-time studies, the possibility of ordering newsletters from each institute, entering grades and attendance into the USOS system, which brings results at other universities.

Another category of expectations were issues related to software (20). Among them, students appealed for more free software (including Canva pro, Office, SPSS, other programs available at the university) (7), USOS for iOS (5), newer versions of the software (4), more extensive and clear download guides software (including USOS and Outlook support) (2) and easier access to iBuk for Apple and a database of available tools and applications divided into categories.

Students would also like to have access to training and scientific sources (11). They proposed training, e.g. in MS Office, PowerPoint, applications needed for diploma theses and projects, or Chat GPT (7), access to scientific databases (2), better access to online libraries, and more interactive tests.

Respondents also had expectations towards lecturers (12), including they would like teachers to have greater openness and better competences in the field of technology (3), explain difficult issues better (3), and also conduct interesting classes with new knowledge, change their attitude towards technical problems students, improved communication, encouraged them to use technologies, showed on their own examples how to use programs, and ensured there was transparent information about who does what and who they can turn to for help.

Students would also like to be supported (8) by: the possibility of consulting how to edit documents, receiving help in installing software, help with technical problems, help in searching for information and broadly understood financial support.

D. ICT as an obstacle to learning

When asked whether and to what extent technologies interfere with learning, 60 people said that they did not notice such a problem (technologies are not an obstacle), 9 people did not answer this question, 6 said they did not know, 2 wrote that to a large extent , and one - to a small extent.

TABLE V
INFORMATION TECHNOLOGIES AS AN OBSTACLE TO LEARNING IN STUDENTS' OPINIONS

Type of obstacle	Number of indications
Technical issues	29
Competencies	25
Impact on mental and intellectual abilities	16
Other aspects	11

Students pointed out that the main obstacle to learning using new technologies are technical issues (29), including: problems with the Internet (9), lack of access to appropriate/up-to-date software/technology (6), lack of equipment (5), too weak or faulty equipment (5), unfavorable (distracting, too distant) arrangement of equipment in rooms (2) and lack of equipment

(e.g. cables, adapters) and the need to constantly log in to the university network.

The second category indicated by students is competences (24), understood as: lack or too low own competences (12), lack of competences of lecturers (5), difficult/opaque/disturbed communication with the lecturer (4), lack of understanding of computer systems/programs (3) and experience.

15 respondents note the negative impact of technology on mental and intellectual abilities, including: distraction (during classes/multiple advertisements) (9) and difficulties in reading, limiting creativity, laziness, unlearning thinking, distracting from work, overload with online activities or even "stopping the brain functioning".

Other aspects (13) that students consider an obstacle include: incorrect content when searching/constant need for verification (3), inability to return to classes, remote lectures, lack of motivation to participate in online classes, lack of access to support, killing time when someone does not learn anything new during classes, the university's information system is not very clear (many pages), the need to create additional documentation online.

E. The impact of the use of ICT on the teaching process

The results indicate that students generally positively evaluate the impact of the use of information technologies on various aspects of teaching, pointing primarily to the convenience of having everything in one place, the efficiency of communication and the convenience of assigning and checking work. However, there are areas, such as focusing on the material during classes and working independently on tasks, where the impact of technology is assessed as less clearly positive.

F. The use of mobile devices in the teaching process

Students relatively often use mobile devices and applications in the teaching process. They use provided materials, search for ad hoc information, document their own work from classes, and communicate with lecturers and other students. The only category in which students do not use mobile devices or do so rarely is communicating with technical support.

G. Using generative artificial intelligence in learning

When asked about the use of AI in learning by students, 79 people declared that they did not use it, 4 people wanted to learn, 3 people did not answer, 2 people said that they were afraid of AI, and one said that they were not interested in it.

TABLE VI
SCOPE OF USE OF ARTIFICIAL INTELLIGENCE BY STUDENTS

The use of AI in the learning process	Number of indications
Searching for information, inspiration, materials	45
Simplifying/correcting work	17
Creating new materials	12
Other	7

Among the 50 students who use AI, 43 use it to search for: information (15), inspiration (6), questions and answers (5), solve problems (3), as well as to check knowledge (3), explain concepts (3), find articles (2), ideas (2), examples (2) and lectures, databases, other points of view, bibliographies.

19 people use AI to simplify or correct their work. Thus, they

summarize long texts (4), paraphrase (3), find errors (2), develop issues (2), use synonyms (2), translate texts, solve simple language tasks, prepare exam issues, and substantively correct texts.

12 people create new materials using AI: work plans (3), lists of the most important information (2), presentations (2), written works (2), graphics (2) and book reviews.

Among other answers (7), there were: for learning (2), discussion, support, colloquium, and notes.

H. ICT and the Special Educational Needs of Students

Only 6 people answered affirmatively to the question about their own special educational needs, mentioning dyslexia (4), dyscalculia (1) and ADHD (1). 131 did not answer this question, 2 said they did not know.

However, more information appeared in the answers to subsequent questions, as if the group of students with SEN was larger.

Responding to the question about the way in which information technologies affect the implementation of their SEN, students indicated that: they have problems with using some programs and need the support of another person, they can record lectures, write, and do tasks on the computer for longer. They notice that they need more time. But they also appreciate: a dictionary that helps you write correctly, multi-sensory interaction, and the possibility of online contact with lecturers. One person stated that information technology did not influence her implementation of SEN.

When answering the question about the way in which academic teachers use information technologies to implement students' SEN, people with SEN drew attention to the extension of exam times, additional online meetings with lecturers, simplifying information and transmitting it via mail or instant messengers. One person thought that he worked like the rest of the group, one that teachers did not use technology for support, two that he did not know.

The support package from the university in the implementation of students' SEN includes online meetings, psychological assistance, e-mail contact, being added to the list, understanding, individual messages and adjustments from lecturers, having an assistant, MS Office with the possibility of enlarging the text, understanding and assistance in implementing some tasks,

2 people do not receive support, one does not know whether it receives it.

What would be helpful for students in implementing their SEN include: better adjustments in exams (extending the time by 10 minutes is not enough), personalization, adding to groups on MS Teams, help and understanding. Five people thought they had everything they needed, two didn't know what would be helpful.

I. Additional notes

Among the students' loose comments on the use of information technologies in learning, there were some that were reflective in nature (you need to be up to date, it would be difficult to give up on them, technologies make it easier to search for information and learning, communication, access to materials and their creation, you need to be critical of search results, impair health). There were also those that suggested a return to distance education at least partially, teachers' greater openness to the use of technology, readiness to share presentations with students, providing materials in a structured version, but also that they should not limit themselves only to presentations (also as an assessment), to communicate more efficiently with students. The respondents repeated their comments regarding improving the operation and range of the Internet at the university, access to the SPSS program on the university premises (in the reading room), verification of students' work in terms of its creation by AI and making sure to log out of their accounts at the university. Remote weekends for part-time students and access to edited versions of internship documentation and reports were also requested.

V. THE DISCUSSION

The speed of change in technology means that recommendations about which technologies are valuable for specific educational applications are not always clear, especially since many solutions are created not with education in mind but for other purposes. And only ingenuity or educational needs mean that given ideas, applications or equipment are used in the educational sphere [1]. Therefore, examining the experiences and opinions of people who are beneficiaries of educational activities using technology allows for a better understanding of the conditions and changes related to the implementation of teaching goals. In particular, students are considered to be immersed in the academic environment and have a high level of awareness of what is happening within their university [17].

Analyzing the obtained results, it is visible that students assess their level of IT competences as average - this is understandable due to the fact that the studied university mainly offers courses in the field of social sciences. However, over the years, there has been a significant decline in the level of self-esteem in this area, which can be explained by the fact that the scope of using technology in teaching has decreased compared to the period of distance education. Especially since students indicate university education as the main source of acquiring IT competences. As Burns points out, in order for the use of new technologies in education to be effective, the competences of the learners themselves are necessary, including their behaviors and habits that support educational success [5]. Hence, the university becomes a place for shaping positive and constructive attitudes towards the use of technology in education, which is also reflected in the declarations of students, because for almost half of them IT is not treated as an obstacle to learning. Moreover, students use mobile devices and generative AI to learn, although to a limited extent.

Among the recommendations following the distance education crisis, one could find a recommendation to create an online academic community that connects both male and female students and academic teachers around topics of interest to them [18]. Student research shows the popularity of borrowed means of communication among students and their use to obtain information or work with lecturers, as well as the use of MS Teams as a university platform enabling sharing, collecting, and exchanging information. At the same time, however, they have little knowledge of how the university can actually support the use of IT solutions, although they formulated many expectations in this regard.

CONCLUSION

While the role of technology is not to correct and modernize inadequate curricula, it can contribute to improving educational processes. In particular, for people who are educationally

excluded for some reason (e.g. due to disability, distance from educational centers) [5]. Hence, the topic of students' special educational needs also appeared in the presented research. Respondents see the possibilities of IT in supporting students' SEN only to a symbolic extent; they rather express the opinion that technologies require effort in using them, although they allow for quick contact and the ability to simplify the information provided.

There are fields of science in which constant improvement in the field of IT is absolutely necessary [19], although social sciences are not among them. The preparation of students and their readiness to use technology in learning, communication and future professional activities may soon prove becomes indispensable.

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