Education via ICT Due to Corona Crisis – Our View on Pros and Cons

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Abstract - **The article summarizes our experience in teaching via ICT due to Corona crisis in the period March 2020 - January 2023, at the Faculty of Economics, Technical University, Košice. We discuss pros and cons of this form of education from the point of view of university teachers and we present also our students views obtained from questionnaires. Today in the fast-changing global environment, knowledge is one of the most important factors determining success and technologies influence all areas of human lives. That is why in our article we deal with the following problems: what methods should we implement to optimize the effects of education via ICT and what will be the impacts on students' knowledge base. We discus also what will be the overall effects of the corona crisis on education.**

Keywords - education; ICT; evaluation; knowledge base; skills;

I. INTRODUCTION

COVID-19 has changed processes all around the world. Due to Corona crisis we are forced to look for new ways how to act, how to do business, how to teach and learned ...

We have shifted into survival mode and we focused on digital world and digital economy or more precisely distance world and distance economy. Nowadays we communicate and work via ICT, via ICT (more or less) works e-business, e-learning, e-health, e-government.

It is well known, that every crisis is a great opportunity for rethinking and for new beginnings.

The current situation - after the Corona crisis - has shown that everyone will probably need to update their skills, not only once, but also many times during their career. The McKinsey Global Institute report [4] revealed four key skills areas that will be needed in the future post Corona crisis:

- ability to operate at pace in a fully digital environment;
- cognitive skills for redesign and innovation;
- social and emotional skills to ensure effective collaboration, management, and self-expression;
- adaptability and resilience to thrive during COVID-19 aftershocks;

Confronting with the educational emergences, factors above involve a modification of the education systems, systems of knowledge and work, and, as a consequence, also of educational politics which must promote a personal development of citizens through the development of the necessary knowledge base, skills, and competences.

II. HOW THE CORONA CRISIS AFFECTED US IN THE FIRST WAVE

During the summer semester 2019/2020, in the third week of teaching, March 9th 2020, we were forced, due to the regulations and rules of the government and the university management, to move to fully online teaching. The situation was not easy, we were not prepared, new procedures were unknown, we did not know if and when the situation would return to normal.

Pros and cons of the situation from the point of view of infrastructure, teachers, students and management were as follows:

Pros:

- we had a well-established LMS system Moodle at the faculty, teachers and students were used to work in the Moodle environment - therefore, we could immediately start using it more intensively;
- a computer for the teacher was available in each classroom and the Internet was introduced, an interactive whiteboard was also available in every computer lab;
- we had "department of IT support" at the faculty - this small department was and still is extremely important in managing online teaching;
- we tried to do our best, we were optimistic and enthusiastic, we believed in the early end of the crisis – as we can see now, "state of mind" is extremely important in overcoming problems;

Cons:

- we did not have adequate equipment (tablets, whiteboards) and platforms (webex, MS Teams, Zoom) available for online lectures and exercises and, of course, teachers' and students' experience of using them were minimal;
- the home technical equipment and the quality of the students' internet connection were very different, especially in the case of foreign students (they mostly come from India and Ukraine);
- regulations adopted by the government and university management were not clear, further procedures, processes and practices could not be estimated, the lockdown was extended,

- conditions were confusing and uncertain practically in all areas of life.

The online education during first wave - meant at least ensuring the publication of offline materials - lectures, solved examples, assignments, procedures mostly via LMS Moodle. Later, the instructional videos and some lectures were published e.g. on YouTube, but it can't be called a systematic approach.

During the semester, we provided access and training for employees and students to the WebEx and MS Teams platforms, and we purchased and replenished technical equipment.

III. HOW THE CORONA CRISIS AFFECTED US IN THE NEXT WAVES

We were ready to start the winter semester 2020/2021 "normally" (full-time study in person), but the situation with COVID-19 has worsened and so, in order to protect health and safety, we have started online education via ICT again, but we have moved to a higher level.

We have approached online education according to a fixed schedule (this was not the case in the previous semester), following the rules of full-time teaching. Teachers had fully equipped classrooms at their disposal, and students joined lectures and exercises from home. The platform, mostly WebEx or MS Teams, was chosen by the teacher according to the specifics of the subject. The "common using" of LMS Moodle has moved to a significantly higher level. Many teachers discovered until that time unused functionalities of LMS Moodle and e.g. included various activities and tests in the teaching process.

Due to the ongoing pandemic, we were forced to make difficult decisions before the start of the next three semesters - whether the teaching will take place online or face-to-face. The most important factors that influenced us were the regulations of the government and Public health office of the Slovak Republic and the regulations of university management. Based on this regulations, the number of students who could participate in group tuition was significantly limited, the meeting of teachers and students was conditioned by proof of infection-free status based on COVID-tests, and accommodation and catering facilities for students were closed. The efforts of both teachers and students to protect their health and health of their families were also significant, which resulted in many cases of reluctance to teach/learned face-to-face. That is why we had full online education for 4 semesters. In summer semester, which starts in February 2022, we have online education and credit tests and exams took place face-to-face.

During the Corona crisis time we tried to implement different models at our university - a combination of online and face-to-face teaching, but the results were not convincing. For example: students were divided into small groups in order to comply with government regulations and attend classes every other week. The curriculum was either repeated - which significantly reduced the content of the curriculum, or the curriculum was taken in the usual way and the students alternated between online and face-to-face form.

Based on feedback, teachers' and students' responses to these models were not very favorable.

IV. WHAT IS THE CORONA CRISIS HAS TAUGHT US?

Nowadays in every environment, also in the school system it is necessary to count with a minimal stability and certainty. The only thing that is certain in today's world is a permanent change. For a successful existence in this turbulent environment it is very important:

- to learn how to cope with crisis and changes;
- to catch information that is useful, know how to keep it and use it for our benefit;
- it is necessary for us as educational institution not only to be „educating" but also to be „learning";
- the ratio of our change has to be higher than the ratio of changes in the environment around us;
- a good position can only be the result of a quick adaptation to current needs and changing requirements;
- the implementation of innovations is considered as the key factor of success;

During our attempt to adapt the education we contemplated human's abilities, processes and technologies in their mutual relations and connections. We use a well-known holistic, model of knowledge management (sometimes consciously, sometimes intuitively). This tool allows us to profit from synergic effect. It is well captured in the Figure 1.
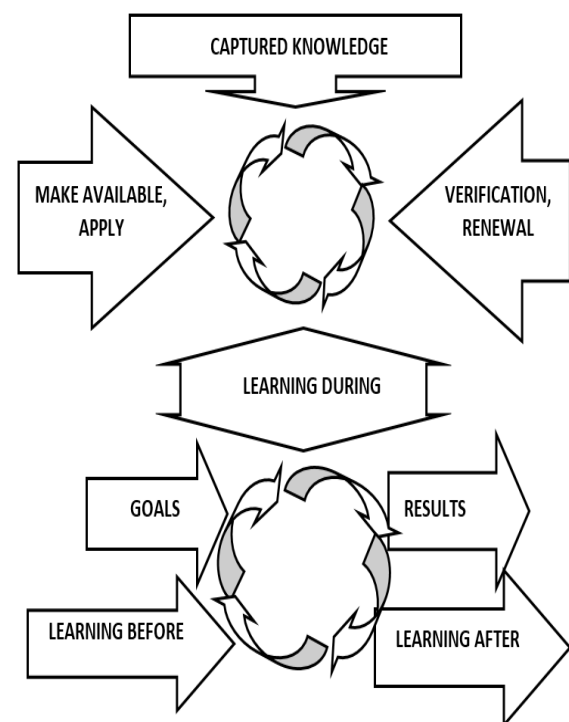

Figure 1. Knowledge management – holistic model according to[6]

V. IMPACTS OF ONLINE EDUCATION ON STUDENTS' KNOWLEDGE BASE

An important question for us, of course, is: What is the impacts of online education on students' knowledge base?

As an example, we present the evaluation of the subjects Informatics II in the Figure 2, Mathematics II in the Figure 3, and Management in the Figure 4, in the year 2018/2019 in "normal" full-time teaching and examination and in the next years 2019/2020, 2020/2021 - online teaching and online examination, and in the 2021/2022 year - online teaching and face to face examination. Grades A, B, C, D, E, and FX represent the success of students according to the commonly used scale: A means 100 - 91%, B 90 - 81%, C 80 - 71%, D 70 – 61 %, E 60 – 51 % and FX is a failing grade 50 % and less.

As we can see in the Figure 2 and Figure 3 there is a significant decrease in subject failure and an increase in grades, especially B and C in the case online examination. Of course we tried to use all available ways/methods to ensure the objectivity of the online assessment of students. For example: collective writing of credit tests, turning on the camera during the testing/exam, mixing test questions, etc. Consequently, in the last year (online teaching but face-to-face assessment) an extreme increase in failure is visible.

Most teachers of subjects based on quantitative methods have similar experiences. We can conclude, that from our point of view, the full online form of teaching is inappropriate for these kind of subjects and it can serve as a support or as a solution to specific situations.

Vice versa, within the full online form of teaching subjects such as Management, were appropriately supplemented and expanded teaching texts and materials with online lectures, demonstrations, case studies, etc. which could have resulted in a higher success rate, as we can see in the Figure 4.

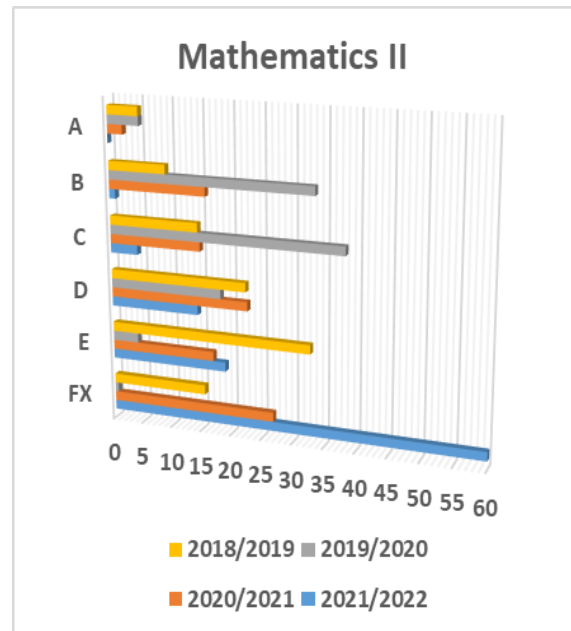Figure 2.   Evaluation of subject Informatics II in percentage, own source

Figure 3.   Evaluation of subject Mathematics II in percentage, own source

The negative consequences of online teaching in secondary schools are felt significantly in the first year of study at our faculty. Students' knowledge base in the field of mathematics and informatics is significantly limited compared to years with a standard way of teaching.

VI. WHAT ARE STUDENTS' VIEWS ON ONLINE EDUCATION?

We collect students' opinions on online education from several sources:
- survey initiated by the Student Council of Higher Education Institutions in Slovakia at the end of March 2020;
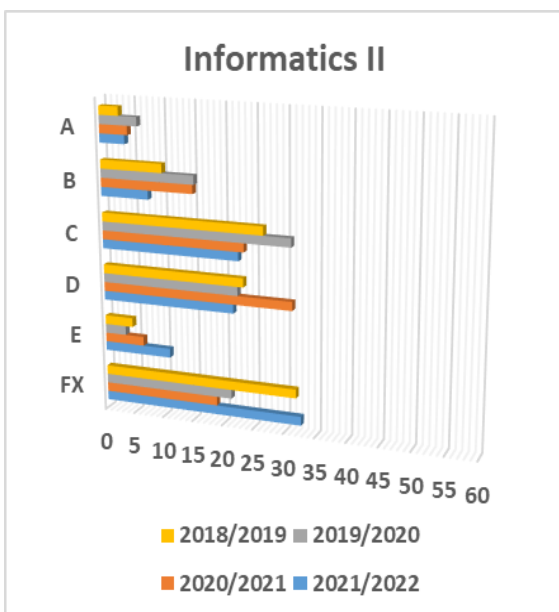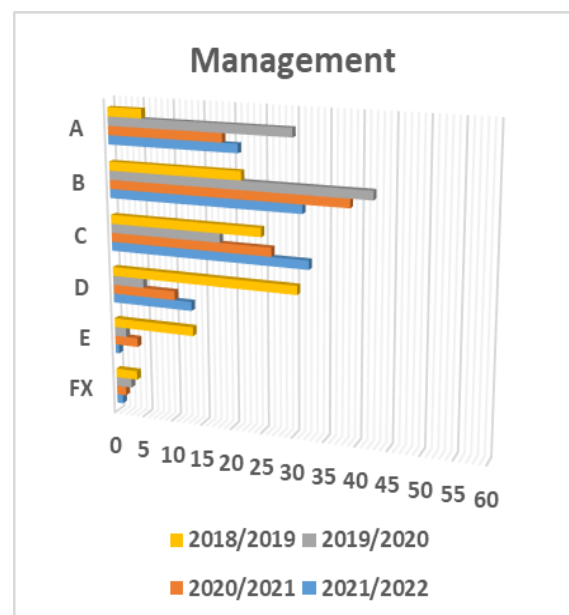

Figure 4.   Evaluation of subject Management in percentage, own source

- questionnaire of The student part of the Academic senate TUKE to determine the impact of the Corona Crisis;
- twice a year administered questionnaire. Evaluation of the quality of previous semester teaching at the faculty.

The survey initiated by the Student Council of Higher Education Institutions in Slovakia, with the aim of mapping the situation regarding the distance education at Slovak universities. The result was the participation of 1130 respondents from 22 universities in Slovakia, and the material is available at [7]. 224 full-time students from our faculty participated in the survey.

We can present their opinion and views as follows: The most preferred methods in the first online semester (frequency more than 75%), at the faculty was the recommendation of study literature and scripts to be studied by students (43%), providing presentations created by teachers (38%), distance learning is also realized through writing seminars. works (31%) and e-learning materials (22%). On the contrary, few (less than 25%) used video conferencing, live lectures and archived lectures.

In other questions, students were asked to evaluate the course of distance learning from three perspectives, whether:

- they feel informed by the school to the extent that they can handle distance learning – information sufficiency;
- they are satisfied with the course of distance learning in their field – satisfaction, and
- they consider the distance form of teaching to be a full-fledged substitute for full-time teaching – equivalency.

The data in Figure 5, on a scale (1 - agree; 5 - disagree) indicate that 22% of students feel sufficiently informed by the school, 19% have expressed a neutral attitude and only 10% have expressed that they do not feel well informed by the school. The average scale value of the responses to this item reached 2.58, which is closer to agreeing with sufficient information. 19.5% of students are satisfied with the course of distance learning, almost 14% are dissatisfied. The average scale value of the answers reached the value of 2.87, which means that most respondents do not feel expressed satisfaction or dissatisfaction. Regarding the evaluation of distance teaching as a full-fledged substitute for full-time teaching, the results strongly indicate that more than a third of students (37%) do not consider distance teaching as a full-fledged substitute for full-time teaching, the opposite opinion was taken by only 9% of respondents. The average scale value of the answers in this item was 3.61, which is closer to the disagreement.

Another source of feedback information was a questionnaire survey at the Technical University in Košice (TUKE), organized by the student part of the Academic senate TUKE.

Figure 5. Evaluation of studnets´opinion on online education, source [7]

Basic information about the questionnaire participants:

- number of TUKE students 10059, number of responses 4133 (41.09%);
- number of students of our faculty 1012, number of responses 432 (42.69%).

We chose evaluation of questions related to student satisfaction with the online form of teaching.

The questions: I – I acquired similar knowledge as during face-to-face teaching. II – The distance method was able to fully replace face-to-face lectures. III – The distance method was able to fully replace face-to-face exercises/seminars.
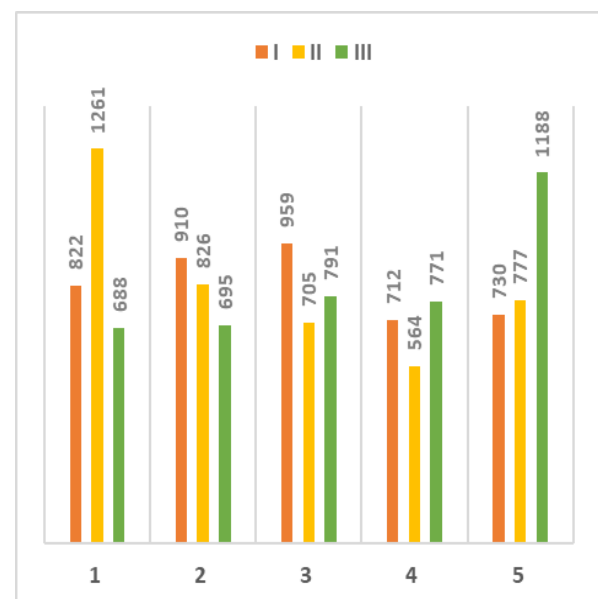

Figure 6. Evaluation of studnets´ online education satisfaction, internal source of TUKE

The scale: 1 - I agree 2 - I rather agree 3 - I do not know 4 - I rather disagree 5 - I do not agree

As we can see in the Figure 6, students perceived online teaching relatively positively only in the case of lectures. In the case of exercises and seminars, online teaching was insufficient. Even in the case of the assessment of acquired knowledge, there are more negative opinions, or the students could not assess that. This assessment corresponds to the experience and opinions of teachers at our faculty.

We also assessed the level of online teaching and its effects through a questionnaire survey at the faculty after the end of each semester. In general, we can say that students' satisfaction with information flows, technical equipment and the course of online teaching gradually grew. However, the percentage of students who demanded a return to face-to-face teaching was always around 50.

VII. DISCUSSION

Nowadays everyone agree, that education is widely accepted to be a fundamental resource, both for individuals and societies, as we can read in [2].

In the current situation we understand education in accordance with [1] as any act or experience that has a formative effect on an individual's mind, character, or physical ability.

In accordance with what we stated above and based on our experience we can see now pros and cons of education via ICT from the point of view of infrastructure, teachers, students and management as follows:

Pros:

- our institution in accordance with [5] (Gartner pandemic response) went through three phases: respond, recover, renew - we were forced to react adequately and we gathered large amount experience;
- now we are ready to act/respond in the case of another crisis better and faster than before the Corona crisis;
- the technical and software equipment has improved significantly;
- the abilities and skills of educators and students in the field of teaching/learning and communicating via ICT have significantly improved;
- both students and teachers have personal experience with the positive and negative sides of e-learning and home office, they are able to assess their strengths and weaknesses;
- crisis empowered educators and student to teach/to learn better through sharing good practice and collaboration;
- now we see more clearly the positive aspects of e-learning – cost effective, saves time, improves performance and productivity, lower environmental impact, in accordance with [3], [5];

- crisis created an opportunity to reset some of our goals and ambitions;

Cons:

- the reactions of the government, the state administration and university management to the rapid changes, challenges and demands of the present are inadequate;
- some problems associated with the ICT using in education are difficult to solve despite technological progress especially when students live in remote areas or because of their socioeconomic situation or special needs;
- it is very time consuming to prepare and to integrate elements such as images, videos, audio and graphics but it is way of keeping learners engaged, compared to traditional learning;
- the crisis confirmed even more that the biggest challenges of education still remain motivation and objective evaluation for both students and educators;

VIII. CONCLUSION

Even before Corona crisis, revolutions in technologies, workforce preferences, and many new models were affecting the ways of education. The virus has accelerated and intensified this, and is forcing education institutions to shift their organization's crisis operations while fundamentally reimagining strategies, teaching and learning models.

The Corona crisis has created an opportunity to reset our goals and ambitions. But we have to ask: What will our future be? How further technological development and advances will affect education?

We hope that the knowledge and experience gained during the past difficult period will help us face new challenges.

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