

COVID-19 IMPACT ON HIGHER EDUCATION – THE TRIGGER FOR DIGITAL TRANSFORMATION: CASE STUDY

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Abstract

The Covid-19 pandemic has affected educational system worldwide; Latvia hasn't been an exception. After 11th of March 2020 when Latvia has declared state of emergency over Covid-19, all educational institutions, including higher education forced to move to remote learning because of the quarantine. The quick response to new circumstances and challenges has been required. The aim of this article is to find out the emerged problems and difficulties caused by Covid-19 in the context of higher education in Latvia, to describe possible solutions and identify the pros and cons of remote learning based on the semi-structured questionnaire held online in June 2020. It also tends to describe the importance and readiness of students and lecturers in the specified aspects: study environment, organization of study process, key competences and IT-Human interaction. The summarized results of the questionnaire among Latvian students and lecturers provided an opportunity to list recommendations and guidelines of introduced remote learning and digital transformation.

Keywords: Higher education, remote learning, Covid-19, digital transformation.

1 INTRODUCTION

Covid-19 outbreak, how it all started? The beginning took place in December 2019, with pneumonia of unknown origin occurred in Wuhan, China. On 5 January, 2020 World Health Organization (WHO) published their first Disease Outbreak News and four days later officially announced the discovery of a new coronavirus, that has been responsible for the infectious respiratory disease called COVID-19, that means Coronavirus Disease of 2019 year. As COVID-19 spread rapidly around the world, so on 11 March WHO has declared it as pandemic. The success of social distancing, restrictions and other measures adopted by China and clearly recommended by the WHO, encouraged many other countries to take similar action (WHO, 2020). At the same time, the Covid-19 has put the whole world and our lives into unexpected and complex context. This had a specific impact on higher education as well.

The topic is widely discussed and analyzed, this also is proved by Google search as of 14th of September, 2020, for the term of Covid-19 and higher education, over 1,5 billion hits, while after analyses the abstract and citation databases like EBSCO the number is not so huge - 2 144 records, but it is increasing day by day.

2 METHODOLOGY

The current study is based on the non-experimental mixed research design involving analyses of quantitative and qualitative data on the impact of Covid-19 in the context of higher education. The semi-structured questionnaire "The Impact of Covid-19 in the context of higher education: emerged problems and possible solutions" was chosen as the main research method. 93 respondents, including 27 lecturers and 66 students, from Latvian higher educational institutions have participated in the online questionnaire. The four key aspects have been covered: study environment, organization of study process, competences and IT-Human dialogue. Identified aspects are transdisciplinary fields considering many disciplines, so the focus of this article is on pedagogical and educational ones.

The following hypothesis of the research has been stated - by understanding the importance of the main aspects of distance learning/teaching, neither students nor lecturers were ready for such a rapid transformation of the study process followed by Covid-19.

The following research methods have been used: SPSS Statistics for data processing, descriptive statistics, reliability analyses test – Cronbach's alpha, Mann – Whitney test for two ranks, Kruskal Wallis test for three and more ranks, Wilcoxon Signed ranks test for comparison, Kendal rank correlation and visual graphic method for data representing.

3 RESULTS

3.1 Literature review

According to data published at World Economic Forum a long-overdue revolution in education followed by Covid-19 has been predicted (WEforum, 2020). What new model or paradigm can be developed? As offered by Skolkovo Business School there are three ways to look at COVID-19 impact on the global higher education system. The first and the simplest – COVID-19 forced the transition of learning/teaching process to online. All study processes have been moved online. Some institutions have switched to distance learning, organizing emergency training courses, some refused to hold classes until the fall, citing digital inequality. Most have adjusted the academic calendar for this year. The second way – the pandemic is an example of a serious, but still time-limited cataclysm, that allows to evaluate the readiness level of higher education institution to such shock – condition. So the third way – the real time to the detailed diagnostics of higher education reality (Melnik, 2020).

From the beginning of COVID-19 pandemic the International Association of Universities (IAU), non-governmental organization that is associated with UNESCO, has been closely monitoring the impacts on higher education around the world. IAU with partners from around the world has developed two Global surveys, one has been held in the beginning of pandemic, the second global survey will be held in the fall 2020 (IAU, Covid-19: Higher Education Challenges and Responses, 2020). Based on the first survey the major challenges have been already listed and possible solutions provided.

Considering that the situation is really serious, not only IAU, but also different organizations conducted surveys and questionnaires as well, to understand the disruption caused by Covid-19. For instance, the European Association for International Education (EAIE), for stronger indication of what educational community need and how it is possible collectively to support each other (EAIE, 2020). One more example, the survey of The Erasmus Student Network (ESN) – What kind of effect did Covid-19 have on your mobility? Indicating the finding concerning the impact on the students exchange programs in Europe (ESN, 2020). The Institute of International Education (IIE) in the USA has organized Snapshot survey series to identify the effect on USA higher education campuses and students mobility in USA (IIE, 2020). Additionally, German Academic Exchange Service (DAAD) has provided the overview of the general state of Covid-19 analyses in the field of higher education, by publishing the list of conducted surveys as well (DAAD, 2020).

However, the most detailed survey has been held by International Association of Universities (IAU). The survey was available online and open from 25 March until April 2020, covering main aspects: general assessment of Covid-19 impact on higher education, effect of teaching and learning, impact on the research, key challenges and potential opportunities and changes (IAU, Report the Impact of Covid-19 on Higher Education around the World, 2020).

While in Latvia Covid - 19 Emergency situation has been declared starting from 12 March, 2020 (MK, 2020). The first survey has been conducted by Ministry of Education and Science of Latvia in co-operation with EDURIO with the first two weeks of online learning/teaching process in schools only (EDURIO, 2020). Afterwards, from 10th till 18th of April 2020 the Student Union of Latvia with Ministry of Education and Science has organized another survey, but has covered only the financial aspect of students followed by Covid-19 (LSM, 2020). While from 24th of April till 08th of May 2020 students of five higher educational institutions of Latvia have created CrisisLab as the solution of Covid-19 impact, including such fields as education, health, business and security organizations (CrisisLab, 2020).

Following the provided frameworks and recommendations from IAU report, the questionnaire about online teaching/learning in higher educational institutions of Latvia followed by Covid-19 has been developed. The questionnaire has been organized online among the students and lecturers of higher educational institutions of Latvia in June 2020.

3.2 Questionnaire "Remote Learning in the Context of Higher Education followed by Covid-19"

The majority of statements in the questionnaire were closed format questions; respondents had to choose between certain options (1 to 5). However, there was one optional open format question, which

gave the opportunity to indicate proposals and suggestions for necessary changes or improvements to make digital/ online studies more efficient, taking into consideration Covid-19 effect. Importance and Readiness questions included 28 statements each, focus on four aspects of study process followed by Covid-19: study environment, organization of study process, competences and IT-Human Dialogue.

Questionnaire inner reliability was tested by Cronbach's alpha, $\alpha = .922$. This means very good reliability of questionnaire statements as value is $> .900$.

3.2.1 Respondents of the Research

As it has been indicated 93 respondents have participated in the research: 27 men and 60 women, others – preferred not to answer. The age of the respondents ranged from 18 to 62, while the majority presented the age group of 18-25 (almost 31%). There has been no significant distribution in the location of respondent, 76% (71 respondent) has been from Latgalia. The majority of respondents has been students (66 or 71%) and 27 lecturers (or 29%). The respondents have presented such scientific fields as engineering (42 respondents or 45%), social studies (41 respondent or 41%) and human studies (7 respondents or 8%).

3.2.2 Key Findings of the Questionnaire

There have been 28 statements in the context of four key aspects in the questionnaire. Each statement has been evaluated as for the Importance as for the Readiness. In general, the Importance Index is higher than the Readiness Index to all indicated 28 statements. Then, the aspects analyses have been provided. Aspect analyses covers a number of related statements designed to reduce a set of observed variables to a smaller set (Bors, 2018).

Firstly, aspect Nr.1 – Study Environment. The offered 5 statements included: ICT supply (computer, smart device, internet connection); ICT malfunctions, including internet connection; the chance to study on own time and place; distance is eliminated in e- environment; comfortable environment for studies. The most important for remote learning/teaching is ICT supply (4,83) and malfunction, including internet connection (4,72), across the board less important factor is comfortable environment of studies (3,97). While the most specific distinction between Importance Index and Readiness Index has been observed for ICT malfunctions, including internet connection (4,72 to 3,48) and ICT supply (4,83 to 4,32). Such statements as comfortable environment and distance elimination has been evaluated with scant difference (3,97 to 3,86) and (4,2 to 4,05) accordingly.

Secondly, aspect Nr. 2 – Organization of Study Process. The offered 9 statements included: unlimited study resources; quick and wide range of info learning; individual study approach is ensured; opportunity for creative work; different communication options are offered; promoted collaboration in e- environment; students and lecturers interaction is enhanced in e-environment; promoted meaningful co-operation in e-environment. The respondents have identified as the most important factors unlimited study resources (4,34), individual study approach (4,12) and different communication options (4,11), but the less important - promoted collaboration in e-environment (3,61). When analyzing the distinction between the Importance and Readiness Indexes the specific one is for ensuring individual study approach (4,12 to 3,31) and for unlimited study resources (4,34 to 3,59), while the opportunity for creative work (4,01 to 3,6), communication options (4,11 to 3,71) and promoted collaboration (3,61 to 3,2) are evaluated with the scant difference.

Thirdly, aspect Nr. 3 – Competences. The offered 7 statements included: developed ICT competence; developed communicative competence; info selection skill; info critical evaluation skill; student self-management skills of study process; new knowledge and skills development basing on previous experience; problem- solving skill. One of the top transformation priorities has been level of competences. The Importance Index for all indicated competences and skills is 4,24 and more, the highest importance index is for self-management competence (4,56) and info critical evaluation (4,48), for problem-solving skill (4,41), ICT competence (4,37), info selection skill (4,38) and communicative competence (4,24). While the importance of transformative competence, when new knowledge and skills are developed basing on previous experience, is evaluated as 4,26. Despite the fact of high Importance Index for offered competences, still the Readiness Index for all statements has been evaluated lower. The specific distinction between Importance and Readiness is observed for student

self-management skills (0,99). While the difference between Importance and Readiness Indexes for other competences lies on the range from 0,55 to 0,66.

Finally, aspect Nr.4 – IT-Human Dialogue. The offered 7 statements included: different speed, volume, content; unlimited communication opportunities; the ability to adopt and choose quickly changed technologies; learning process is influenced by technologies; learning procedure fits to cognitive process and digital technologies; the learning outcome depends on the selection of learning model; IT is good alternative of traditional forms, wide range to choose. Similarly, as three previous aspects, the Readiness Index for all offered statements is lower than the Importance Index. While the specific distinction between Importance and Readiness Indexes is observed for the ability to adopt and choose quickly changed technologies (4,19 to 3,57) and learning procedure fits to cognitive process and digital technologies (4,16 to 3,43). Across the board, the insignificant difference is for the statement that IT is good alternative to traditional forms (3,87 to 3,52).

Perhaps, not surprisingly, by analyzing four aspects in total, the Readiness Index has been lower than the Importance Index (see Fig.1). According to Fig.1, the highest Importance index is observed for aspect Nr. 3 - Competences (4,39), but the lowest Importance index is observed for aspect Nr. 2 - Organization of Study Process (3,93). While the highest Readiness Index is for aspect Nr.1 - Study Environment (3,87), when the lowest Readiness Index is for aspect Nr. 2 - Organization of Study Process (3,38). The specific distinction in between is as following: for Competences (4,39 to 3,73), for the Organization of Study Process (3,93 to 3,38), for IT-Human Dialogue (4,11 to 3,56) and for Study Environment (4,37 to 3,87).

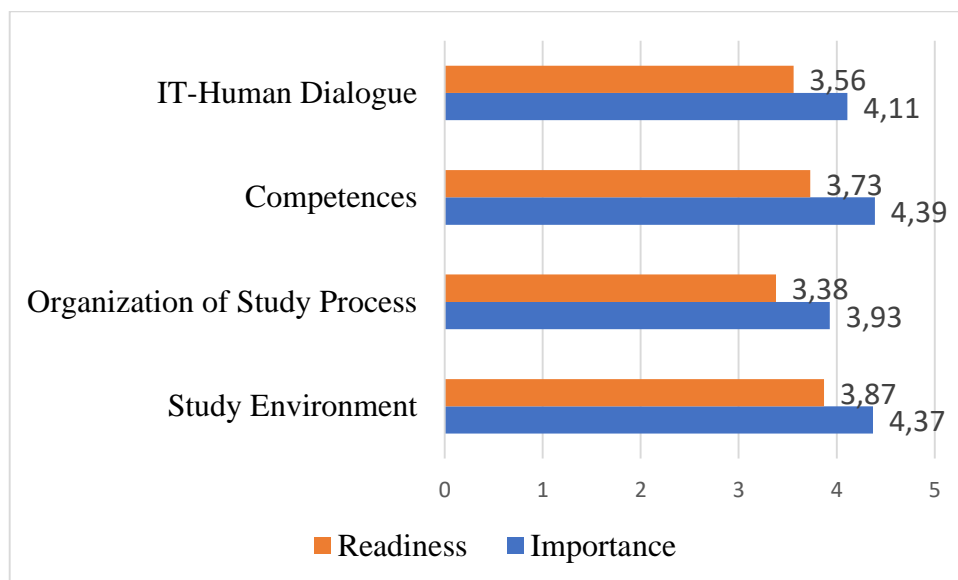


Figure 1. Aspects analyses

3.2.3 Analyses of Statistics Tests

Wilcoxon Signed Ranks Test - To check the Importance and Readiness Indexes for four specified aspects Wilcoxon Signed Ranks Test has been used. According to test statistics, the significant difference between Readiness and Importance Indexes is observed for Study Environment (.528), Organization of Study Process (.484) and Competences (.309), while the insignificant one for IT-Human Dialogue (.033).

Mann-Whitney Test - Through this study, which focuses specifically on higher education, it's possible to compare the priorities of men and women as well. The Importance and Readiness Indexes for four described aspects are higher for women than men, the exception Readiness Index for Study Environment (Mean Rank 45,33 to 43,40) and Readiness Index for IT-Human Dialogue (Mean Rank 48,41to 42,02). While Mann-Whitney Test according to respondent occupation has wider assignment (see table 1).

Table 1. Mann-Whitney Test for Gender.

	status	N	Mean Rank Importance Index	Mean Rank Readiness Index
Study Environment – Importance	students	66	47,09	47,89
	lecturers	27	46,75	44,44
	Total	93		
Organization of Study Process – Importance	students	66	50,40	48,80
	lecturers	27	37,23	41,83
	Total	93		
Competences - Importance	students	66	43,75	46,33
	lecturers	27	56,35	48,94
	Total	93		
IT-Human Dialogue - Importance	students	66	47,09	47,02
	lecturers	27	46,75	46,94
	Total	93		

According to Table 1, the Importance Index for Study Environment is almost the same as for Students (Mean Rank 47,09) as for Lecturers (Mean Rank 46,75); The Importance Index for Organization of Study Process is higher for Students (Mean Rank 50,40), while for Competences – for Lecturers (Mean Rank 56,35); The Importance and Readiness Index for IT-Human Dialogue is almost the same as for Students (Mean Rank 47,09 and 47,02) as for Lecturers (Mean Rank 46,75 and 46,94). The Readiness Index for Study Environment and Organization of Study Process is higher for Students (Mean Rank 47,89 and 48,80), while for Competences it is higher for Lecturers (Mean Rank 48,94).

Kruskal –Wallis Test - The relation between occupation, field and age and the indicated aspects have been analyzed through Kruskal-Wallis Test (see table 2).

Table 2. Kruskal –Wallis Test for Three Ranks.

Aspect	Occupation		Field		Age	
	Importance	Readiness	Importance	Readiness	Importance	Readiness
Study Environment	Students of <u>Doctoral</u> Program	Students of <u>Master</u> program	No significant difference	<u>Human</u> Science	Age group <u>36-45</u>	Age group <u>26 -35</u>
Organization of Study Process	Students of <u>Doctoral</u> Program	Students of <u>Doctoral</u> Program	<u>Human</u> Science	<u>Engineering</u>	Age group <u>26-35</u>	Age group <u>26 -35</u>
Competences	Students of <u>Doctoral</u> Program	Students of <u>Master</u> Program; Students of <u>Doctoral</u> Program	<u>Human</u> Science	<u>Human</u> Science	Age group <u>46-55</u>	Age group <u>46-55</u>

IT-Human Dialogue	Students of Doctoral Program	Students of Doctoral Program	Social Science	Engineering	Age group 26-35	Age group 26 -35
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Based on the data above, the highest Importance Index for all four aspects have been to the students of Doctoral program, while the Readiness Index has been the highest for Doctoral program students for Organization of Study Environment and IT-Human Dialogue, while for Study Environment it has been higher for Master program students and for the Competences as for Master as for Doctoral program students. There is no similarity in the field factor as well. The presented fields of the respondents have been Engineering, Human Science and Social Science. As the Importance Index has no significant difference for the Study Environment, while there is a coincidence as the Importance and Readiness Indexes are the highest for the respondents of Human Science. It is no wonder that the Readiness Index for Organization of Study process and IT-Human Dialogue is higher for the respondents of engineering field, as they included IT specialists. The dispersion has been observed for the age factor. The majority of respondents with high evaluation of the Importance Index for Study environment aspect has been of age group 36-45, for the Organization of Study process and IT-Human Dialogue aspects of age group 26-35, while for the Competences aspect of age group of 46-55. The Readiness Index, except the Competences, has been higher for the respondents of age group 26,35, when for the Competences – the respondents of age group 46-55.

Kendall's Correlation Test - For measuring the ordinal association between Importance and Readiness for four aspects Kendall rank correlation coefficient has been calculated. The correlation of Importance Index is weak (.280 - .378) for all four aspects: Study Environment, Organization of Study Process, Competences and IT-Human Dialogue. While the correlation of Readiness Index is higher, but still weak (.316 - .497) for all four aspects. That means that four aspects are not correlated as for Importance as for Readiness. The four aspects are not correlated also by gender, place, occupation and field. The weak correlation (.269) is observed only for Importance Index of Competences and Age.

3.2.4 Open Question – Effectiveness Test

The open question method has been used for qualitative data obtaining. The purpose of qualitative analyses is to define the meaning of the narrative by dipping into the meaning. For this reason, the analysis is based on the content. Qualitative coding includes multiple steps: content unit, category and concept (Kropljls, Raščevska, 2004).

The respondents have been offered to answer to only one open question - What would you like to change or improve to make digital/online studies more efficient? – by providing their proposals and suggestions for checking effectiveness of study process followed by Covid-19. The most important finding that **18 respondents (or 19%)** have been satisfied with digital/online studies, no changes needed, while other have indicated different aspects (see Table 3).

Table 3 Content units, categories and concepts, identified in the questionnaire.

Content unit	Category	Concept
- Digital/online studies require more time as from lecturers (for preparation, test, check, etc.) as from students (more individual work needed).	Online Study process additional time aspect	Additional Time aspect of online study process
- It is important to evaluation the possibility how to combine online learning with traditional learning (theory – online; practice – traditional).	Combination of traditional and online learning	
- It is necessary to improve different competences, especially self-management skills, ICT competence and communication competence.	Self-management, ICT and Communication competence	

- ICT competence needed to be improved all the time (the special course should be added to each program despite the study field, offering such possibility).	Continuous ICT competence improvement	Development of ICT, self – management and communication competence
- To use unique system for organization of learning/teaching process, to create unique platform for online learning (within one institution or even on a state level).	Unique platform/system for online learning/teaching	Unique learning/teaching platform, including online lessons Part-time programs online
- E-materials should include online videos (online lessons, lecturers, to give the possibility to study at any time and place).	Online lessons, lecturers	
- The most important perspective for online learning, it is good solution for part-time programs.	Organization of part –time programs online	

On the basis of concepts distributions, the following suggestion was made to increase the effectiveness of study process in higher educational institutions followed by Covid-19, it is necessary to pay attention to the following aspects: additional time of online study process, development of ICT, self-management and communicative competences, unique learning/teaching platform, including online lessons and part-time programs online.

4 CONCLUSIONS

Within the investigation it has been concluded that Covid-19 has influenced the study process of all educational levels, including higher education. The current study covers the analyses of four key aspects of study process of higher educational institutions followed by COVID-19. The following conclusions have been stated: Firstly, ICT supply, ICT malfunction and internet connection has been indicated as the most important factors for the Study Environment aspect. Secondly, for the Organization of Study Process aspect the most important are unlimited study resources, individual study approach and different communication options. Thirdly, all indicated competences, such as self-management skills, problem –solving competence, info selection and info critical evaluation skills, ICT and communication competences, have been marked as important ones. Finally, if to cover IT-Human Dialogue aspect, the influence of the technologies to the study process has been indicated as the sufficient one. Moreover, the comparison of the Importance and Readiness Index of each aspect has proved **the hypothesis** of the research that neither students nor lecturers were ready for such a rapid transformation of the study process followed by Covid-19.

Based on the questionnaire preliminary results, the aspects of effective IT-Human interaction have been revealed, listing key competences and important changes and amendments required for effective remote learning and digital transformation in the context of higher education in Latvia. Covering two main concepts the importance and readiness of students and lecturers for IT-Human interaction as Covid-19 highlighted consequence.

However, there is still a discussion, which need to be developed, about key competences for effective IT-Human interaction (digital competence, information and communication technologies competence, problem-solving competence, communicative competence, info selection and info critical evaluation competence) towards a common set and its application and development in the context of higher education.

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