



INTENSIFICATION OF THE EDUCATIONAL PROCESS OF HIGHER EDUCATIONAL INSTITUTIONS BY TOOLS OF INTERACTIVE TECHNOLOGIES

INTENSIFICAÇÃO DO PROCESSO EDUCACIONAL DAS INSTITUIÇÕES DE ENSINO SUPERIOR POR MEIO DE FERRAMENTAS DE TECNOLOGIAS INTERATIVAS

INTENSIFICACIÓN DEL PROCESO EDUCATIVO DE LAS INSTITUCIONES DE EDUCACIÓN SUPERIOR MEDIANTE HERRAMIENTAS DE TECNOLOGÍAS INTERACTIVAS

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Abstract: Intensification of the educational process of a higher educational institution by tools of interactive technologies (IT) is studied in terms of efficiency of distance learning platforms. A good deal more IT tools are integrated into the educational process than platforms, the main function of which is the exchange of materials, task supervision, registration of activity and attendance. Within the scope of on the survey and data analysis of the Moodle platform for the period from September to January 2019 (230 students and 8 educators of Ivan Franko National University of Lviv from the following faculties have been involved, namely: economic, financial and business management, international relations of the 2nd year of study). The scale of intensification of the educational process due to the integration of different types of IT has been estimated. The analysis of users' activities of the distance learning platform has been carried out. An improvement of the communication level, self-monitoring, assessment, reducing time for preparation of materials, as well as increasing the efficiency of tasks' performance has been revealed. Increasing the level of attendance and increasing the level of control and responsibility are the most common manifestations of the intensification of the educational process. The reduction in the time for obtaining and searching for materials and saving in the time for preparing materials by educators has been recorded. As a result, there was a significant reduction of time for the course's organization. The educators have given higher assessment of the intensification of the educational process in terms of using IT tools compared to students' assessment. However, students' assessments of the processing of materials and tasks' performance are higher compared

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to the assessments of educators; it characterizes a certain level of subjectivity of students in assessing their own educational activities. The results obtained can be used to theorize the experience of using IT in the organization of the educational process of higher educational institutions, as well as for further experimental research in this area in order to reveal effective models of “teacher / student” interaction and search for effective ways to intensify the educational process of higher educational institutions in the paradigm of introducing distance education in the realities of the Covid-19 pandemic.

Keywords: Educational process, intensification of the educational process, the performance of the educational process, interactivity, interactive technologies of HEI.

Resumen: A intensificação do processo educacional de uma instituição de ensino superior por meio de ferramentas de tecnologias interativas (TI) é estudada em termos de eficiência de plataformas de ensino a distância. No processo educacional estão integradas muito mais ferramentas de TI do que plataformas, cuja função principal é a troca de materiais, supervisão de tarefas, registro de atividades e assiduidade. No âmbito do levantamento e análise de dados da plataforma Moodle para o período de setembro a janeiro de 2019 (230 alunos e 8 educadores da Universidade Nacional Ivan Franko de Lviv das seguintes faculdades estão envolvidos, nomeadamente: económica, financeira e empresarial gestão, relações internacionais do 2º ano de estudo). A escala de intensificação do processo educacional devido à integração de diferentes tipos de TI foi estimada. Foi realizada a análise das atividades dos usuários da plataforma de ensino a distância. Foi revelada uma melhoria do nível de comunicação, automonitoramento, avaliação, redução do tempo de preparação de materiais, bem como aumento da eficiência de desempenho das tarefas. Aumentar o nível de frequência e aumentar o nível de controle e responsabilidade são as manifestações mais comuns da intensificação do processo educacional. Registra-se a redução do tempo de obtenção e busca de materiais e a economia de tempo de preparo de materiais pelos educadores. Como resultado, houve uma redução significativa do tempo para a organização do curso. Os educadores deram uma avaliação superior da intensificação do processo educacional em termos de uso de ferramentas de TI em comparação com a avaliação dos alunos. No entanto, as avaliações dos alunos sobre o processamento de materiais e o desempenho das tarefas são mais altas em comparação com as avaliações dos educadores; caracteriza um certo nível de subjetividade dos alunos na avaliação de suas próprias atividades educacionais. Os resultados obtidos podem ser utilizados para teorizar a experiência do uso de TI na organização do processo educacional de instituições de ensino superior, bem como para futuras pesquisas experimentais nesta área, a fim de revelar modelos eficazes de interação e pesquisa “professor / aluno”. por formas eficazes de intensificar o processo educacional das instituições de ensino superior no paradigma de introdução da educação a distância nas realidades da pandemia de Covid-19.

Palabras clave: Processo educativo, intensificação do processo educativo, desempenho do processo educativo, interatividade, tecnologias interativas de IES.

Resumo: Se estudia la intensificación del proceso educativo de una institución de educación superior mediante herramientas de tecnologías interactivas (TI) en términos de eficiencia de las plataformas de educación a distancia. En el proceso educativo se integran muchas más herramientas informáticas que las plataformas, cuya función principal es el intercambio de materiales, la supervisión de tareas, el registro de la actividad y la asistencia. Dentro del alcance de la encuesta y el análisis de datos de la plataforma Moodle para el período de septiembre a enero de 2019 (230 estudiantes y 8 educadores de la Universidad Nacional Ivan Franko de Lviv de las siguientes facultades, a saber: economía, finanzas y negocios gestión, relaciones internacionales del 2º año de estudios and undergraduates of the National Pedagogical University named after MP Drahomanov, faculties of informatics and historical education (course "Pedagogy of higher school"). Se ha estimado la escala de intensificación del proceso educativo debido a la integración de diferentes tipos de TI. Se ha realizado el análisis de las actividades de los usuarios de la plataforma de educación a distancia. Se ha revelado una mejora en el nivel de comunicación, autocontrol, evaluación, reducción del tiempo de preparación de materiales, así como aumento de la eficiencia del desempeño de las tareas. Incrementar el nivel de asistencia y aumentar el nivel de control y responsabilidad son las manifestaciones más comunes de

la intensificación del proceso educativo. Se registra la reducción del tiempo de obtención y búsqueda de materiales y el ahorro de tiempo de preparación de materiales por parte de los educadores. Como resultado, hubo una reducción significativa del tiempo para la organización del curso. Los educadores han otorgado una mayor evaluación de la intensificación del proceso educativo en términos de uso de herramientas informáticas en comparación con la evaluación de los estudiantes. Sin embargo, las evaluaciones de los estudiantes sobre el procesamiento de materiales y el desempeño de las tareas son más altas en comparación con las evaluaciones de los educadores; caracteriza un cierto nivel de subjetividad de los estudiantes a la hora de evaluar sus propias actividades educativas. Los resultados obtenidos se pueden utilizar para teorizar la experiencia del uso de las TI en la organización del proceso educativo de las instituciones de educación superior, así como para futuras investigaciones experimentales en esta área con el fin de revelar modelos efectivos de interacción y búsqueda “profesor / alumno”. por formas efectivas de intensificar el proceso educativo de las instituciones de educación superior en el paradigma de introducir la educación a distancia en las realidades de la pandemia Covid-19.

Palabras-chave: Proceso educativo, intensificación del proceso educativo, el desempeño del proceso educativo, interactividad, tecnologías interactivas de las IES.

1 INTRODUCTION

The intensification of the educational process of institutions of the higher educational institution (HEI) is carried out due to the use of IT, which improve the flexibility of schedules and training formats (Zhu, E., 2017). IT increase the level of students' productivity (Benta, D., Bologa, G., Dzitac I., 2015), as well as students' self-efficacy (Moreno, V., et al, 2016). 100% availability of materials for students has been experimentally proven (Chivu, R.-G. et al, 2018). As a result, higher educational institutions become adaptive in terms of use of interactive pedagogy and digital technologies, providing a higher level of flexibility of the educational process (Stewart, C., Wolodko, B., 2016). The flexibility of the educational process also involves adaptation to the needs of students (Arrosagaray, M., et al, 2019), namely, the availability of educational materials at any time, anywhere (Adams, S. et al, 2017). Intensification by IT tools is also carried out due to improved communication between the educator and students (Keane, T., Keane, W. F., Blicblau, A. S., 2016). As a result, a synergistic effect of IT is provided: pedagogical, professional, social, catalytic and technical effects are integrated (Jain, M., Tyagi, R., 2017).

The purpose of the scientific investigation is to assess the intensification of the educational process of higher educational institutions after the introduction of IT tools.

The basic hypotheses of the investigation are as follows:

H1: Learning Management System (LMS) as an IT tool that provides an intensification of the educational process through reducing time for organization (preparation of educational materials for students, search for educational materials by students, automatic control of students' tasks, automatic control and assessment of attendance).

H2: IT tools provide intensification of the educational process by reducing the time for communication between the educator and students.

H3: IT tools provide intensification of the educational process by increasing the motivation and self-efficacy of students (study of course materials available in LMS, the need to download to LMS course tasks, automatic control of downloaded tasks and control of attendance in LMS contributes to the overall increase of motivation).

2 LITERATURE REVIEW

Intensification of the educational process is an increase in the performance level of an educator and a student during educational activities. Factors of intensification are as follows: the high level of organization of the educational process, the availability of materials in the learning process, taking account of the age and individual characteristics of students, the use of interactive technologies (IT).

Interactivity is considered as a set of input actions and responses to provide two-way communication by using a specific user interface. The term interactivity is considered as: 1) interaction between individuals; 2) interaction between the individual and the system; 3) interaction between systems (Georgieva-Tsaneva, G., Bogdanova, G., Negoslav Subev, N., 2017). Interactive technologies are considered as real-time applications used by individuals to exchange information, as well as knowledge, based on input data and taking into account the perception of the environment. It is a set of real-time applications that contributes to the interactivity of technologies (Kebble, P.G., 2017), which transform the educational process and teaching systems, and training at HEI (Henderson, M., Selwyn, N. & Aston, R., 2017). IT provide integration of pedagogical and technological skills of educators, obtaining continuous and coordinated technological support (Zhu, E., 2017). "The combination of teaching and information technologies is at the origin of a more embracing, flexible and accessible approach to learning" (Rolim, C. and Isaias, P., 2019).

The basic types of technologies used by HEI are as follows: e-mail, Web, Word Processing, Course Management System, IM&MPJ, Multimedia, Presentation, spreadsheet, Graphics, electronic Publishing, database and business intelligence tools, Web Learning Modules, Modeling or Simulation, Statistical Analysis, Programming. Social media has also become part of the educational process (Rowan- Kenyon, H.T., et al, (2016). These types of technologies can be considered as tools for obtaining information and knowledge, processing of educational materials. The use of these technologies is effective due to the possibility of including online learning materials in the educational process (Lytras, M., Sarirete, A., Damiani, E., 2020). Properly chosen tools of e-interactive learning contribute to the growth of creativity and productivity of the educational process (Al-Zahrani, A. M., 2015). On the other hand, the proper integration of IT into the educational process on the basis of a systematic dynamic approach provides more effective teaching and course management practices (Serrano, D. R., et al, 2019), and "makes higher education more affordable, ... and increased focus on students' success" (Drake, B. M.,Walz, A., 2018).

Little attention has been paid to the study of the level of intensification or performance of the educational process at HEI by applying IT tools. Performance is considered through indicators of using of IT tools (attendance of students on electronic platforms of distance learning, hours; users enroll (including accounts creation) (Benta, D., Bologna, G., Dzitac I., 2015). "The group who have benefited the integration of e-learning had many more improvements" (Benta, D., Bologna, G., Dzitac I., 2015).

Studies focus on identifying the effectiveness of learning management systems (LMS) (Moreno, V., et al, 2016). Scientific publications study the issue of users' acceptance of new technologies, the Technology Acceptance Model (TAM) (Moreno, V., et al, 2016). Perceptions and a positive attitude towards technology in the educational process affect the efficiency of IT use (Moreno, V., et al, 2016). However, studies do not reveal the effects of IT that have a positive effect on the intensification of the educational process, which can be evaluated through such measurements, as: organization, accessibility of materials, communication, motivation, self-efficacy, control, assessment.

As a matter of fact, LMS are distance learning platforms (for example, Moodle), which can be defined as an interactive system of exchanging materials between the educator and the student, monitoring students' performance of course assignments, and assessing knowledge (Pino, S., et al, 2017; Subhash, S., Cudney, E. A.2018). Such system indirectly affects the intensification of learning through increasing the level of organization of the educational process and the availability of materials (Sysoieva, S.O. and Osadcha, K.P., 2019; Yang, G., Xiang, H., & Chun, L. (2018). In fact, downloading the course materials to the system contributes to the student's ability to both access and quickly find the information necessary for preparation.

The organization of the educational process is improved due to the higher level of students' involvement through automatic control of performance, attendance and assessment (Younie, S., & Leask, M., 2013; Yaroshenko T., 2019).

3 DATA AND METHODS.

Conceptual Framework

This academic paper is based on the Technology Acceptance Model (Moreno, V., et al, 2016), which makes it possible to measure indicators of the intensification of the educational process of higher educational institutions. The model contains indicators that have been previously validated in the scientific literature and the authors' assessments of intensification. The three-dimensional virtual world is actively integrated into the educational process of HEI (Ghanbarzadeh, R. and Ghapanchi, A.H., 2018), which, in general, indicates the most common use of 13 IT tools.

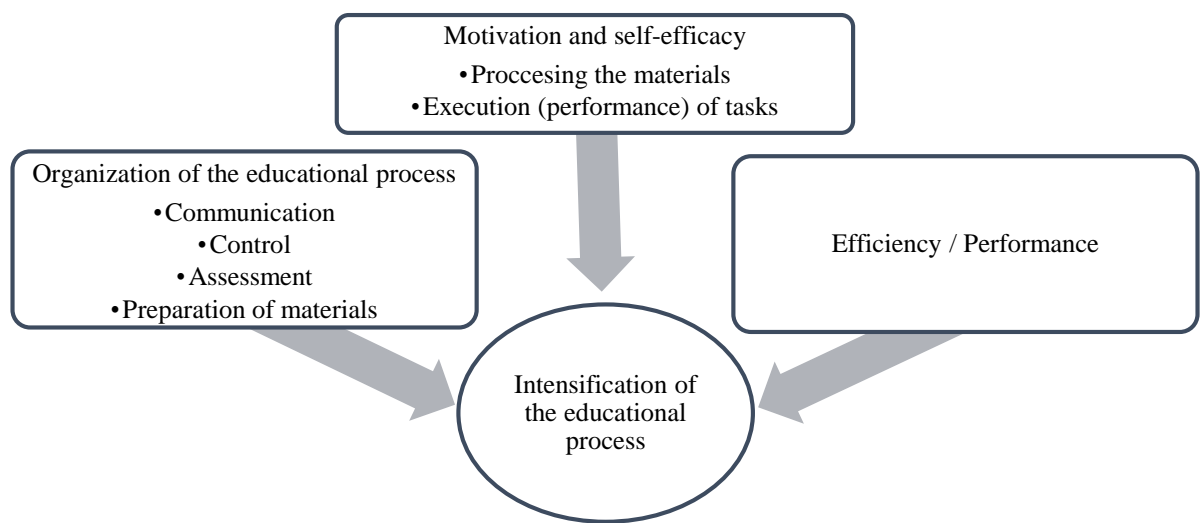


Figure 1: Proposed Research model

Source: compiled by the author.

In order to assess the measurement of the intensification of the educational process of HEI, a system of statements has been developed, which are grouped into a questionnaire. The questionnaire is composed to assess the intensification of the process by students and teachers, taking into account the need to assess all IT tools used in the educational process and ensuring its intensification.

Table 1. Characteristics of statements to assess the intensification of the educational process of HEI

Measurement of the intensification of the educational process		Statement / essence
Organization	Communication	1. The educator / student provided feedback within an hour. 2. The educator / student clearly formulated questions, gave answers. 3. The educator / student felt confident and relaxed in communication process.
	Control	1. The student reviewed attendance control.

		2. The student reviewed materials, homework and independent assignments, course materials.
	Assessment	1. The student received a higher score per course compared to the average score for the previous semester.
	Preparation of materials (for educators)	1. Downloading of materials took from 1 to 2 hours and did not require further preparation efforts. 2. Preparation of materials took from half an hour to 1 hour before each session.
Motivation and self-efficacy	Processing the materials	1. The student downloaded all the materials. 2. The student processed the materials provided by the educator at each session.
	Execution of tasks	1. The student downloaded / sent all assignments (tasks).
Efficiency / Performance	Of the educator	1. The time for the course and its organization has been reduced.
	Of the student	1. The materials were completely studied. 2. All tasks are completed during the course.

Source: compiled by the author.

Sampling and data collection process

The students of Ivan Franko National University of Lviv of the following faculties have been involved in the survey, namely: economics, financial management and business, international relations, of the 2nd year of study. The sample was formed taking into account the disciplines taught to students of these faculties, namely: "Management", "Marketing", "Microeconomics", "Macroeconomics", "Accounting", "Statistics", "International Relations", "Political Economy", "Law".

In order to conduct the survey, 230 students and 8 educators of HEI of Ukraine have been involved. The initial data for the study are interdependent. The figure of 8 courses, according to the authors' viewpoint, is sufficient to objectively reflect the results of data collection according to the survey criteria, taking into account the further division of all participants into experimental and control groups. The number of 230 students is conditioned, in turn, by the total number of students attending the controlled 8 university disciplines, taught, respectively, by 8 teachers involved in the experiment.

The number of 230 students is due, in turn, to the total number of students attending the controlled 8 university disciplines, taught, respectively, by 8 educators involved in the experiment. The duration of the experiment is determined by the duration of teaching the selected training courses - one semester of the academic year.

The university uses the following IT tools: e-mail, social media (Viber messenger), Presentation, Spreadsheet, Graphics, distance learning platform Moodle, Microsoft Teams, Web (most used IT tools have been selected). In order to assess the intensification of the educational process, two samples of educators and students have been formed:

1) a control group that does not use IT tools or uses the most traditional ones (e-mail, Presentation, Spreadsheet, Graphics, Web);

2) an experimental group that widely uses all the above IT in teaching and learning practice and has relevant experience of interaction in this area (they understand the ways and models of interaction through IT and, in particular, LMS): 4 educators; 115 students. The groups were formed in such a way that each academic group was divided into 2 subgroups (experimental and control ones), which made it possible to achieve maximum objectivity of the results. Each group attended the same subjects during the same academic period.

The data collection process began after completion of the courses and assessments. All 8 training courses were organized in the same format; the course folder was named after the course name. The following electronic folders were placed in the structure of each course, namely: Announcements, Preliminary Course Outline, Course Materials (Course Readings, Data sources, Lecture notes), Assignments, Lecture videos, Course evaluation. For doing homework, an advanced function with the ability to download files at a strictly defined time period has been used. For each day of delay, 1 point was deducted from the assessment. All students were registered by the platform administrator and received access data (login, password) via e-mail. The process of the experiment lasted from September 2019 to January 2020.

The questionnaire for further determination of the performance indicators of the experiment was composed by using Google Form and sent to the control group via e-mail, the experimental group received it via Viber messenger. The process of developing the questionnaire and data collection continued in March - April 2020 after the completion of training courses that fell within the experiment.

4 METHODS

The questionnaire as a means of collecting data on the assessment of the level of intensification of the educational process by students and educators is the most effective way of the investigation. The questionnaire was the basic research tool. An additional tool was the analysis of logs of files from the Moodle server platform after the courses' completion. The data for analysis from the Moodle platform were collected in February 2020. These data made it possible to determine such intensification indicators, as: users' activities on e-platform Moodle, homework tasks assignments, homework submitted, participation rate. The analysis was an additional method of assessing the level of motivation and self-efficacy of students.

3.4. Statistical methods of processing results

The following statistical methods have been chosen to process the results of the questionnaire survey:

- 1) Cronbach's alpha to assess the reliability of the results.
- 2) Descriptive estimates: average value, minimum, maximum, standard deviation, trend.

Statistical analysis by using SPSS 22.0 has been applied to process the results of the questionnaire. The significance level of the test results has been selected at the level of 5% and 10%.

5 RESULTS

Results of Moodle server file analysis: evaluation of performance of educational process

The most important result of the study can be considered change in attitudes towards learning towards more conscious one and students' perception of homework. Taking into consideration the need to download tasks on time, the level of responsibility has increased. The activity log (Figures 2 and 3) has been used to assess the level of students' activity). Of all the activities, registered on Moodle, a high percentage fell on students' activity (72%). 25% of the activity has been taken by the educator's actions in downloading

materials, updates, tasks, maintaining a register of attendance, course reports, viewing users. 3% of actions have been performed by the administrator (course development, resource allocation, downloading accounts, users' registration).

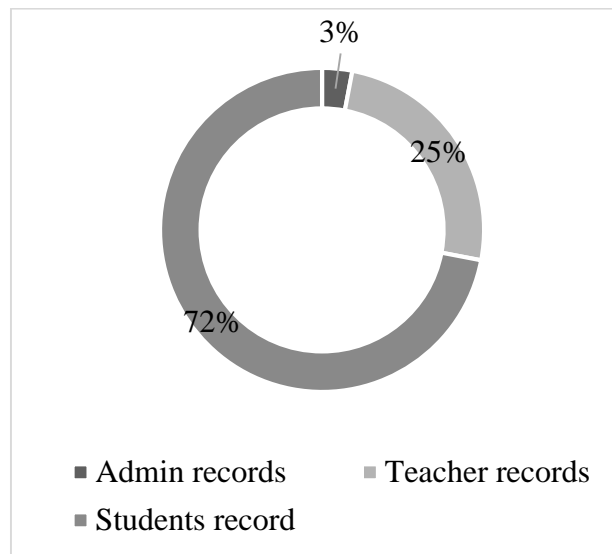


Figure 2. Users' activities on e-platform Moodle

Source: compiled by the author.

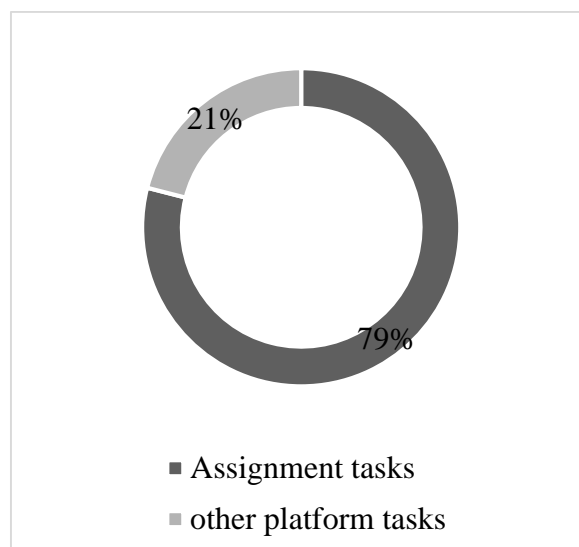


Figure 3. Homework tasks vs. other platform tasks

Source: compiled by the author.

Most of the tasks on the platform were related to homework 79% (Figure 2). Other tasks (administrator and educator) accounted for 21% of all actions. There were also such records of actions on the platform, as: viewing of materials, folders, attending classes and assessments. Therefore, the platform as an IT tool is effective primarily for homework control.

The platform was an incentive for students to do homework and process the materials. This, in general, increased interest in the courses. During the analysis, the number of homework tasks, sent in the

traditional way via e-mail, was estimated. 24% of tasks, sent via e-mail, were not confirmed (Figure 4), while 14% of tasks, sent via the platform, were not confirmed (Figure 5).

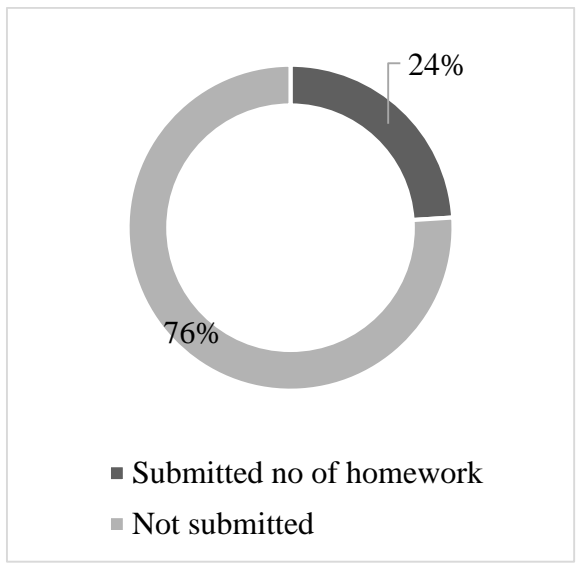


Figure 4. Submitted/Not submitted homework in traditional way

Source: compiled by the author.

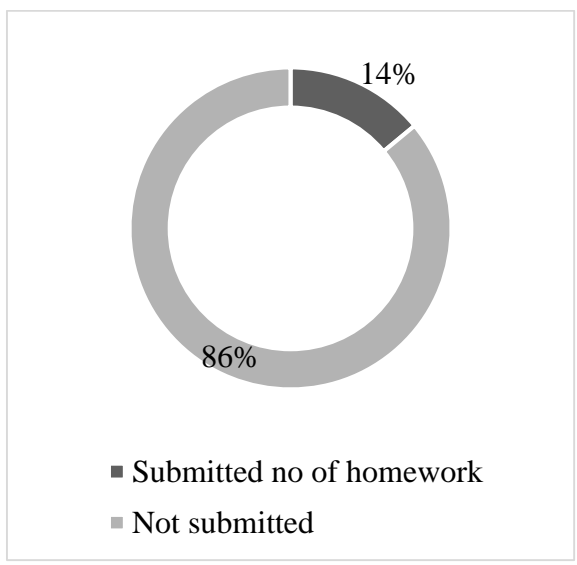


Figure 5. Submitted/Not submitted homework using e-learning

Source: compiled by the author.

Thus, the platform is a tool to increase control, in particular students' self-control. Clearly defined statement concerning downloading of the task at a certain time has become a method of objective control. The platform also stimulated a higher level of course attendance (Figures 6-7).

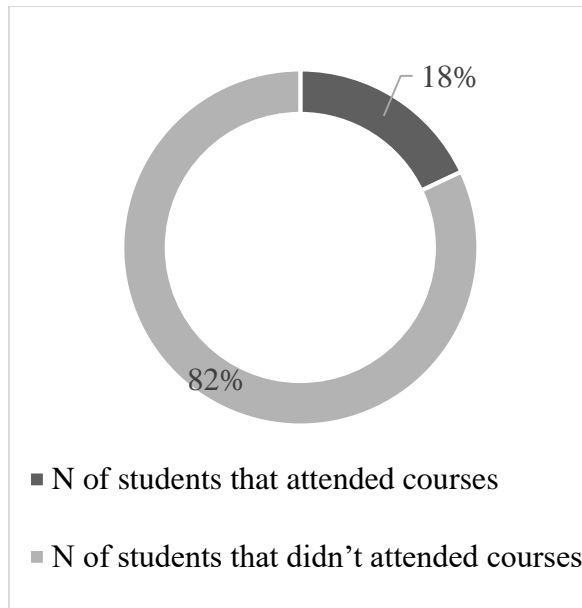


Figure 6. Participation rate in traditional way

Source: compiled by the author.

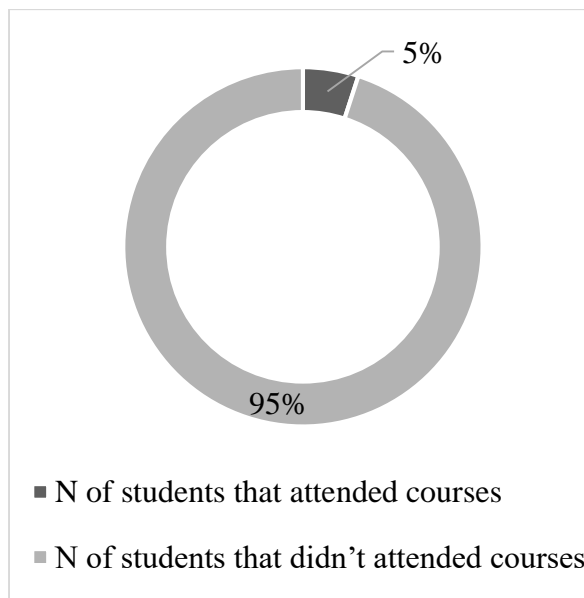


Figure 7. Participation rate using e-learning platform

Source: compiled by the author.

One of the important elements for ensuring the growth of students' attendance at courses was the display of the number of visits by each student through an electronic platform: each student could see the number of classes he missed and the score for attendance in Moodle. As a result, 82% of students attended the course in the control group and 18% missed classes, while 95% of students attended courses in the experimental group.

Survey results: assessment of the intensification of the educational process

Cronbach's alpha has been calculated according to the questionnaires' data of the control group, experimental group and educators' group in order to form the correct conclusions based on the analysis of the questionnaire. The results of the survey are reliable and make it possible to draw correct conclusions about the intensification of the educational process (see table 2).

Table 2. The Reliability statistics

Reliability statistics	Cronbach's alpha	N of Items	N of respondents	Reliability level
Students				
Control group	0,706	14	115	0.61 to 0.80 High
Experimental group	0,702	14	115	0.61 to 0.80 High
Educators				
Control group	0,697	14	4	0.61 to 0.80 High
Experimental group	0.698	14	4	0.61 to 0.80 High

Source: compiled by the author.

The results of the survey of the control group of students (Table 3) are on average lower than the results of the survey of the experimental group (Table 4). The average value of all 14 statements in the first case was 2,741, in the second - 3,372. The most problematic issue in the traditional form of training were the clarity of the wording of the questions and answers by the educator (average 2,222, deviation 1,086), while the educators assess this statement higher (to compare with a control and experimental group with average 3,213 and 3,323). Thus, in the process of communication, a problem of formulating questions by students arises due to possible lack of effective communication skills. Whereas educators with communication and teaching skills assess the communication process more effectively. At the same time, the assessment of the clarity of the wording of the questions and answers is higher in the experimental group of educators, which can be explained by the student's need to form a question and the answer in writing through the platform Moodle, Viber etc.

Table 3. The results of a survey of a control group of students

Measurement of the intensification of the educational process	Statement / essence	Average	Minimum	Maximum	Standard deviation	Trend
Communication	1. The educator / student provided feedback within an hour.	2,741	1,0	4,0	1,130	4,0
	2. The educator / student clearly formulated questions, gave answers.	2,222	1,0	4,0	1,086	2,0

	3. The educator / student felt confident and relaxed in communication process.	3,185	1,0	4,0	0,786	3,0
Control	1. The student reviewed attendance control.	1,815	1,0	4,0	1,039	1,0
	2. The student reviewed materials, homework and independent assignments, course materials.	1,889	1,0	4,0	1,013	1,0
Assessment	1. The student received a higher score per course compared to the average score for the previous semester.	2,926	1,0	4,0	0,874	3,0
Preparation of materials (for educators)	1. Downloading of materials took from 1 to 2 hours and did not require further preparation efforts.	2,556	1,0	4,0	1,188	4,0
	2. Preparation of materials took from half an hour to 1 hour before each session.	3,037	1,0	4,0	1,126	4,0
Processing the materials	1. The student downloaded all the materials.	2,111	1,0	4,0	1,188	1,0
	2. The student processed the materials provided by the educator at each session.	3,037	1,0	4,0	0,854	3,0
Execution of tasks	1. The student downloaded / sent all assignments (tasks).	2,259	1,0	4,0	1,095	2,0
Of the educator	1. The time for the course and its organization has been reduced.	3,067	1,0	4,0	1,330	5,0
Of the student	1. The materials were completely studied.	3,130	1,0	4,0	1,182	5,0
	2. All tasks are completed during the course.	3,296	1,0	4,0	1,382	4,0

Source: compiled by the author.

Another issue of the control group is as follows: students' self-control of their attendance (average values 1,815 and 1,889), while the experimental group, having access to the attendance register in the platform, assessed self-control significantly higher (average values 3,444 and 3,185). This can be explained by the student's need to contact the educator for receiving an attendance register, while IT tools make it possible to view this data at any time. On the other hand, there was no problem of control on the part of educators: in any case, educators maintain a register of attendance.

The third problem of the control group is as follows: the need for constant search for materials (average value 2,556). By contrast, the experimental group assessed this statement at 3,025. This means that there is a need to periodically search for materials in the system, despite the systematization of material in Moodle.

Table 4. The results of a survey of an experimental group of students

Measurement of the intensification of the educational process	Statement / essence	Average	Minimum	Maximum	Standard deviation	Trend
Communication	1. The educator / student provided feedback within an hour.	3,519	1,0	4,0	1,252	3

	2. The educator / student clearly formulated questions, gave answers.	3,444	1,0	4,0	1,251	4
	3. The educator / student felt confident and relaxed in communication process.	3,444	1,0	4,0	1,368	4
Control	1. The student reviewed attendance control.	3,444	1,0	4,0	1,368	3
	2. The student reviewed materials, homework and independent assignments, course materials.	3,185	1,0	4,0	1,331	4
Assessment	1. The student received a higher score per course compared to the average score for the previous semester.	3,407	1,0	4,0	1,448	4
Preparation of materials (for educators)	1. Downloading of materials took from 1 to 2 hours and did not require further preparation efforts.	3,025	1,0	4,0	1,235	3
	2. Preparation of materials took from half an hour to 1 hour before each session.	3,185	1,0	4,0	1,456	4
Processing the materials	1. The student downloaded all the materials.	3,451	1,0	4,0	1,025	3
	2. The student processed the materials provided by the educator at each session.	3,245	1,0	4,0	1,324	4
Execution of tasks	1. The student downloaded / sent all assignments (tasks).	3,947	1,0	4,0	0,988	4
Of the educator	1. The time for the course and its organization has been reduced.	3,568	1,0	4,0	0,457	3
Of the student	1. The materials were completely studied.	3,258	1,0	4,0	0,457	3
	2. All tasks are completed during the course.	3,678	1,0	4,0	0,658	4

Source: compiled by the author.

Compared with the control group, the assessment of the study of course materials increased in the experimental group. Higher level of downloading and studying the materials was noted in the experimental group (average values 3,451 and 3,245) compared to the control group (average values 2,111 and 3,037). The same applies to the statement about the execution (performance) of tasks: the experimental group assessed the statement at 3,547, while the control group - at 2,259. In general, the students of the experimental group noted a reduction in time for the organization of the course: the average value is 3,568 (control group - 3,067). Students of the experimental group also noted higher level of processing the materials and tasks (average values 3,258 and 3,678), compared with the control group (average values 3,130 and 3,296).

The results of the survey of the control group of educators (Table 5) differ from the survey's results of the experimental group of educators (Table 6). The educators noted a significant improvement of students' grades in the experimental group (average values 2,245 and 3,345).

Table 5. The results of a survey of a control group of educators

Measurement of the intensification of the educational process	Statement / essence	Average	Minimum	Maximum	Standard deviation	Trend
Communication	1. The educator / student provided feedback within an hour.	3,452	2	4	1,024	3
	2. The educator / student clearly formulated questions, gave answers.	3,213	2	4	1,325	3
	3. The educator / student felt confident and relaxed in communication process.	3,254	2	4	1,456	3
Control	1. The student reviewed attendance control.	3,047	1	4	1,024	3
	2. The student reviewed materials, homework and independent assignments, course materials.	3,214	1	4	0,897	3
Assessment	1. The student received a higher score per course compared to the average score for the previous semester.	2,245	1	4	0,599	3
Preparation of materials (for educators)	1. Downloading of materials took from 1 to 2 hours and did not require further preparation efforts.	3,453	2	4	1,478	4
	2. Preparation of materials took from half an hour to 1 hour before each session.	3,284	3	4	1,587	4
Processing the materials	1. The student downloaded all the materials.	3,046	1	4	1,213	4
	2. The student processed the materials provided by the educator at each session.	3,123	2	4	1,234	3
Execution of tasks	1. The student downloaded / sent all assignments (tasks).	3,174	3	4	1,245	4
Of the educator	1. The time for the course and its organization has been reduced.	3,097	3	4	1,478	4
Of the student	1. The materials were completely studied.	3,214	3	4	1,412	3
	2. All tasks are completed during the course.	3,074	1	4	1,023	3

Source: compiled by the author.

The educators noted a reduction of the time of preparation of materials. The experimental group assessed the reduction of time for downloading and preparation of materials (average values 3,563 and 3,874), compared with the control group (average values 3,453 and 3,284). This is explained by the ability of the educator of the experimental group to provide students with a response to the placement of materials compared to the need of the educator to send the material to students if necessary. The educators of the experimental group also noted an increase in the level of downloading and processing the materials. Herewith, students of the experimental group assess the level of downloading and processing the materials higher than the educators of the experimental group. The results of answers to the assessment of the level

of performance of tasks are the same: students of the experimental group assess the level of performance at an average of 3,947, while educators - at 3,864.

Table 6. The results of a survey of an experimental group of educators

Measurement of the intensification of the educational process	Statement / essence	Average	Minimum	Maximum	Standard deviation	Trend
Communication	1. The educator / student provided feedback within an hour.	3,542	2	4	1,027	4
	2. The educator / student clearly formulated questions, gave answers.	3,323	2	4	1,23	3
	3. The educator / student felt confident and relaxed in communication process.	3,654	2	4	1,023	4
Control	1. The student reviewed attendance control.	3,147	2	4	1,044	3
	2. The student reviewed materials, homework and independent assignments, course materials.	3,344	2	4	0,887	3
Assessment	1. The student received a higher score per course compared to the average score for the previous semester.	3,345	1	4	0,522	3
Preparation of materials (for educators)	1. Downloading of materials took from 1 to 2 hours and did not require further preparation efforts.	3,563	2	4	1,028	4
	2. Preparation of materials took from half an hour to 1 hour before each session.	3,874	3	4	1,365	4
Processing the materials	1. The student downloaded all the materials.	3,196	2	4	1,112	4
	2. The student processed the materials provided by the educator at each session.	3,243	2	4	1,203	3
Execution of tasks	1. The student downloaded / sent all assignments (tasks).	3,864	3	4	1,345	4
Of the educator	1. The time for the course and its organization has been reduced.	3,877	3	4	1,267	4
Of the student	1. The materials were completely studied.	3,334	3	4	1,354	3
	2. All tasks are completed during the course.	3,274	2	4	1,003	3

Source: compiled by the author.

The educators noted a significant reduction of time for the course and its organization (3,097 and 3,877). Whereas in comparison with groups of students, the educators of both groups noted that the time for the course and its organization is shorter compared to students' assessments (3,067 and 3,568, respectively). This means that the educators have more functions in organizing the educational process and more broadly characterize the effect of using IT tools, compared with students. The educators of the control group assessed processing the materials at 3,214 and the performance of tasks at 3,074, while the educators of the experimental group - at 3,334 and 3,274, respectively. Compared to the two groups of students, students' assessments are higher, which characterizes a certain level of subjectivity of students in assessing

their own activities. The educators' data on the frequency of use of IT tools were collected in order to assess the level of use of IT tools (Table 7).

Table 7. The educators' assessment of IT tools' using (Control and Experimental Group)

IT	Control Group		Experimental Group	
	The educators' using rate, N per month per Teacher (Average)	The educators' using rate, % per month	The educators' using rate, N per month	The educators' using rate, % per month
E-mail	96	52,46%	45	11,90%
Viber	0	0,00%	118	31,22%
Presentation	27	14,75%	26	6,88%
Spreadsheet	19	10,38%	23	6,08%
Graphics	26	14,21%	29	7,67%
Moodle	0	0,00%	87	23,02%
Microsoft Teams	0	0,00%	15	3,97%
Web	15	8,20%	35	9,26%
Total	183	-	378	-

Source: compiled by the author.

The frequency of use of IT tools of the experimental group significantly exceeds the frequency of the control group' use. In addition to traditional IT tools, the educators are actively using new IT tools, which have two consequences: both the development of digital skills and simplification of the educational process, and increasing the burden on the educator. The use of additional IT tools by the experimental group took more time to perform certain functions (communication with students in addition via Viber, for example). At the same time, the use of Moodle and Viber has greatly simplified the provision of materials to students by the educators. Herewith, some educators noted the reluctance to use new IT tools (Moodle and Viber) and explained this by the impossibility of replacing the process of personal communication, in which personal contact with the student make them estimate the level of understanding of the material, as well as their needs. Other educators noted the simplification of communication with students because of removing communication barriers. It is easier for students to ask questions through IT tools, as there is an opportunity and time to form a clear statement and, as a result, to get a clear-cut answer from the educator.

6 DISCUSSION

In general, the results of the investigation are related and confirm the conclusions about the efficiency of use of IT tools at HEI. "The results allow identifying the main advantages, opportunities, and drawbacks of using these technological tools for educational purposes" (Pérez-delHoyo, R, et al, 2020). Motivation to perform tasks by students has increased, the level of communication has increased, and automatic control has deprived students of the subjectivity of assessing the importance of the course: students assessed the courses as more important ones, the level of interest in the course increased. Similar conclusions were made in the study of Póljanowicz W. et al. (2011): "The motivation is a significant self-regulator of student's behavior in distance education process".

Some studies have noted an increase in overall satisfaction of use of IT tools (Benta, D., Bologa, G., Dzitac I. (2014). However, our investigation is focused on a limited subject matter: expressness in communication has been proven through IT tools, questioning, and simplicity in communication.

The most visible effects of IT tools include simplifying the preparation process, gaining access to materials. The same conclusions are contained in the study of (Adams, S. et al, 2017). This enhances the level of cooperation (Keane, T., Keane, W. F., Blicblau, A. S.2016): the educator does not spend time explaining the resources of placement of materials, however, he has the opportunity to spend time explaining the essence of the material.

Conclusions have been also confirmed regarding the increase of students' performance due to the growth in attendance rates of courses, the fulfillment of the objectives of the courses. "Distance learning electronic systems have increased the level of intrinsic motivation" (Benta, D., Bologa, G., Dzitac I., 2015). In fact, the understanding of the need for self-loading of tasks led to the emergence of an internal motive, which centered around understanding the losses: the grade is reduced automatically, the educator will not be able to adjust the grade due to the registration of all students' actions in the system. A certain level of subjectivity in the assessments has been revealed (Barteit, S. et al., 2020).

Herewith, while the study of Chivu, R.-G .; Turlacu, L.-M .; Stoica, I .; Radu, A.V. (2018) has proved the effectiveness of the distance learning platform at HEI, we have identified a negative point in the use of IT tools at HEI: an increase in the burden on the educator due to the need to use numerous IT tools at the same time and the lack of direct contact. The latter often causes the lack of understanding by the educator of students' knowledge level. While Rahman, S, Ramakrishnan, T, Ngamassi, L. (2019), on the one hand, talk about improving the teaching experience through social media at HEI and prove the positive effect of their use (level of satisfaction), we, on the other hand, assess the negative effect of using social media - level of understanding.

It is the integration of tools that gives a positive effect in the educational process (Jain, M. & Tyagi, R., 2017). While Henderson, M., Selwyn, N. & Aston, R. (2017) talk about the lack of transformation, then, in fact, we prove the existence of transformational changes, namely in such processes as communication. As a matter of fact, these changes concern the level of understanding between the educator and the student. Kebble, P.G., (2017) points at the development of communication forms, and he has a case here, because communication becomes more clean-cut, understandable and simple. However, the level of understanding in communication differs. Due to the fact that students often do not provide feedback on educators' responses, educators do not have a clear understanding of how well a student understands the material.

7 CONCLUSION

The conducted study makes it possible to draw a number of conclusions about the intensification of the educational process through the use of IT. The application of IT tools has a number of advantages; however, at the same time it causes an increase in the burden on the educator due to the fact that there has been no complete retreat from traditional ways of organizing the educational process to IT technologies, forcing educators to balance between traditional and innovative teaching models, sometimes doing double work (in order to ensure all forms of reporting and control over teaching the discipline). This is due to the resistance of the majority of teachers, and partly of students concerning the transition to innovative ways of teaching and attracting innovative forms of interaction "teacher / student", due to the lack of direct contact between participants in the pedagogical process.

The conducted experiment showed that the intensification of the educational process through IT tools took place in such areas as: communication, self-monitoring, assessment, preparation of materials, tasks. The most clearly observed improvements are such dimensions of intensification as an increase in the

level of involvement in training (through the attendance of the platform on which the training course is placed); increasing the level of control and responsibility, perception of the importance of the course tasks by students; reduction of time for receiving and searching for materials; reduction of time for preparation of materials by educators; growth of the level of downloading and processing the materials; significant reduction of time for the course and its organization. In the aggregate, the educators' assessment of the intensification of the educational process with application of IT tools was higher compared to students' evaluation. It is noteworthy that the self-assessment of students in the processing of materials and tasks set by educators are higher compared to educators' assessments, which demonstrates a certain level of subjectivity of students in assessing their own educational activities.

The obtained research results can be used in the theoretical generalization of data on the process of enhanced use of IT technologies in higher educational institutions, which is relevant in general for the organization of the modern educational process on a global scale. The relevance of the data obtained is further enhanced by the need to develop effective models of interaction between students and educators in light of spreading Covid-19 and its implications for the educational sector, in particular, the urgent need to learn and teach in the distance learning paradigm, where traditional models of interaction between the subjects of educational activities are completely ineffective. Forasmuch as the questionnaire survey and analysis of data obtained on the basis of statistical indicators of the Moodle platform have confirmed the effectiveness of interactive technologies in intensifying the educational process of higher educational institutions, further experimental investigations and theorization of the results obtained in this area will be appropriate and will contribute to the renewal of higher education, its adaptation to modern conditions of the information globalized era.

REFERENCES

- Adams, S., Cummins, M., Davis, A., Freeman, A., Hall, C., Ananthanarayanan, V. (2017). NMC Horizon Report: 2017 Higher Education Edition. Austin, Texas: The New Media Consortium. Retrieved from <http://cdn.nmc.org/media/2017-nmc-horizon-report-he-EN.pdf>
- Al-Zahrani, A. M. (2015). From passive to active. *British Journal of Educational Technology*, 46, 1133-1148. doi:[10.1111/bjet.12353](https://doi.org/10.1111/bjet.12353)
- Arrosagaray, M., González-Peiteado, M., Pino-Juste, M., Rodríguez-López, B. (2019). A comparative study of Spanish adult students' attitudes to ICT in classroom, blended and distance language learning modes, *Computers & Education*, 134, 31-40, ISSN 0360-1315, <https://doi.org/10.1016/j.compedu.2019.01.016>
- Barteit, S. et al., (2020). Evaluation of e-learning for medical education in low- and middle-income countries: A systematic review, *Computers & Education*, 145, 103726, <https://doi.org/10.1016/j.compedu.2019.103726>, <http://www.sciencedirect.com/science/article/pii/S0360131519302799>
- Benta, D., Bologa, G., Dzitac I. (2014). E-learning Platforms in Higher Education. Case Study, *Procedia Computer Science*, 31, 1170-1176, ISSN 1877-0509, <https://doi.org/10.1016/j.procs.2014.05.373>
- Benta, D., Bologa, G., Dzitac I. (2015). University Level Learning and Teaching via E-Learning Platforms, *Procedia Computer Science*, 55, 1366-1373, ISSN 1877-0509, <https://doi.org/10.1016/j.procs.2015.07.123>.
- Brito, C. D. A., & Nunes, C. P. (2020). The intensification of teaching work in the context of the commercialization of higher education in Brazil. *Journal of Research and Knowledge Spreading*, 1(1), 1-17.

- Chivu, R.-G., Turlacu, L.-M., Stoica, I., Radu, A.V. (2018). Identifying the effectiveness of e-learning platforms among students using Eye-Tracking technology. *Fourth International Conference on Higher Education Advances*, 621-628. Available from: https://www.researchgate.net/publication/326501573_Identifying_the_effectiveness_of_e-learning_platforms_among_students_using_Eye-Tracking_technology [accessed May 02 2020].
- Drake, B. M., Walz, A. (2018). Evolving Business Intelligence and Data Analytics in Higher Education. *New Directions for Institutional Research*, 39-52. doi:[10.1002/ir.20266](https://doi.org/10.1002/ir.20266)
- Dias, A. F., Cardoso, H. de M., Santos, A. L. dos, Menezes, C. A. A., & Rios, P. P. S. (2017). Schooling and subversions of gender. *Revista Tempos e Espaços em Educação*, 10(22), 83-92.
- Ebrahimi, M. A. (2020). Cultural value of translation of proverbs and synopsis. *Journal of Research and Knowledge Spreading*, 1(1), 1-10.
- Fullagar, S. (2019). A physical cultural studies perspective on physical (in)activity and health inequalities: the biopolitics of body practices and embodied movement. *Revista Tempos e Espaços em Educação*, 12(28), 63-76.
- Georgieva-Tsaneva, G., Bogdanova, G., Negoslav Subev, N. (2017). Characteristics of Interactivity and Using the Interactive Technologies in System North+. Digital Presentation and Preservation of Cultural and Scientific Heritage. Conference Proceedings. Vol. 7, Sofia, Bulgaria: Institute of Mathematics and Informatics – BAS, 133-142.
- Ghanbarzadeh, R. and Ghapanchi, A.H. (2018). Investigating various application areas of three-dimensional virtual worlds for higher education. *British Journal of Educational Technology*, 49: 370-384. doi:[10.1111/bjet.12538](https://doi.org/10.1111/bjet.12538)
- Henderson, M., Selwyn, N., Aston, R. (2017). What works and why? Student perceptions of 'useful' digital technology in university teaching and learning. *Studies in Higher Education*, 42(8), 1567-1579. doi: <https://dx.doi.org/10.1080/03075079.2015.1007946>
- Jain, M., Tyagi, R. (2017). Education standard can be improved by integrating. ICT in Education. *International Education & Research Journal*, 3(10), 77-80. Available from: <http://ierj.in/journal/index.php/ierj/article/view/1452/1383>
- Keane, T., Keane, W. F., Blicblau, A. S. (2016). Beyond traditional literacy: Learning and transformative practices using ICT. *Education and Information Technologies*, 21(4), 769-781. doi: <https://dx.doi.org.ezproxy.uned.es/10.1007/s10639-014-9353-5>
- Kebble, P.G. (2017). Assessing Online Asynchronous Communication Strategies Designed to Enhance Large Student Cohort Engagement and Foster a Community of Learning. *Journal of Education and Training Studies*, 5(8), 92-100. doi: <https://doi.org/10.11114/jets.v5i8.2539>
- Lytras, M., Sarirete, A., Damiani, E. (2020). Technology-enhanced learning research in higher education: A transformative education primer, *Computers in Human Behavior*, 109, 106350, ISSN 0747-5632, <https://doi.org/10.1016/j.chb.2020.106350>
- Moreno, V., Cavazotte F., Cavazotte, F., Alves I. (2016). Explaining university students' effective use of e-learning platforms: Effective use of e-learning platforms. *British Journal of Educational Technology*, 48(4), DOI: 10.1111/bjet.12469
- Pérez-delHoyo, R, Mora, H, Martí-Ciriquíán, P, Pertegal-Felices, ML, Mollá-Sirvent, R. (2020). Introducing innovative technologies in higher education: An experience in using geographic information

- systems for the teaching-learning process. *Comput Appl Eng Educ*, 1– 18. <https://doi.org/10.1002/cae.22287>
- Pino, S., Mora, C., Diaz, A., Guarnizo, P., Jaimes, D. (2017). Improving skills in pediatric rheumatology in Colombia: A combined educational strategy supported by ILAR. *Clinical Rheumatology*, 36 (7), 1631-1635, 10.1007/s10067-016-3294-x
- Póljanowicz W. et al. (2011). The effectiveness of education with the use of e-learning platform at the Faculty of Health Sciences, *Medical University of Bialystok. Studies in logic, grammar and rhetoric*, 25 (38), 159-172.
- Rahman, S, Ramakrishnan, T, Ngamassi, L. (2019). Impact of social media use on student satisfaction in Higher Education. *Higher Education Quality*, 00, 1– 16. <https://doi.org/10.1111/hequ.12228>
- Rolim, C. and Isaias, P. (2019). Examining the use of e-assessment in higher education: teachers and students' viewpoints. *British Journal of Educational Technology*, 50, 1785-1800. doi:[10.1111/bjet.12669](https://doi.org/10.1111/bjet.12669)
- Rowan-Kenyon, H.T., Martínez Alemán, A.M., Gin, K., Blakeley, B., Gismondi, A., Lewis, J., McCready, A., Zepp, D. and Knight, S. (2016). Social Media in Higher Education. *ASHE High. Edu. Rept.*, 42, 7-128. doi:[10.1002/aehe.20103](https://doi.org/10.1002/aehe.20103)
- Santos, I. T. R., Barreto, D. A. B., & Soares, C. V. C. O. (2020). Formative assessment in the classroom: the dialogue between teachers and students. *Journal of Research and Knowledge Spreading*, 1(1), 1-14.
- Serrano, D. R., Dea-Ayuela, M. A., Gonzalez-Burgos, E., Serrano-Gil, A., Lalatsa, A. (2019). Technology-enhanced learning in higher education: How to enhance student engagement through blended learning. *European Journal of Education*, 54, 273– 286. <https://doi.org/10.1111/ejed.12330>
- Stewart, C., Wolodko, B. (2016). University Educator Mindsets: How Might Adult Constructive-Developmental Theory Support Design of Adaptive Learning?. *Mind, Brain, and Education*, 10, 247-255. doi:[10.1111/mbe.12126](https://doi.org/10.1111/mbe.12126)
- Subhash, S., Cudney, E. A. (2018). Gamified learning in higher education: A systematic review of the literature, *Computers in Human Behavior*, 87, 192-206, ISSN 0747-5632, <https://doi.org/10.1016/j.chb.2018.05.028>.
- Sysoieva, S., O., Osadcha, K. P. (2019). The state, technology and perspectives of distance learning in higher education in Ukraine. *Information Technology and Learning Tools: Specialized Electronic Scientific Edition*, 70 (2). 271-284. ISSN 2076-8184
- Yang, G., Xiang, H., & Chun, L. (2018). CSL teachers' cognition in teaching intercultural communicative competence. *System*. doi:10.1016/j.system.2018.09.009
- Yaroshenko T. (2019). Distance learning in higher education: current trends. *Engineering and Educational Technologies*, 7 (4), 8-21.
- Younie, S., & Leask, M. (2013). Implementing learning platforms in schools and universities: lessons from England and Wales. *Technology, Pedagogy and Education*, 22(2), 247–266. doi:10.1080/1475939x.2013.802118
- Zhu, E. (2017), Breaking Down Barriers to the Use of Technology for Teaching in Higher Education. *To Improve the Academy*, 26, 305-318. doi:[10.1002/j.2334-4822.2008.tb00516.x](https://doi.org/10.1002/j.2334-4822.2008.tb00516.x)

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