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DOI: 10.34866/mxk2-1j54

Online learning versus practical skills: the role of engagement in distance learning

Nauka online a umiejętności praktyczne: rola zaangażowania w kształcenie na odległość

Słowa kluczowe: uczenie się online, uczenie się przez całe życie, awaryjne zdalne uczenie się, trening umiejętności praktycznych, zaangażowanie w zdalne uczenie się.

Streszczenie: Obecnie kluczowym wyzwaniem w nauczaniu online jest przygotowanie uczniów do rozwijania umiejętności praktycznego zastosowania zdobytej wiedzy. Celem artykułu jest ukazanie znaczenia tych umiejętności podczas studiowania zdalnego oraz przedstawienie wyników badań dotyczących wpływu umiejętności praktycznego zastosowania umiejętności aplikacyjnych studentów na efekty kształcenia zdalnego, z uwzględnieniem ich zaangażowania w kształcenie na odległość. Aby wyjaśnić tę kwestię, przeprowadzono badanie empiryczne z wykorzystaniem kwestionariusza ankiety. W badaniu wzięły udział 1883 osoby z różnych uniwersytetów w czterech krajach o różnych kulturach. Nasze badania dostarczają przydatnych rekomendacji i spostrzeżeń dla środowisk akademickich, w tym tego, w jaki sposób nauczyciele powinni zachęcać uczniów do zwiększania poziomu zaangażowania w proces zdalnego nauczania i stosowania zdobytej wiedzy w praktyce. Wyniki tego badania potwierdzają, że skuteczna nauka zdalna wymaga zarówno aktywnego wykorzystania zdobytej wiedzy, jak i wysokiego poziomu zaangażowania w proces uczenia się.

Key words: online learning, lifelong learning, emergency remote learning, practical skills training, engagement in remote learning.

Abstract: Currently, a key challenge in online learning is to prepare students to develop skills for the practical application of acquired knowledge. The aim of this article is to demonstrate the importance of those skills during remote learning and present the results of a study on the impact of students' practical application skills on remote learning outcomes, taking into account their involvement in distance learning. To clarify this issue, an empirical study was conducted using a survey questionnaire. A total of 1,883 people from different universities in four countries were surveyed. Our research provides useful recommendations and insights for academia,

including how teachers should encourage students to increase their level of engagement in the remote learning process and apply the knowledge gained in practice. The results of this study confirm that successful remote learning requires both active use of the acquired knowledge and a high level of engagement in the learning process.

Introduction

Online learning is now an essential part of the modern educational system at all levels, including continuing education. With the rapid development of communication and information technologies, online learning has not only become an alternative to traditional education methods, but also an essential tool in situations where face-to-face learning is not possible, such as during the global COVID-19 pandemic (Abbasnejad, 2023). With access to a variety of learning resources and remote learning platforms, learners have the opportunity to acquire knowledge regardless of location, hours and time constraints. However, a key challenge for online learning is ensuring the effectiveness of converting acquired knowledge into practical skills that are applicable to real-world work (Tsai, 2020) and life situations (Herdan and Stuss, 2019).

The increasing demand for workers with varying levels of educational achievement as a result of technological progress and economic development will force them to continually expand their skills and competencies throughout their careers (Chłoń-Domińczak et al., 2016). The value of the concept of Lifelong Learning, both in the context of formal and informal education, tends to increase (Buchowicz, 2020, pp. 2–7). The contemporary economy, faced with dynamic transformations resulting from globalization, imposes significant challenges on societies that are forced to constantly update their knowledge and change their attitudes towards entrepreneurship, flexibility and creativity. The required competencies in the contemporary labor market include mobility and adaptability, which are often shaped on the basis of the lifelong learning model, as described by B. Urbaniak (2010, pp. 16–17).

During the COVID-19 pandemic, the significant increase in the use of ICT in the learning process and the focus of academics on the quality of the process have led them to take a greater interest in the concept of active student learning (Adedoyin et al., 2020, pp. 863–875). Active learning engages students effectively, which translates into their ability to achieve better learning outcomes. This is the result of a better understanding of their own learning and comprehensive preparation for continuing education and future careers (Visuddho, 2023).

One of the effective learning strategies with the possibility of using online learning, in which individuals are responsible for setting their own individual learning goals, monitoring their progress and controlling their motivation, behavior and cognitive functions is self-regulated learning (SRL) (Bandura, 2001; Pintrich, 2004; Dresel et al., 2015; Russo et al., 2021). This strategy is geared towards the need for students to

develop a variety of skills (Hoang et al., 2021), including planning, idea generation, self-assessment, self-monitoring and reflection. Using this learning strategy with an online platform can help learners meet their individual needs by offering a greater degree of autonomy and flexibility, allowing them to adapt their pace of learning to their abilities (Bernard et al., 2014; Chen et al., 2014; Means et al., 2013; Potter, 2015).

Recent research findings in the literature on the issues of online learning (Kumar et al., 2019; Jack and Moules, 2020; Xhaferi and Xhaferi, 2020, Krzyżak and Walas-Trębacz, 2021), practical knowledge use (Hoang et al., 2021; Harsch et al., 2021; Ji et al., 2022; Visuddho, 2023) and student engagement in remote learning (Ryan and Deci, 2020; Hiver et al., 2021; Zhang et al., 2021) reveal a number of significant issues. A review of the literature provides a basis for identifying the research gap in terms of the impact of the formation of practical application skills on learning outcomes, taking into account the role of engagement in remote studying.

This article aims to present the results of a study on the relationship between the formation of skills for the practical application of knowledge during online learning and outcomes in the process of remote education, taking into account the influence of the level of involvement in remote studying as a mediator. For this objective, four research hypotheses were adopted, which were verified in their research. The study was conducted with 1,883 respondents from various universities in Poland and abroad, including India, Indonesia and the UK.

This study consists of four parts. The first section explains the theoretical aspects of the benefits and challenges of online learning in the context of developing practical knowledge skills and the role of engagement in the remote learning process. The second section presents the research methodology. The next section shows the results of the empirical research. At the end of the article, there is a discussion and conclusions section, that presents the contributions of the main study and recommendations for remote instructors.

Literature review

Benefits and challenges of online learning in the context of developing practical knowledge skills

Currently, the higher education system is constantly changing and educational institutions are obliged to adapt to the changing needs, expectations and demands of students. Consequently, information technology and e-learning platforms are key determinants of higher education institutions (Jensen, 2019). These institutions are steadily increasing their investments in online infrastructure, including e-learning systems and tools. However, in the digital age, a significant challenge that educational institutions must address is the harmonious integration of innovative e-learning systems to effectively enhance and support learning processes (Coman et al., 2020, pp. 1–22).

Online learning is a widely used practice in higher education to complement, enrich and in some cases, replace traditional 'face-to-face' learning (Hollyhead et al., 2012; Whitaker et al., 2016). In order to ensure continuity of teaching, online learning can be introduced entirely in the event of factors beyond the control of the university, so-called external factors such as pandemics (Jack and Moules, 2020), natural disasters, major sporting events (Olympic Games) (Bick et al., 2020; Bayham and Fenihel, 2020) and when universities are challenged to adapt their curricula due to changing learning environments (i.e., creating new materials, adapting curricula and learning content to enable dynamic interactions between teachers, students with topics and settings) (Zhang et al., 2014, p.253; Debarger et al., 2017, p. 67). Some researchers have suggested that online education may overtake traditional education, just as e-commerce may soon overtake traditional commerce (Kumar et al., 2019, p. 33). However, when creating and adapting curricula (including learning objectives, learning content, teaching strategies, teaching conditions and student behavioral needs) for online learning, it is important to keep in mind the learning needs of students and the possibility of adapting learning activities to online learning by enabling students to acquire equivalent knowledge and develop equivalent practical skills that can be obtained by studying in university buildings (Wladis et al., 2017; Kumar et al., 2019), for example, promoting inquiry-based learning during online learning (Debarger, 2017; Trott et al., 2019).

C. Cheung and J. Cable identified and accurately described the eight principles underlying effective online learning. These principles include (Cheung and Cable, 2017, pp. 1–16): (1) encouraging student-teacher interaction, (2) collaborative learning, (3) immediate feedback, (4) active learning methods, (5) motivating learners to engage in longer task sessions, (6) high expectations–communication of clear expectations from the teacher to inspire and stimulate student motivation, (7) differentiated learning strategies and (8) effective use of information technology.

The above principles set the foundations for effective online learning, helping create a learning environment conducive to effective distance learning.

Today, in the face of dynamic changes in the global labor market, practical skills play a key role in the effective functioning of individuals and organizations. They influence employees efficiency, innovation and adaptability. Students with well-developed practical skills can solve problems, make good decisions and quickly and effectively achieve objectives. Those who can to apply knowledge in practice are more likely to experiment, propose new solutions and create innovative strategies. Moreover, the ability to adapt quickly to new situations is crucial in a changing business environment.

Online learning, by providing access to learning resources including interactive materials, interactions and virtual laboratories, allows students to develop the ability to put knowledge into practice. Students in virtual laboratories can conduct research in a safe and controlled environment, which is particularly valuable in

scientific and engineering research. Online learning is particularly effective in developing technical skills such as programming, graphic design, 3D modeling or sound processing.

On the other hand, virtual learning platforms often provide opportunities for collaboration in class, exchange ideas and lead discussions (Harsch et al., 2021). This, in turn, develops communication skills, which are important both in the work environment and private life. Online language courses enable the development of language skills through interactive lessons, pronunciation exercises and virtual conversations (Bolliger and Martin, 2018; Ji et al., 2022). Many learning platforms offer courses for the development of soft skills such as leadership, interpersonal communication or conflict resolution.

Online learning requires a high degree of self-discipline and time management skills (Krzyżak and Walas-Trębacz, 2021). Therefore, learners have the opportunity to develop the ability to plan their own learning or organizational skills.

In conclusion, it is important to emphasize that online learning, in the context of the formation of transferable skills, brings both benefits and challenges.

The benefits of online learning in the context of developing skills for the practical application of knowledge include (Xhaferi and Xhaferi, 2020, pp. 86–103; Potera, 2021, pp. 19–22):

1. Access to a variety of learning resources: Remote learning platforms offer a wide range of learning resources, including multimedia presentations, videos, e-books and interactive assignments, which can help learners understand and assimilate knowledge.
2. Individualization of learning: Online learning allows the pace of learning to be individually adapted to the needs and preferences of each learner. They can repeat the material that they are struggling with or accelerating their knowledge in areas where they are already advanced.
3. Active learner engagement: Remote learning platforms can offer a variety of tools such as quizzes, interactive tasks and projects that encourage learners to actively participate in the learning process.

However, there are also challenges that may hinder the development of practice skills in online learning (Potera, 2021, pp. 19–22; Xhaferi and Xhaferi, 2020, pp. 86–103):

1. Lack of face-to-face interaction: Online learning limits face-to-face interactions between teachers and learners, which can affect the quality of feedback and support for learning.
2. Lack of real-life practical situations: Often, online learning does not provide the opportunity to directly apply the knowledge gained in real-life situations, which can limit the opportunities to develop practical application skills.
3. Self-discipline and motivation: Online learners must to be more self-disciplined and responsible for their own learning processes, which can be challenging for some.

In the context of e-learning in higher education, it can generally be concluded that the literature provides results that support its usefulness, effectiveness and positive impact on student achievement. According to a study on the impact of e-learning on learners and teachers (Burac et al., 2019, pp. 1–8), the majority of teachers surveyed expressed confidence in the potential of e-learning to improve their learning process. The researchers confirmed that e-learning contributes to improved collaboration and communication with students and provides flexibility, enabling students to better understand lectures. When analyzing students' attitudes towards e-learning, K. Dookhan stated that their attitudes were favorable and improved, especially when they noticed the availability of e-learning systems (Odit-Dookhan, 2018, pp. 628–643). Another study (Lochner et al., 2016, pp. 69–74), it was found that the use of e-learning as a complementary form of learning to traditional classes contributed to students' learning experiences and engagement in lecture classes. A comparative analysis between traditional and online learning (Alsaaty et al., 2016, p. 31) found that although a significant number of students surveyed felt that they assimilated content better in face-to-face classes than online ones, they rated the online learning experience positively overall, despite the difficulties encountered in using e-learning platforms.

Nevertheless, while most studies emphasize a favorable attitude towards e-learning, analogous studies have shown that students express the belief that remote classes do not achieve the same value as classroom instruction. In addition, students seem more likely to accept hybrid learning, including both online and face-to-face classes, than online learning alone (Krzyżak and Walas-Trębacz, 2021, pp. 207–216).

Engagement in remote study

Student engagement is critical to the success of any educational process and engagement in the remote learning process plays an important role in developing the ability to put knowledge into practice. M. Bower (2019) found that studies on engagement in technology-enhanced learning environments are of increasing interest. Engagement refers to active participation, emotional involvement and pursuit of learning goals (Hiver et al., 2021). Research has shown that students who demonstrate higher levels of engagement in the remote learning process perform better academically and develop stronger skills in the practical application of knowledge (Bolliger and Martin, 2018; Zhang et al., 2021).

The self-determination theory (SDT) developed by E.L. Deci and R.M. Ryan (2020, pp. 1–7), is an important source of knowledge regarding the mechanism of building adult learning motivation, taking into account individual preferences. According to Deci and Ryan's proposal, human beings have the capacity and the right conditions to be active in their environment. Sources of this capacity can be found both within the individual and in the surrounding environment in which he or she functions. Within this theory, man is seen as an entity capable of self-regulation, constituting

a system capable of self-development by integrating long-term functioning. Humans demonstrate the ability to make autonomous and informed decisions on issues relevant to their lives, including areas related to personal development.

Longstanding observations and research by E.L. Deci and R.M. Ryan demonstrate that three key needs have a significant impact on the level of task engagement in the learning process. These needs include autonomy, competence and relationships with others (Ryan et al., 2019, pp. 89–110). Satisfying the aforementioned needs creates conditions for effective functioning, which focuses on taking an active role and maintaining it, even in the face of the challenges encountered (Deci et al., 1991, p. 326).

The need for autonomy refers to the belief in one's own independence as a source of action and the ability to make independent choices based on bounded rationality driven by personal interests, beliefs and needs (Ryan and Deci, 2020, p.1). Teacher activities that support learner autonomy can include initiatives that build students' sense of control over their own learning, especially in the context of online learning, where adult students can to manage their learning time independently.

The need for competence means striving to achieve important results for the learners. This need inspires students to actively participate in the learning process, seek development and improvement and build pride in their educational achievements. This is related to the innate need to feel proficient and effective in performance (Ryan et al., 2019, pp. 89–110). In online learning, adult students feel more competent when they can engage in tasks with varying levels of difficulty, allowing them to develop their practical skills. Teachers' behaviors to support the need for competence may include: adequate online learning and student support, discussing and setting achievable goals with students, organizing tasks using a variety of learning methods that develop new skills, or providing regular feedback (Ryan and Deci, 2020, pp. 1–7). According to R.M. Ryan and E.L. Deci (Deci et al., 1991, p. 4), developing a sense of competence contributes to the development of a strong sense of autonomy, reduces feelings of interdependence, and enhances inner confidence in decision-making.

Relationships must focus on the extent and intensity of interactions with other people. It includes emotional attachment and shared experiences of care, respect and interests. This need can be strongly correlated with the need for autonomy and negatively impacts a sense of dependence, especially in the context of distance education. Teachers' behaviors that foster the need for relationships with others include promoting teamwork, developing mutual respect, building trust with other group members and supporting the achievement of group goals (Ryan et al., 2019, pp. 89–110).

In summary, engagement in remote study can be stimulated through the following activities (Ryan and Deci, 2020, pp. 2–7):

1. Understanding learning objectives. Clearly defined learning objectives and the benefits of acquiring knowledge and skills can motivate learners to become more actively involved in the learning process. However, real motivation to learn can only exist when learners initiate and sustain their participation in learning activities. This is only possible when the learning activity is recognized as valuable (Park and Choi, 2009, pp. 207–217) and the learner is empowered, which takes responsibility for his or her own learning and has the ability to consciously plan, maintain and evaluate his or her own learning (Harsch et al., 2021).
2. Interaction between teachers and other learners. The ability to interact with teachers and other learners on remote learning platforms enables discussions, knowledge sharing and gaining support for learning.
3. Diversification of learning methods. The use of various learning methods, such as interactive exercises, group projects and online debates, can encourage learners to actively participate in the learning process.
4. Readiness for online learning. This term was explained by Warner et al. (1998). It encompasses students' preferences for different forms of learning, their confidence in the learning environment and their ability to engage in learning.

Research methodology

Research objectives and hypotheses

The adopted research methodology adopted does not differ from that presented in the literature and is used in the study of social science problems (Apanowicz, 2005; Czakon, 2015; Sułkowski et al., 2021). The social sciences, by their very nature, are practical and largely refer to empirical research (Januszkiewicz, 2016). The research methodology has been adapted to the subject matter discussed in this article and includes several steps to achieve the research objective (Van de Ven and Johnson, 2006; Kreamer et al., 2023). The research process was conducted in three main stages: conceptual, empirical and deductive (Sułkowski et al., 2021, p. 26).

The first stage of the research process involved conducting a review of Polish and foreign literature using four publicly available databases: EBSCO, Scopus, Web of Science and Emerald. A literature review is the basis for formulating the research problems for which an answer is sought. The stated objective and proposed research problems determine further stages of the research procedure (Zdonek and Hysa, 2017; Sułkowski et al., 2021, p. 49). The literature review conduct three issues (the focus of the research): online learning, skills for the practical application of knowledge and engagement in remote studying. The primary research method in this phase was the analysis of the available research papers in leading Polish and foreign journals. This analysis made it possible to determine the type of research problems addressed so far by different authors and to identify the existing research gap in the field of the formation of skills for practical use of knowledge in the

context of online education (Babbie, 2005; Czakon, 2015) and to determine the form of the theoretical construct (Dyduch, 2020).

An extremely important element in conducting research is to clearly define its purpose. The research objectives illustrate the intended outcomes and help to answer specific questions posed by the researcher (Sułkowski et al., 2021). The following objectives were addressed in this study (Babbie, 2005):

1. Exploratory: An analysis of the relationship between the formation of skills for the practical application of knowledge in the context of online learning and the remote learning outcomes achieved, influenced by the mediating factor of the level of engagement with e-learning (Figure 1).
2. Methodological: The creation and verification of a theoretical model of the relationship between the ability to use knowledge in practice in the context of online learning and remote learning outcomes.
3. Practical (application): Developing conclusions and recommendations for practitioners in higher education regarding the implementation of effective solutions to support the formation of skills for the practical application of knowledge in online learning systems and thus, in raising the level of achieved results using remote learning.

In the next stage, with a defined subject and research objective, specific research questions are summarized (Czakon, 2015; Sułkowski et al., 2021):

1. Does students' engagement in remote learning mediate the relationship between the formation of skills for practical application of knowledge during remote activities and remote learning outcomes?
2. Does cultural context moderate the relationship between the formation of practical skills in remote classes and remote learning outcomes?

The result of the literature analysis is to propose hypotheses (Sułkowski et al., 2021), which will be verified in empirical studies:

H1: Shaping the ability to put knowledge into practice during remote activities positively influences student engagement with remote learning.
H2: Student engagement has a positive impact on remote learning outcomes.
H3: Student engagement in remote learning mediates the relationship between practical skill formation and remote-learning outcomes.
H4: Different cultural contexts such as Eastern Europe, Western Europe and Southeast Asia may have different expectations and preferences for the formation of practical skills in the remote learning process, which may affect remote learning outcomes.

A research model (Sułkowski et al., pp. 82–83; p. 228) was developed to conduct this research and verify the hypotheses (see Figure 1). The research model is the result of the operationalization of a theoretical construct.

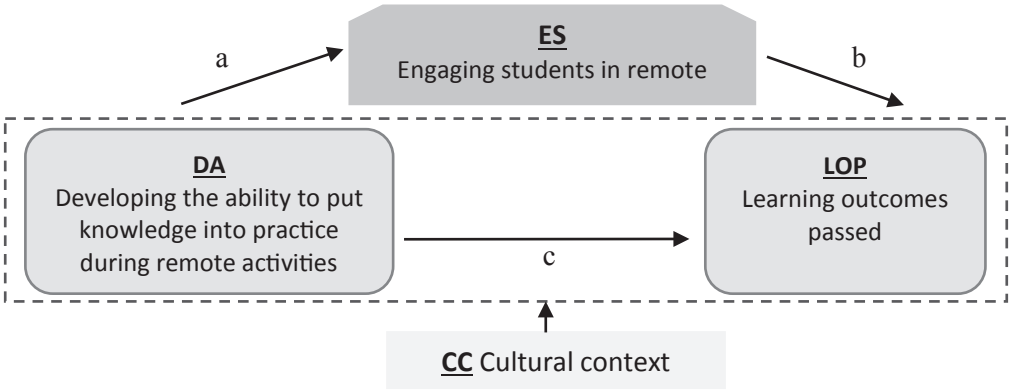

Fig. 1. DA-ES-LOP research model

Source: Own study.

Validation of the hypotheses will contribute to obtaining more detailed knowledge of the mechanisms that explain the impact of the formation of practical skills during remote classes on remote learning outcomes by engaging students in remote learning. This may have important implications for the design of remote learning processes and development of strategies that promote student engagement in remote learning.

Research tools

In the conceptualization stage, an important task is to prepare a research tool (Sułkowski et al., p. 27). Defining the objectives, research problems and research hypotheses allows for the selection of an appropriate research tool (Collis and Hussey, 2013; Czakon, 2015). To verify the adopted hypotheses and answer the research questions posed, the diagnostic survey method was chosen to conduct the research, which allowed us to collect information regarding the phenomenon of interest to the researcher to study the views and beliefs of respondents and their state of knowledge, and a survey questionnaire was used to collect information (Matejun, 2016; Januszkiewicz, 2016).

The second part of the research involved the implementation of a survey (Sułkowski et al., 2021, p. 27). The survey questionnaire developed by the team of employees of The Cracow University of Economics was verified in terms of the correctness of the questions posed by means of a pilot study using interviews with social science experts. The suggestions made by the experts on some questions helped improve the research instrument (survey questionnaire). The improved version of the questionnaire was used in the framework of proper research, which is quantitative in nature.

The main survey was conducted between December 15, 2021 and July 13, 2022. A computer-assisted web interview (CAWI) technique was used to elicit responses from the respondents using the Google Forms application. The study sample was purposively selected. The questions were aimed at students from different countries and focused on identifying the relevant factors affecting the quality of the remote study process during the prevailing COVID-19 pandemic. The structure of the questionnaire included nine questions identifying the characteristics of the study participants and 17 specific questions that addressed different aspects related to the remote study experience. Participation in the study was completely voluntary and anonymous. Respondents agreed to express their views on the benefits, challenges and expectations of the remote-learning process during the pandemic.

This study focuses on selected aspects of an extensive research project.

The third part of the research process (deductive application) involved the statistical analysis of the results obtained (Stopher, 2012; George et al., 2016; Sułkowski et al., 2021) collected through the questionnaire. Statistical analysis was performed using Statistica PL 13.3 package. Linear regression was used to assess the degree of interdependence of the analyzed variables (Varian, 2014; George et al., 2016, p. 22; Sulkowski et al., 2021, p. 230). Dummy variables were used in the regression for different combinations of variables, allowing interaction effects to be included in the regression model (George et al., 2016). In the next step, based on the results obtained, conclusions (Sułkowski et al., 2021, p. 254–264) and recommendations were formulated in the context of the research problems posed and the adopted research hypotheses (Flick, 2020), and further directions for empirical research were indicated (Sułkowski et al., 2021).

Characteristics of the participant groups studied

The research sample consisted of students from different levels of education, forms of study, and majors and years of study. A total of 1,883 students from Poland, India, Indonesia and the UK participated in this study.

The structure of the participants is shown in Table 1, in which nine key criteria were used to divide the respondents.

A clear distribution according to the distinguishing criteria is noticeable in the analysis of the research sample of 1883 students, a clear distribution according to the distinguished criteria is noticeable, as shown in Table 1. The highest representation was found in the following groups: female (60.4%), full-time students (75.8%), first-year students (43.3%), those studying at Polish universities (62.7%), those with a laptop as the main tool for remote learning (75.5%), those with exclusive access to the equipment necessary for remote education (87.4%), and those attending remote classes of more than 75% in the last semester (80.4%).

Table 1. Characteristics of the respondents surveyed according to different breakdown criteria

Parameter		n	%	Parameters		n	%
1. Sex	Women	1138	60.44%	6. Professional work outside studies	No work	903	47.96%
	Men	745	39.56%		Casual work	548	29.10%
2. Age	18–19 years old	518	27.51%		Full-time work	409	21.72%
	20–22 years	897	47.64%		Other forms of work	23	1.22%
	23–24 years old	280	14.87%	7. Attendance at remote classes during the last semester	Attendance up to 25%	25	1.33%
	Over 24 years	188	9.98%		Attendance 25–50%	69	3.66%
3. Year of study	Little study experience (first year of study)	815	43.28%		Attendance 51–75%	276	14.66%
	Intermediate study experience (2nd year of study)	538	28.57%		Attendance above 75%	1513	80.35%
	Extensive study experience (3rd and 4th year of study)	530	28.15%	8. Equipment for remote learning	Exclusive equipment	1646	87.41%
4. Form of study	Full-time studies	1427	75.78%		Equipment shared with others	237	12.59%
	part-time studies	456	24.22%	9. Type of equipment used as primary during remote learning	desktop computer	206	10.94%
5. University	Poland	1180	62.67%		laptop	1421	75.46%
	India	154	8.18%		tablet	101	5.36%
	Indonesia	307	16.30%		smartphone	155	8.23%
	UK	242	12.85%				

Source: Own elaboration based on results from empirical studies.

Research findings

The data obtained from the surveys allowed the statistical analysis to be conducted using the research model presented (see Figure 1). The first step of the statistical analyses was to obtain detailed information regarding the

characteristics and distributions of the studied variables of the DA-ES-LOP model in the analyzed dataset. Table 2 presents the detailed descriptive statistics of the variables studied.

Table 2. Descriptive statistics of the DA, ES and LOP variables

Parameter	N	Average	SD	Median	Min	Max	Q1	Q3
DA	1883	3.01	0.96	3	1	5	2	4
ES	1883	2.76	1.03	3	1	5	2	3
LOP	1876	3.15	1.09	3	1	5	2	4

SD – standard deviation, Q1 – lower quartile, Q3 – upper quartile
Source: Own elaboration based on empirical findings

Based on the results of the statistical analysis in Table 2 for the three analyzed variables DA, ES, and LOP, it can be seen that all these variables have a median value of 3. This means that the median value was close to the mean value of these variables. Therefore, it can be assumed that most students rated the formation of practical skills during remote classes (DA) at a medium level. A median value of 3 for ES indicates that there is a balance between those who are more involved and those who are less involved in remote studying. In contrast, according to the majority of respondents, online learning enables a similar level of learning outcomes (median LOP=3) as face-to-face learning.

The mean value of the standard deviation for the DA variable (0.96) indicated a moderate degree of variability in evaluations regarding the formation of practical skills. This means that participants' opinions are relatively diverse, but do not show large deviations from the mean. The higher standard deviation value for ES (1.03) compared with DA may indicate a higher degree of variability in the evaluations of engagement in remote studies. The higher standard deviation of LOP (1.09) may suggest a slightly higher variability in the perception of remote learning effects among the study participants.

The Q1 and Q3 quartile values showed that most of the values for each variable fell between the first and third quartiles. The ES variable had a slightly lower Q3 than the other variables, suggesting slightly less variation at the top of the distribution.

The next step in the statistical analysis was to verify the assumption of the mediating role of student engagement in remote learning (ES) in the relationship between the formation of practical skills during remote activities (DA) and remote learning outcomes (LOP). The methodology proposed by R.M. Baron and D.A. Kenny (1986) was used to determine whether a variable played a mediating role (in this case, student engagement in remote learning). Kenny (1986). Statistical analysis was conducted to examine the significance of the different pathways: a, b and c (see Figure 2).

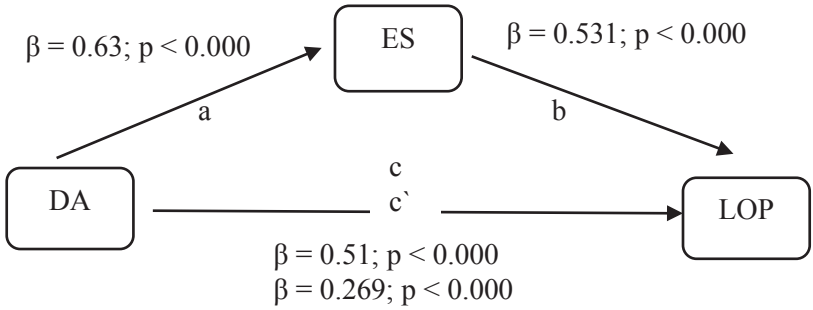

Fig. 2. A model of the mediating role of student engagement in remote learning between the formation of practical skills during remote classes and remote learning outcomes

Source: Compilation based on survey results.

These measurements were performed using regression analysis in three successive steps. The first step tested whether the relationship between the independent variable (DA) and dependent variable (LOP) was statistically significant (path c). The second step was to determine whether the relationship between the independent variable (DA) and the mediator (ES) (path a) and the mediator (ES) and the dependent variable (LOP) (path b) were statistically significant. The third step was to test whether the relationship between the independent and dependent variables weakened when a mediator was introduced into the regression model (path c').

The results in Figure 2 indicate that both the independent variable DA and the mediator ES are significantly and positively related to remote learning outcomes (LOP). Therefore, it can be assumed that both the development of practical skills during remote classes and students' involvement in the remote learning process contribute to better distance learning outcomes. In a model that included both an independent variable (DA) and a mediator (ES) (path c'), the role of developing practical skills during remote classes decreased (β= 0.269), while retaining a level of statistical significance, while student engagement in remote learning was strongly associated with remote learning outcomes (β = 0.531).

Confidence intervals (CIs) were determined to assess the statistical significance of the relationship between the study variables and confirm confidence in the range within which the calculated parameter values lie. At the 95% confidence level, one can be sure that the parameter value (β=0.51) of the influence of practical skills formation (DA) on remote learning outcomes (LOP) is between 0.464 and 0.555. This result is statistically significant; therefore, it can be concluded that practical skill formation has a significant and measurable influence on remote learning outcomes. The regression coefficient for the independent variable DA equal to 0.51 also indicates that there is a positive impact of the formation of practical skills during remote classes on remote learning outcomes (see Table 3).

Table 3. Simple linear regression model of the effect of practical skills formation during remote classes on remote learning outcomes

DA →LOP (live report)

N=1876

Feature	Parameter	95%CI		P	R^2=0.20324894
DA	0.51	0.464	0.555	<0.000 *	

* Statistically significant relationship (p<0.05).

Source: Own elaboration based on empirical findings.

The results presented in Table 4 indicate that with confidence, the 95% parameter value (β=0.63) of the effect of practical skill formation (DA) on students' engagement in remote learning (ES) ranged from 0.589 to 0.667. The regression coefficient for the independent variable DA of 0.63 means that there is a positive and statistically significant relationship between practical skill formation during remote classes and students' engagement in remote learning.

Table 4. Simple linear regression model of the effect of practical skills formation during remote classes on students' commitment to remote learning

DA →ES (per mediator)

N=1883

Feature	Parameter	95%CI		p	R^2=0.34477550
DA	0.63	0.589	0.667	<0.000 *	

* Statistically significant relationship (p<0.05).

Source: own elaboration based on empirical findings

The regression coefficient for the mediator ES had a value of 0.531, suggesting a positive and statistically significant relationship between student engagement in remote learning and remote learning outcomes (see Figure 2). Owing to the statistical significance of the results, it can be assumed that student engagement has a measurable and significant impact on remote learning outcomes.

The multivariate linear regression model, showing the effect of two independent variables, namely, the formation of practical skills during remote classes (DA) and engagement in remote learning (ES), on remote learning outcomes (LOP), was statistically significant. The value of the standardized parameter for DA was statistically significant. This means that engagement (ES) did not fully take over the 'explanatory role' of the dependent variable (LOP); therefore, we do not have total mediation (see Table 5).

Table 5. Multivariate linear regression model of the impact of practical skills formation during remote classes and student engagement in remote learning on remote learning outcomes

DA+mediator→LOP

N=1876

Feature	Parameter	95%CI		p	R^2=0.28961320
DA	0.269	0.215	0.322	<0.000 *	
ES	0.384	0.334	0.434	<0.000 *	

* Statistically significant relationship (p<0.05).

Source: own elaboration based on empirical findings.

The value of the coefficient of determination (R^2) in the DA+mediator →LOP model was higher than that in the DA →LOP model, indicating a direct relationship; therefore, partial mediation can be assumed to exist. Furthermore, the value of the Sobel test was statistically significant (z=9.41890415; p<0.001), thus confirming the partial mediating role of remote learning engagement in the influence of practical skill formation during remote classes on remote learning outcomes.

In the next analysis, the relationship between the formation of practical skills (independent variable) and the dependent variable related to remote learning outcomes, as well as the influence of the moderator and cultural context, was examined. Therefore, this study focused on the independent variable (X), the formation of practical skills during remote classes; the dependent variable (Y), the effects of remote learning and the moderator (M), and cultural context. The values of the regression coefficients and significance statistics were calculated for four different countries: Poland, India, Indonesia and the UK. Table 6 summarizes the statistical analysis results.

Table 6. Simple linear regression model of the effect of practical skills formation during remote classes on remote learning outcomes with moderator cultural context

Dependent variable (Y)	Independent variable (X)	Moderator (M)	Impact of X on Y				Relevance of moderation
			Poland	India	Indonesia	UK	
LOP	DA	CC	0.621	0.318	0.36	0.259	p<0.000 *

* Statistically significant relationship (p<0.05).

Source: Own elaboration based on empirical findings.

The results of the analysis (see Table 6) indicate that the formation of practical skills acquired in remote classes (variable X) had a statistically significant effect on remote learning outcomes (variable Y). The regression coefficients for all countries were positive, indicating that an increase in practical skills is associated with an increase in remote learning outcomes. The values of these coefficients (0.621 for Poland,

0.318 for India, 0.36 for Indonesia and 0.259 for the UK) suggest that the impact of practical skills may vary from country to country, but is generally positive. It is worth noting the differences in the moderation coefficient values for the individual countries. For Poland (0.621), India (0.318) and Indonesia (0.36), the coefficients are higher than for the UK (0.259), suggesting that in countries with different cultural contexts, practical skills may have a greater impact on remote learning outcomes.

Discussion

It is difficult to investigate the issue of engagement in online learning environments. Four issues complicate engagement research: ignorance of its multidimensionality, lack of quantitative and mixed methods, neglect of emotional and psychological external reflection, and excessive focus on behavior.

The higher education literature shows that higher satisfaction among students means higher engagement during online learning (Murillo-Zamorano et al., 2019; Thompson et al., 2023).

One concept that can be used to understand them more fully and apply them more widely in the area of the role of learning engagement is E.L. Deci and R.M. Ryan (2020, pp. 1–7). Satisfying students` needs, such as competence, autonomy and relationships with others, influences the level of engagement in the learning process and enables effective remote learning.

Based on the statistical analysis performed on the relationship between the trait "DA" (ability to use knowledge in practice) and the trait "ES" (study engagement), it can be surmised that the ability to put knowledge into practice during remote activities is an important factor that influences student engagement in the remote learning process. In the context of student learning, it is important to consider which competencies need to be developed and how so that, in the event of dynamic change, students can support the companies in which they work or work as service providers.

The development of practical skills during distance learning in higher education can address a range of competencies that allow students to effectively transform acquired knowledge into practical activities and use it in various contexts. An important competency related to the practical application of knowledge during remote learning is the ability to effectively solve problems (Fu et al., 2022). Students should be able to use their knowledge to identify, analyze and solve real-world problems that occur in different organizations.

In the era of remote learning, students must be technologically competent and skilled in using technological tools, e-learning platforms, online communication software and remote working tools. Recent years have shown that the inclusion of online activities in curricula has allowed students to engage and develop many skills in different forms, not only to improve competencies in the technical use of different platforms (Warren et al., 2020), but is also more effective in interpersonal

communication, collaboration in team problem solving, discussion (Harsch et al. 2021), and arguing their decisions and choices and being more creative (Kuo and Tien, 2023; Gómez, et al., 2023).

Remote learning requires effective online communication. Students should be able to express their ideas, collaborate with other online course participants, ask questions and provide feedback. The practical application of knowledge often requires creativity in problem-solving and generating new ideas. Students should be able to think innovatively and adapt their knowledge to the changing circumstances.

Another competence related to the practical application of knowledge in remote learning is the understanding of cultural diversity. In the global world of distance learning, the ability to collaborate and communicate with people from various cultures is crucial. The ability to collaborate and work effectively in online groups is particularly important during team projects and discussions.

Remote learning often requires students to be more independent in their learning, including the ability to plan their own learning, self-monitoring, and motivating themselves. Participants in remote classes must be disciplined and able to effectively manage their time to maintain the regularity of learning and adapt to flexible schedules.

It is essential for students to demonstrate the ability to evaluate the reliability of online information sources and use them appropriately in the learning process. Students should be able to critically evaluate information, consider context and conduct analyses to make decisions based on reliable sources.

However, despite the significant impact of the ability to use knowledge in practice, there is still approximately 71.04% of the variability in the variable 'ES' (R^2=0.2896) that is not explained by this characteristic. Therefore, it is important to consider other factors that influence student engagement in the study process.

In the context of remote learning, there are other determinants that have an important function that can include the aspect of autonomy (Ryan and Deci, 2020, p. 1–7). Autonomy in remote learning, understood as the competence to make decisions independently and manage one's learning process, enables students to have more control over their own learning. This gives them a sense of responsibility for their own development, which can lead to a greater motivation to learn.

Findings from empirical studies conducted in four culturally diverse countries (Poland, India, Indonesia and the UK) suggest that attention should be paid to practical skill formation during remote learning activities and engagement in remote learning as key factors influencing online learning outcomes. These findings suggest that the formation of practical skills is important for remote learning outcomes in these countries, but the impact may vary.

The differences in dependency outcomes among the countries studied may be the result of several factors that influence how the formation of practical skills in remote classes interacts with remote learning outcomes. Cultural differences, such as attitudes towards remote learning, teaching styles and student expectations, may influence how students respond to the remote learning process. Culture can shape their attitudes towards independence and active learning. In addition, the level of access to technology and Internet infrastructure can vary between countries. This can affect students' ability to actively participate in remote learning activities and apply the knowledge they gain in practice. A country's history and experience of remote learning can influence how students and teachers approach the learning process. A country with a long history of remote learning could be more advanced in terms of practical skills.

Ultimately, cultural differences are the result of a complex interaction of many factors, whether cultural, social, technological, or institutional. Therefore, it is important to carefully study these factors and analyze how they affect remote learning outcomes in each country.

The type of learning environment can help build self-efficacy, confidence and independence (So and Brush, 2008; Venkatesh et al., 2014), and as suggested by other researchers (Ryan et al., 2016), using a blended learning solution helps to increase satisfaction (Lee et al., 2011; Alqurashi, 2016), engagement (Pellas and Kazandis, 2015), motivation from learning (Yilmaz, 2017), and improve achievement levels (Potter, 2015; Dhaqane and Afrah, 2016).

Conclusions and recommendations

The research that has been carried out has confirmed that online learning is now an integral part of education and that its role is steadily growing, not least in the context of developing skills for the practical application of knowledge. However, the success of this educational model depends on adequate engagement with remote studies. Motivating learners to actively participate, interact and act independently can have a positive impact on the effectiveness of online learning and development of practical knowledge application skills. Teachers should pay attention to these factors and develop strategies to support learner engagement in the remote studying process, resulting in a better transformation of acquired knowledge into practical skills that are applicable to real-life and work situations.

The empirical research carried out and the results obtained allowed the positive confirmation of each hypothesis.

H1: The formation of practical skills during remote learning activities positively influences students engagement in remote learning. The results of the data analysis showed a significant positive relationship between the development of practical skills and the level of students' engagement in remote learning. The development of

practical competencies can stimulate greater student engagement in the education process.

H2: Student engagement has a significant and positive effect on remote-learning outcomes. Data analysis confirmed that engagement in the remote-learning process had a positive impact on outcomes. These results suggest that student engagement may be a key factor that influences the quality of remote learning.

H3: The findings confirm that student engagement in remote learning mediates the relationship between practical skill development and remote learning outcomes. This mediation was confirmed using path analysis, suggesting that the development of practical skills influences student engagement, which in turn, translates into better learning outcomes.

H4: Data analysis reveals significant differences in expectations and preferences for practical skill formation in remote learning among different cultural contexts. Differences in attitudes towards practical skill formation were observed between Eastern and Western Europe and Southeast Asia. These differences may affect remote learning outcomes across regions.

Based on the hypotheses verified in this study, several recommendations can be made regarding remote learning in the context of practical skill formation and student engagement:

1. Developing practical skills: Teachers should focus on developing skills for practical application of knowledge in remote classes. This could include more practical exercises, projects related to real-world problems and the use of technological tools for practical application of knowledge.
2. Raising engagement levels: Teachers should actively engage students in the remote learning process by creating interactive online activities. Creating interactive e-learning platforms and online collaboration opportunities and regularly encouraging students to actively participate can help increase engagement levels.
3. Student support: Universities should provide support for students to gain practical skills and engage in the learning process. This may include access to educational counseling, online tutoring and practical skills training.
4. Adaptation to the cultural context: For universities operating in different countries, it is important to adapt remote learning strategies to the cultural context. Understanding the differences in cultural expectations and preferences can help adapt curricula.
5. Testing the effectiveness of educational strategies: Universities should regularly monitor and evaluate the effectiveness of their distance learning strategies to ensure that they meet students` expectations and produce positive learning outcomes.
6. Improving teachers' competencies: Teachers participating in distance learning should be adequately prepared to teach online and to develop practical skills for students. Training and pedagogical support for the teaching staff are important.

7. Technology availability: Higher Education Institutions (HEIs) should ensure that there is adequate technology infrastructure and access to online tools to enable students to learn effectively remotely.

The above recommendations can help teachers better support remote learning and improve the quality of online learning.

The findings of this study confirm the importance of developing practical skills and engaging students in remote learning. Additionally, this study shows that cultural differences can have a significant impact on these relationships. This means that remote learning strategies should be tailored to specific cultural groups to support the remote learning process effectively. This information is important for further research on remote learning and for educational practitioners seeking to optimize online learning processes.

This empirical study has contributed to a better understanding of the role of practical skills and cultural context in remote learning, which may have important implications for the design of effective online learning strategies in different countries. In the context of online learning, the development of specific modules or practical classes that allow students to apply their acquired knowledge directly in practice is worth considering. This can contribute to making online education more effective and to preparing students for professional challenges.

It is anticipated that the lessons learned during the pandemic will become a source of inspiration for the development and implementation of new courses or modules in educational programs. A key indicator of the competitiveness of HEIs is the preparation of students to study in a hybrid context, meaning that an important goal is to ensure a balance between traditional education methods and lessons learned from remote education experience (Megahed et al., 2022; Saliba, 2023). This approach will enable a more comprehensive and future-oriented preparation of students for the challenges facing the economy, in the face of a changing socio-economic environment and increasing environmental and technological challenges. The analyses and conclusions presented in this study can inspire further research in this area from the perspective of academic teachers.

Acknowledgment

The publication/article presents the results of the Project financed from the subsidy granted to The Cracow University of Economics (047/ZZP/2023/POT and 050/ZZD/2023/POT).

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