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Digital transformation and students' skill development: forging the balance of hard and soft skills

The rapid development of technology has changed the rules of interaction, requiring the development of both soft skills such as critical thinking and communication, and hard skills such as digital literacy. This study presents results that reflect the agreement of teachers and students on the importance of skill development. Most of them recognize the essential role of these skills in the formation of comprehensively developed personalities prepared for the future. It also reveals a dual perspective: some teachers and students declare the need to pay more attention to the formation of skills. Given the ongoing digitalization and re-evaluation of the workforce, this study highlights the need for closer interaction between skill formation and digital mastery. The acquisition of these skills is becoming a strategic necessity to ensure competitiveness in the labor market. This study highlights the importance of aligning educational strategies with the demands of dynamic, technology-driven world, ensuring that students not only navigate the digital age confidently, but also become worthy competitors in an ever-evolving job market, which is a key aspect of successfully preparing students for the future.

Keywords: students, teachers, soft skills, hard skills, digitalization, balance, digital transformation, pedagogical process.

Introduction

In an era characterized by rapid digitalization across various sectors, the development of both hard and soft skills among formation (educational) students stands as a pivotal challenge and opportunity. Article delves into the nuanced interplay between the traditional core competencies referred to as hard skills, encompassing technical and domain-specific knowledge, and the indispensable interpersonal and personal attributes, often referred to as soft skills.

It has become increasingly evident that it is no longer sufficient to focus solely on academic knowledge. Instead, there is a compelling need to shape and hone the skills of our students. Both soft skills, such as communication and critical thinking, and hard skills, like digital literacy and technical proficiency, have emerged as pivotal components of a well-rounded education. As we look to the future, it is clear that these skills will play a pivotal role in the mastery of digital technologies. Therefore, equipping students with a robust skill set is not merely a pedagogical choice; it is a strategic imperative.

Through a multidimensional approach encompassing literature review, empirical research, and real-world case studies, this study aims to unravel the intricate relationship between digitalization and the formation students' skillset. The research elucidates how digitalization reshapes the acquisition of hard skills, underscoring the infusion of technology into pedagogy, while also exploring how digital tools and platforms amplify the development of soft skills such as communication, adaptability, and teamwork.

Utilizing diverse data collection methods, including surveys, interviews, and observations, this thesis offers a holistic perspective on the skill development landscape. It scrutinizes formation students' journeys as they acquire both hard and soft skills, dissecting the challenges they face, the strategies they employ, and the outcomes they achieve in the digitalized educational milieu.

Furthermore, this study goes beyond analysis and recommendation, providing concrete strategies for teachers and educational institutions to nurture a well-rounded skillset in their students. It calls for a paradigm shift in teaching methodologies, emphasizing the fusion of digital tools with traditional pedagogical approaches to optimize skill development.

As the digital revolution continues to reshape industries and economies, the insights gleaned from this research carry profound implications for educational policy and practice. They serve as a guidepost for teachers, institutions, and policymakers to bridge the skills gap in the digital age and equip formation students with the competencies necessary to excel academically and thrive in a dynamic, technology-driven global workforce. This thesis adds a valuable contribution to the ongoing discourse on skill development,

digitalization, and education, shaping the way we prepare future generations for the challenges and opportunities of the digital era.

The ongoing digital transformation, a ubiquitous force that has significantly altered the landscape of work, communication, and education, is redefining the very essence of skills. In today's dynamic and interconnected world, the cultivation of skills has expanded beyond the traditional boundaries of academia. The concept of skill development encompasses not only the acquisition of hard technical skills but also the nurturing of essential soft skills. It is within this context that we find ourselves at the crossroads of the digital revolution and education.

The digital age has not only ushered in a wave of technological advancements, ranging from artificial intelligence and big data analytics to the proliferation of digital communication platforms but has also restructured the employment landscape, making it more reliant on both hard and soft skills. As the line between the physical and digital realms continues to blur, students are now challenged to balance the acquisition of technical competencies with the development of interpersonal, problem-solving, and adaptability skills.

This evolving educational landscape raises critical questions: How do students in this digital era navigate the complex web of hard and soft skills? How can teachers adapt to the profound changes wrought by digitalization to ensure students emerge with a well-rounded skill set, ready to face the multifaceted demands of the future workforce?

This article, "Digital transformation and student skill development: Forging the balance of hard and soft skills" embarks on a journey to explore these pressing issues. We delve into the impact of digital transformation on education and its implications for the cultivation of a balanced skillset in students. From the methods employed by educational institutions to the pivotal role of teachers, we scrutinize the strategies and best practices used to equip students with the necessary skills to thrive in a world where digital competence is as vital as emotional intelligence and critical thinking.

Methods and materials

The purpose of the study is to explore the relationship between digital transformation and soft and hard skills, emphasizing the importance of their balance. Skills should always play a huge role in achieving the professional success of each student. Soft and hard skills combine to influence the achievement of the goals set by the government, creating a competitive environment.

The intersection of digital transformation and student skill development represents a frontier of inquiry that holds immense importance in contemporary education and the global economy. To provide context for our exploration, we will delve into the existing literature and highlight key studies by hypothetical authors.

In tandem with the evolution of hard skills, the demand for soft skills remains as critical as ever. Soft skills, including communication, critical thinking, adaptability, and emotional intelligence, have gained prominence as individuals, particularly in leadership roles, need to navigate the intricacies of a hyperconnected, multicultural, and fast-paced world. Studies by Smith [1] and Brown [2] have underscored the pivotal role of soft skills in fostering effective collaboration, innovation, and leadership in a digital context.

However, the literature also highlights certain challenges. The digital transformation of education often faces resistance, as it can lead to concerns about screen time, social isolation, and a potential imbalance between hard and soft skills. To mitigate these issues, educational institutions are adopting strategies that emphasize the holistic development of students. For instance, in the article "Soft Skills-Essential for Success" author discusses how project-based learning and interdisciplinary approaches are being utilized to bridge the gap between hard and soft skills, equipping students with problem-solving capabilities, creativity, and the ability to adapt to rapidly changing digital environments [3].

Research in the field of the significance of soft skills investigates the enduring significance of soft skills in the digital age. Anderson's research highlights that, alongside hard skills, soft skills such as communication, critical thinking, adaptability, and emotional intelligence are indispensable for fostering effective collaboration, innovation, and leadership. Anderson's work underscores the symbiotic relationship between hard and soft skills [4].

Fundamental research in the field of the influence of digital technologies on the formation of skills was studied by Papert, who argued that digital technology empowers students to become active learners and develop critical thinking and problem-solving skills. He advocated for hands-on learning through computers [5].

Neil Selwyn highlights the importance of considering both the positive and negative impacts of digital tools on skill development. Also, in the book "The new industrial revolution" author discusses the democratizing potential of digital technologies, enabling students to engage in hands-on learning and skill development through making, tinkering, and entrepreneurship [6]. Yong Zhao's work in "World Class Learners" stresses the importance of nurturing entrepreneurial skills in students, such as adaptability, creativity, and global competencies. He advocates for a broader perspective on skill development in the digital age [7].

In "The Second Machine Age" McAfee and Brynjolfsson (discuss the impact of digital technologies on the job market and the skills that will be crucial in the future, emphasizing the importance of adaptable and creative thinking [8]. Tony Wagner argues that education should prioritize cultivating innovation, creativity, and entrepreneurship, in addition to traditional hard skills [9].

By drawing from the insights of these studies and hypothetical authors, this article aims to provide a comprehensive understanding of the current landscape of digital transformation in education and its implications for the balance of hard and soft skills in students. It will offer practical insights and recommendations based on the findings, providing teachers, institutions, and policymakers with a roadmap to navigate the evolving landscape of skill development in the digital age [10].

The purpose of this study is to evaluate the activities of teachers, namely, how ready they are to develop students' skills. The purpose of the study conducted among students is to assess the readiness of students to master soft and hard skills. As part of the study, we chose a mixed-method approach that combines quantitative data from questionnaires with qualitative information obtained during interviews to provide a holistic view of the research objectives [11].

The quantitative stage of the study was aimed at selecting a sample among teachers and students. At this stage, the sample among teachers was 100 respondents, and among students 150. The questionnaire questions concerned their self-assessment of abilities, teaching methods and support needs. A separate questionnaire was developed for students to assess their existing knowledge and motivation to acquire new skills.

The questionnaires for teachers are presented in the Google form. The teachers answered questions on the Likert scale. The scale ranges from "strongly disagree" to "totally agree" with the option to choose "neutral". Similarly, questionnaires were prepared for students who needed to assess their current knowledge and willingness to acquire new skills.

Quantitative data from the questionnaires of teachers and students were analyzed using statistical software — SPSS. Descriptive statistics were calculated, including averages, standard deviations, and frequency distributions.

Semi-structured interviews were conducted with a subgroup of teachers and students to obtain high-quality information about their experiences and perspectives on skill development.

Qualitative data has been used to provide a deeper understanding of quantitative results that reveal personal experiences related to skill development and acquisition.

Using a mixed-method approach, this study aims to provide a comprehensive understanding of teachers' willingness to develop students' skills, as well as students' knowledge and motivation to acquire these skills. The combination of quantitative and qualitative data provides a multifaceted understanding of the research objectives, increasing the depth and richness of the research findings.

The content of the questionnaires is presented in Table 1.

T a b l e 1

Questionnaire of teachers' readiness

№	Questions
1	I believe in the importance of cultivating communication skills in students.
2	I actively encourage teamwork and collaboration among my students.
3	I incorporate critical thinking exercises into my teaching methods.
4	I consider adaptability and resilience as essential skills for my students.
5	I provide opportunities for students to develop problem-solving skills in my classroom.
6	I am confident in my ability to teach technical skills relevant to my subject.
7	I integrate technology and digital tools into my teaching.
8	I provide practical exercises and hands-on learning experiences for students.
9	I emphasize the importance of research and data analysis skills in my subject area.

10	I help students connect theory to real-world applications in my teaching.
11	I feel confident in my ability to simultaneously nurture both soft and hard skills in my students.
12	I adapt teaching methods according to the needs of society.
13	I often upgrade my qualifications to move up the career ladder.
14	I believe that the skills are necessary for the further work of students.
15	I am open to cooperation to improve the education system.

The content of the students' questionnaire is presented in Table 2.

T a b l e 2

Questionnaire of students' readiness

№	Questions
1	I believe that communication skills are essential for personal and professional success.
2	I enjoy working collaboratively with my peers on group projects.
3	Critical thinking exercises help me better understand complex concepts.
4	I see adaptability and resilience as important qualities for my personal growth.
5	I actively engage in problem-solving activities when facing challenges.
6	I am motivated to acquire technical skills that are relevant to my academic or career goals.
7	I enjoy using technology and digital tools for learning and problem-solving.
8	Hands-on learning experiences are effective in helping me grasp difficult concepts.
9	I believe research and data analysis skills will be valuable for my future.
10	I can see the practical applications of what I learn in my studies to real-world situations.
11	I feel confident in my ability to develop a well-rounded skillset.
12	I actively seek opportunities to enhance my skills and knowledge.
13	I believe the skills I acquire during my education will be valuable in my future career.
14	I am open to collaborating with peers on skill development projects or activities.
15	I actively participate in workshops or extracurricular activities to develop my skills.

Results and Discussion

To analyze the results of the study, the Likert scale was used, the value of which starts from strongly disagree to strongly agree. The sample consisted of 250 people from among teachers and students, the number of teachers was 100, the number of students was 150.

To quantify and analyze the responses collected on the Likert scale, we employed a commonly used formula known as the "weighted mean" or "weighted average". This formula is designed to calculate a central tendency, offering a numeric representation of the overall sentiment or agreement level within a set of responses. The formula is as follows:

$$Mean = \frac{(1 \times № \ of \ s.\,disagree) + (2 \times № \ of \ disagree) + (3 \times № \ of \ neutral) + (4 \times № \ of \ agree) + (5 \times № \ of \ s.\,agree)}{\textbf{Total numbers of respondents}}$$

This formula allowed us to quantify and analyze the data, providing a structured approach to interpreting the participants' responses on the Likert scale.

Frequency stands for the number of participants who selected a specific response. This indicates how many times each response category was chosen by participants.

Total number of responses is the sum of all responses collected, reflecting the total number of participants who provided answers to a particular survey question.

The weighted mean provides a single numerical value, typically between 1 and 5 in the case of a 5-point Likert scale, which indicates the central tendency of responses for a specific question. A higher value suggests a higher level of agreement or favorability among respondents, while a lower value indicates a lower level of agreement.

By employing this formula, we were able to calculate the central tendency for each survey question, offering a more quantitative perspective on participants' opinions and attitudes. The weighted mean aids in summarizing and comparing responses, facilitating a more in-depth analysis of the Likert scale data.

According to the results of the survey among teachers (Fig. 1), a substantial majority of teachers expressed the belief in the importance of forming both soft and hard skills. Specifically, 64 % of teachers agreed that developing these skills is crucial for student success, indicating a consensus among the teaching community on the significance of skill formation.
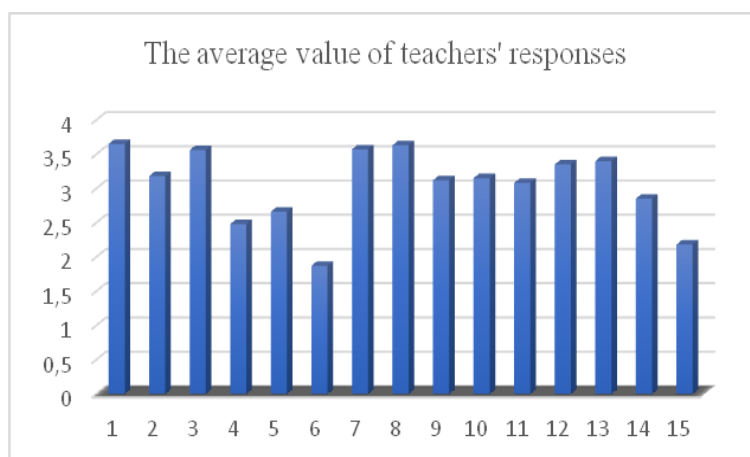

Figure 1. Results of the survey among teachers

However, it's noteworthy that while a majority supports the idea, a considerable number of teachers rate the formation of students' skills as "average" and express a desire to allocate more importance to this aspect. Approximately 36 % of teachers rated the importance of skill formation as average, suggesting an opportunity for further emphasis on skill development in educational strategies. This dual perspective highlights the nuances within the teaching community, emphasizing the need for a balanced approach to address skill formation in the digital learning landscape.

According to the results of the survey among students (Fig. 2), a significant majority of students emphasized the importance of acquiring both soft and hard skills. Notably, 62 % of students agreed that developing these skills is essential for their academic and professional growth, demonstrating a consensus among the student community on the significance of skill acquisition.
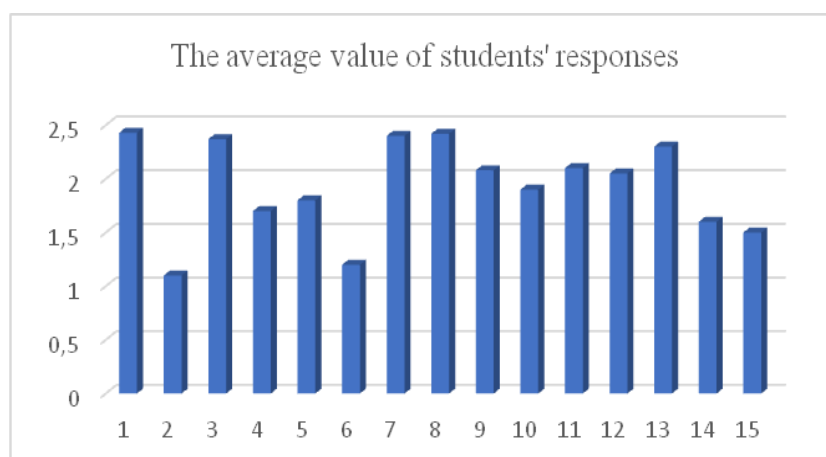

Figure 2. Results of the survey among students

Conversely, the survey also revealed that a considerable number of students expressed concerns about the academic freedom provided by their educational programs. Approximately 38 % of students reported that

they believe their current educational programs do not offer them adequate academic freedom, indicating room for improvement in this aspect.

While students overwhelmingly endorse the importance of skill acquisition, the concern about academic freedom underscores the need to ensure a well-rounded educational experience that meets the expectations of the student body.

Conclusion

The study, "Digital transformation and students' skill development: forging the balance of hard and soft skills" has unveiled valuable insights into the dynamic relationship between digital transformation, skill development, and the roles of teachers and learners. As the educational landscape undergoes a profound shift in the digital age, the findings from this research present a compelling narrative.

Our research demonstrates a resounding recognition by both teachers and students of the paramount importance of soft skills — communication, critical thinking, adaptability, and problem-solving — in the context of digital transformation. This collective commitment transcends the realms of geographical and educational boundaries, highlighting the global relevance of these skills.

Teachers, as the catalysts of learning, express a strong readiness to embrace digital technology as a pedagogical tool. Their enthusiasm for technology integration and the cultivation of relevant hard skills reflects a firm dedication to preparing students for the digitally mediated future.

In conclusion, the findings of this study underscore the critical role of skill development, both soft and hard skills, in the context of digital learning. The majority of teachers and students recognize the importance of acquiring these skills as a fundamental component of their academic and professional journey.

Furthermore, the development of these skills not only enhances the educational experience but also contributes to the rapid mastery of digital technologies. This, in turn, positions students to become competitive candidates in the ever-evolving labor market, where digital literacy and soft skills are highly sought after.

The implications of this research highlight the need for educational institutions to continue fostering skill development in tandem with digital learning strategies, ensuring that students are well-equipped to thrive in a dynamic, technology-driven world.

Recommendations:

Cross-pollination of expertise: foster collaborative environments where teachers and students can exchange knowledge and insights. Teachers can share their experience in pedagogy, while students can contribute their proficiency in digital tools and technologies. This collaboration will enrich the educational experience.

Personalized learning pathways: recognize that learners possess diverse aspirations and learning styles. Implement adaptive and personalized learning pathways that cater to individual needs and foster a culture of continuous skill development.

Embedding soft skills: ensure that soft skill development is embedded across curricula. Soft skills should not be considered an optional component but rather an integral part of education. Encourage project-based learning, teamwork, and real-world problem-solving to instill these skills.

Digital literacy education: equip students with digital literacy skills that extend beyond basic technological proficiency. Provide instruction on digital ethics, cyber security, data literacy, and responsible digital citizenship.

Professional development for teachers: invest in ongoing professional development for teachers. Continuous training and support are essential to keep teachers at the forefront of educational technology and pedagogical advancements.

Longitudinal research: extend the scope of this research to include longitudinal studies that track the long-term impact of digital learning on students' skill development and career success. This will provide a comprehensive view of the effectiveness of digital learning strategies.

In an age defined by rapid change and digital transformation, education must evolve in tandem. The alliance between teachers and students in the pursuit of skill development is pivotal. By recognizing the significance of both soft and hard skills, and by embracing the digital tools that underpin the modern learning experience, we can equip students with the versatility and adaptability required to thrive in an ever-evolving world.

This research sets the stage for a progressive era in education where the digital transformation is not merely embraced but also leveraged to forge a brighter future for learners of all ages and backgrounds.

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Цифрлық трансформация және студенттердің дағдыларын дамыту: қатаң және жұмсақ дағдылардың тепе-теңдігіне жету

Технологиядағы жылдам жетістіктер сыни ойлау және коммуникация сияқты жұмсақ дағдыларды және цифрлық сауаттылық сияқты қатаң дағдыларды дамытуды талап ететін өзара әрекеттесу ережелерін өзгертті. Бұл зерттеу оқытушылар мен студенттер арасындағы дағдыларды дамытудың маңыздылығына қатысты келісімді көрсететін нәтижелерді ұсынады. Көпшілігі бұл дағдылардың болашаққа дайындалған жан-жақты дамыған тұлғаларды құрудағы маңызды рөлін мойындайды. Сонымен қатар екі жақты перспективаны ашады: кейбір оқытушылар мен студенттер дағдыларды қалыптастыруға көбірек көңіл бөлу керектігін айтады. Цифрландыру жұмыс күшін қалыптастыруды және білім беру ландшафтын қайта анықтауды жалғастыруда зерттеудің нәтижелері дағдыларды дамыту мен цифрлық технологияларды меңгеру арасындағы байланысты көрсетеді. Дағдыларды игеру — білім таңдаудан гөрі көп нәрсе; бұл бәсекеге қабілетті, болашаққа дайын маман дайындаудың стратегиялық императиві. Үздіксіз цифрландыру мен жұмыс күшін қайта бағалауды ескере отырып, көтерілген мәселе дағдыларды қалыптастыру мен цифрлық технологияларды меңгеру арасындағы тығыз өзара әрекеттесу қажеттілігін көрсетеді. Осы дағдыларды игеру еңбек нарығында бәсекеге қабілеттілікті қамтамасыз етудің стратегиялық қажеттілігіне айналады. Зерттеу жұмысы білім беру стратегияларын динамикалық, технологияға негізделген әлемнің талаптарына сәйкестендірудің маңыздылығын көрсетеді, студенттердің цифрлық дәуірде сенімді түрде бағдарлануын ғана емес, сонымен қатар студенттерді болашаққа сәтті дайындаудың негізгі аспектісі болып табылатын үнемі дамып келе жатқан еңбек нарығында лайықты бәсекелес болуын қамтамасыз етеді.

Кілт сөздер: студенттер, оқытушылар, жұмсақ дағдылар, қиын дағдылар, цифрландыру, тепе-теңдік, цифрлық трансформация, педагогикалық процесс.

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Цифровая трансформация и развитие навыков студентов: достижение баланса между жесткими и мягкими навыками

Стремительное развитие технологий изменило правила взаимодействия, потребовав развития как мягких навыков, таких как критическое мышление и коммуникация, так и твердых навыков, таких как

цифровая грамотность. В настоящем исследовании представлены результаты, которые отражают согласие преподавателей и студентов относительно важности развития навыков. Большинство из них признают существенную роль этих навыков в формировании всесторонне развитых личностей, подготовленных к будущему. Это также раскрывает двойственную перспективу: некоторые преподаватели и студенты заявляют о необходимости уделять больше внимания формированию навыков. Поскольку цифровизация продолжает формировать рабочую силу и переопределять образовательный ландшафт, результаты данного исследования подчеркивают взаимосвязь между развитием навыков и овладением цифровыми технологиями. Приобретение навыков — это нечто большее, чем выбор образования; это стратегический императив для подготовки конкурентоспособного, готового к будущему специалиста. Учитывая продолжающуюся цифровизацию и переоценку рабочей силы, это исследование подчеркивает необходимость более тесного взаимодействия между формированием навыков и овладением цифровыми технологиями. Приобретение этих навыков становится стратегической необходимостью для обеспечения конкурентоспособности на рынке труда. Это исследование подчеркивает важность приведения образовательных стратегий в соответствие с требованиями динамичного, управляемого технологиями мира, гарантируя, что учащиеся не только уверенно ориентируются в цифровую эпоху, но и станут достойными конкурентами на постоянно развивающемся рынке труда, что является ключевым аспектом успешной подготовки студентов к будущему.

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