

RESEARCH ARTICLE

A Comprehensive Study on Fostering Innovative Activities in Future Specialists through Training and Student-Centered Learning Approaches

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ABSTRACT

The study focused on the development of innovative skills among future specialists in the education sector using a student-centred pedagogical approach. We employed a specialized methodology to assess the importance of innovation in the development of students' specialized skills. Additionally, we explored the impact of individualized education and transformational pedagogical practices. It was found that an individual learning approach has a positive association with the development of professional competencies. Moreover, an individualistic approach positively contributes to innovative thinking abilities. Furthermore, transformational pedagogical practices have a positive association with self-based learning. Overall, the study provides valuable insights into individualized learning education and its contribution to the development of professional competencies and innovative skills in the education sector.

INTRODUCTION

The primary objective of the study was to highlight the importance of innovative educational practices in developing students as future specialists in diverse disciplines. The study explores education in two important dimensions: traditional education methodologies and innovation-based educational methodologies. The study also highlighted the ongoing strategies for enhancing teaching professional capacities, with the systematic development within an existing educational framework serving as an example. In this study, we

proposed a Kazakhstan educational program that focused on innovative educational practices driven by a self-development perspective. The program was based on a strategic approach that focused on global competitiveness in the nation's education framework (Karabassova, 2021). The strategic approach we applied in this study specifically focused on individualized education, global ranking, and the importance of scientific advancements and their impact on socio-economic development.

We assessed the literature and identified the development of the educational framework through the transformation of the secondary education system

in Kazakhstan and on a global scale from 2016 to 2019. We discovered a shift in the educational system on an international level in secondary education (Gibson, 2019). The basic mechanism that geared up the transformation was the development of technology and its implications for modern innovative pedagogical practices in educational institutes, focusing on the importance of the practical application of knowledge using the technology. Central to this educational metamorphosis is the cultivation of lifelong learning skills and the fostering of self-education among prospective specialists, reflecting a strategic alignment with the evolving demands of contemporary professional landscapes (Carter, 2008). Evident within this context is the pronounced effectiveness of training strategies tailored to higher education students. Student-oriented approaches emerge as indispensable tools for instilling inquisitive and research-oriented qualities essential for future specialists navigating the complexities of our rapidly evolving information age (Runnberg-Valadez, 2017; Ashurova, 2021).

The head of state Kassym-Jomart Tokayev's paradigm emphasizes the need for a subtle departure from traditional subject-centric knowledge acquisition in line with the imperative of the digital era. Rather, it advocates for the cultivation of high-order attributes such as creative acumen, a propensity for risk-taking, critical thinking, and initiative. This advancement was crucial for producing specialists who can meet the demands of future educational requirements in any field. This modern era, where the role of technology must be addressed, requires the adaptation of innovation at the right time with the right resources. Moreover, the adaptation of new technologies and innovative methodologies in education requires a diverse set of skills and knowledge. Moreover, from students' perspectives, the adaptation of innovative learning is essential to learning and developing themselves from the perspective of future specialists in diverse fields of educational pedagogy (Ashurova, 2021; Shunkov et al., 2022)

The study primarily focused on the ongoing discussion regarding innovation adaptability in education for the development of specialists in education methodologies. Through the collaboration between educational reforms and innovative methodologies

for the development of future specialists. Moreover, the study further focused on student-oriented training. The student-centred approach to learning primarily focuses on the student's readiness for innovative methodologies of learning. The study's conceptual model was based on the importance of innovative activity development through students' self-development skills and the development of innovative and critical thinking skills among students so that they can utilize these platforms to develop their careers as future specialists. The direction of improving the quality of education in Kazakhstan will ensure the integration of the innovation process at all levels of education. In this regard, the effectiveness of student-centred learning and innovative processes in the field of design education is directly related to the special training of future designers for innovative activity, which is being prepared in a higher educational institution. This is a bright factor that shows that the innovation process in the field of education depends on the interconnectedness of all its levels (Yildiz and Kayili, 2015). Therefore, the purpose of the study is to increase the quality of design education by increasing the dependence of designers trained in higher educational institutions on creativity, knowledge, innovative training, cognitive-cognitive level, culture, and spiritual richness of personality. The field of education, responding to the modern needs of society and the labour market, allows each design specialist to adapt quickly and in a timely manner to modern socio-economic realities. This opportunity itself is an important condition for the successful, sustainable development of each teacher and the entire educational sphere as a whole.

We thoroughly assessed the literature and found that no current study that was conducted in the Kazakhstan context addresses the need for innovative teaching pedagogy for the development of future specialists in design education and in other diverse educational fields. We, therefore, developed a comprehensive research methodology that focused on Kazakhstan's vision of 2025 (Yakavets and Dzhadrina, 2014) through the adaptation of innovative methodologies to develop reforms in the educational field. Through our comprehensive methodology, we target teachers, students, and academicians at the policy-making level to understand

the association between innovative educational practices and future demands in terms of specialists in the diverse fields of education. Furthermore, Kazakhstan is currently highly dependent on the foreign workforce to cover the gaps in specialist aspects ranging from teaching to research, including practical grounds that require specialists to bring educational reforms. This not only drags on the economic position of the country but also weakens the productivity of the current educational system. Additionally, this study will provide a framework for students and teachers to improve learning methodologies, along with a strong understanding for policymakers to generate productive educational reforms.

LITERATURE REVIEW

Literature highlights the importance of educational pedagogy in the development of students; however, these findings highlight only the general understanding (e.g., Garzón et al., 2020; Gleason and Manca, 2020). However, there are no studies in the context of Kazakhstan that highlight the importance of educational specialists in terms of current and future needs. Moreover, the current educational system requires a comprehensive exploration of initiatives to enhance competencies through the adaptation of innovation methodologies among future specialists. The state-level program for the development of education and science (2020-2025) in the Republic of

Kazakhstan was based on the initiative of adaptability of innovative teaching and learning methodologies. The Vision 2025 educational reform program is a cornerstone program, highlighting a strategic vision to reach global competitiveness through the development of the national education and science program (Sagintayeva et al., 2014). The program is essential due to its primary focus on individualized education, innovative methodologies, and its role in the development of science and technology, resulting in socio-economic development.

The current development within secondary education institutions in Kazakhstan from 2016 to 2019 represents a significant advancement toward aligning educational paradigms with evolving needs in terms of global competitiveness. This advancement is focused on innovative pedagogical practices in schools, with a specific focus on the practical application of knowledge and technology (Hughes, 2005). The goal of fostering self-education and lifelong learning skills—both crucial traits for future specialists navigating the complexities of a rapidly evolving information age—underpins this shift. Scholarly discourse on higher education underscores the efficacy of student-oriented approaches in preparing students for the challenges posed by the modern professional landscape. These approaches, characterized by a focus on inquisitive and research-oriented qualities, are regarded as indispensable tools for nurturing the competencies required for innovation and adaptability (Livingston et al., 2023).

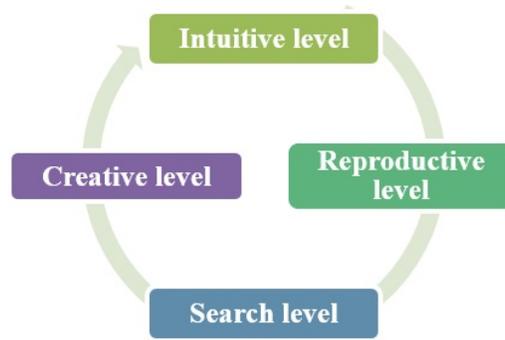


Figure 1: Levels of readiness for innovative action

The address by the head of state, Kassym-Jomart Tokayev, highlights a paradigmatic shift in the

conceptualization of specialist training. The emphasis on attributes such as creative acumen,

risk-taking propensity, critical thinking, and initiative underscores the imperative of aligning education with the demands of a technologically advanced and rapidly changing environment (Malik and Pasha, 2022). In the context of the digital age, readiness for innovative activity emerges as a key indicator of an individual's preparedness for the demands of the workforce. This perspective aligns with international frameworks such as the "Oslo Guide," which defines innovative activity as a multifaceted process encompassing scientific, technological, organizational, financial, and commercial dimensions (Perani, 2019; Iatsyshyn et al., 2022).

Efforts to integrate innovation across all levels of education are substantiated in the literature, with student-centred learning emerging as an effective pedagogical approach. This approach is celebrated for its transformative impact on the quality of education, emphasizing the need for active student engagement and fostering innovation at various educational stages (Kilag et al., 2023). The association between innovative activities and teaching methodologies in the education field is a prime focus of the literature review. It presents the symbiotic association between specialized educational methodologies and self-development approaches within secondary educational institutions and the role of innovative activities in developing specialists in diverse educational fields. This association focused on the internal mechanisms of innovative learning activities across different educational levels at a secondary level (Kumari et al., 2019).

The traditional educational system is based on one-to-one interaction, where students learn from teachers through interaction. This interaction can be one-way or two-way depending on the system, subject, and teaching approach, therefore limiting the rate of innovation that can be generated through discussion and the use of technology to connect with diverse audiences. The State Program for the Development of Education and Science in the Republic of Kazakhstan (2020-2025) serves as a benchmark, combining the strategic vision for the development of national education against global competitiveness (Kaimoldiyev, 2021; Abbas et al., 2021). Moreover, this systematic program emphasizes the importance of individualized education, educational values, and

their impact on scientific advancements and socio-economic development. The transformative processes witnessed in secondary education institutions from 2016 to 2019 are recurrent themes in the literature, reflecting a deliberate effort to align educational paradigms with the evolving needs of contemporary society (Akour and Alenezi, 2022). A key objective in this transformation is the infusion of innovative pedagogical practices in schools, prioritizing the practical application of knowledge. This paradigm shift aims to instil lifelong learning skills and foster self-education among students, essential attributes for future specialists navigating the intricate challenges of the rapidly evolving information age.

The scholarly discourse on higher education resounds with an acknowledgement of the effectiveness of student-oriented approaches in preparing individuals for the multifaceted demands of the modern professional landscape (Boulden, 2019). These pedagogical approaches, characterized by their focus on cultivating inquisitive and research-oriented qualities, are widely recognized as indispensable tools for nurturing competencies essential for innovation and adaptability in the workforce. The address by the head of state, Kassym-Jomart Tokayev, on March 16, 2022, introduces a paradigmatic shift in the conceptualization of specialist training (Manvuto and Samwanda, 2023). The emphasis on attributes such as creative acumen, risk-taking propensity, critical thinking, and initiative underscores the imperative of aligning education with the dynamic requirements of a technologically advanced and rapidly changing environment.

Within the context of the digital age, readiness for innovative activity emerges as a pivotal indicator of an individual's preparedness for the workforce. This perspective aligns with international frameworks such as the "Oslo Guide," which defines innovative activity as a multifaceted process encompassing scientific, technological, organizational, financial, and commercial dimensions (Demir and Akuzum, 2023). The guide accentuates the nuanced nature of innovation, recognizing that certain steps may be fundamentally innovative, while others are integral but not inherently innovative, yet necessary for successful innovation implementation.

Efforts to integrate innovation seamlessly across all

levels of education find substantial support in the literature. The student-centred learning approach is a comprehensive pedagogical approach that focuses on students' learning needs and their collective impact on the quality of education (Levesque-Bristol et al., 2019). This approach highlights the importance of student engagement, fostering innovation in learning and teaching at different educational levels through the development of creativity and critical thinking using active problem-solving mechanisms (Porter et al., 2006). This association highlights the importance of a better understanding of the association between innovation, student-centred learning, and the adaptation of technology to cope with the demands of future specialists. Moreover, based on the literature review, we have developed the following set of hypotheses to test our theoretical assumptions.

Hypotheses Development

Null Hypothesis (H0): There exists a negative association between individualized approaches to education and the development of professional competencies among future specialists.

Alternative Hypothesis (H1): There exists a positive association between individualized approaches to education and the development of professional competencies among future specialists.

Null Hypothesis (H0): A negative association exists between innovative pedagogical practices and learning skills.

Alternative Hypothesis (H2): There exists a positive association between innovative pedagogical practices and learning skills.

METHODOLOGY

In this study, we collected data from a diverse population consisting of 523 academicians, students, and teachers. The selection of teachers and students was performed using random sampling, and only teachers and students from secondary education levels were incorporated into the study. The data was collected over six months. We conducted data collection in three ways. We collected data from teachers who were teaching at a secondary level. After receiving their consent, we collected data from 158 teachers. In the second phase, we collected data from students who were studying at the secondary level. We first obtained their consent to participate in the study, and after that, we collected the data. In total, we have collected data from 146 students. Lastly, in stage 3, we collected data from academicians who were involved with secondary education in an administrative capacity. In total, we collected data from 219 academicians.

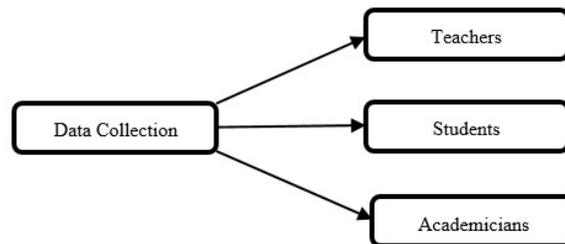


Figure 2: Data collection

Instrument

We used a Likert five-point scale, ranging from 1 (strongly disagree) to 5 (strongly agree) on a scale applied in this research.

Individualized Education (IE): We used a self-developed scale consisting of 15 items that focus on capturing individualized education dimensions. Aithal & Aithal's (2020) guidelines served as the foundation for developing the scale. Moreover, Cronbach's alpha value for this scale was found to

be $\alpha = 0.82$, falling within the widely accepted range according to social science standards (Baistaman, 2020).

Professional Competencies (PC): We assessed professional competencies (PC) through a scale developed based on the study of Taylor and Neimeyer (2022). Moreover, the scale consists of 10 items. These 10 items were designed to measure students' abilities in problem-solving, creativity, and critical-thinking abilities. The Cronbach's alpha value for this

scale was determined to be $\alpha = 0.82$.

Innovative Pedagogical Practices (IPP): The scale for Innovative Pedagogical Practices (IPP) was adopted from the work of Süer and Oral (2021). Moreover, the scale consists of eight items that were developed based on innovative skills and technology adaptation. The Cronbach's alpha value for this scale was calculated to be $\alpha = 0.83$.

Learning Skills (LS): A self-developed Learning Skill (LS) based on the work of Ayyildiz and Tarhan (2015)

was used to assess students' learning skills. The scale consists of 10 items. These 10 items were based on abilities to learn, develop, and understand new knowledge. The Cronbach's alpha value for this scale was established at $\alpha = 0.81$.

ANALYTICAL PROCEDURES AND RESULTS

Sobel test

Table 1: Results showing all direct effects and indirect effects

Paths	Estimate	Sobel test <i>t</i> -value	Std. Error	<i>p</i> -value
Direct Effect IE →PC	a×b 0.428	1.27432567	0.127	0.000
Direct Effect IPP →LS	c×d 0.319	2.27426213	0.031	0.000
Model Summary	R = .832	Std. Error = 1.2461		

Significance levels: ****p* < .001; **p* < .05; Individualized Education (IE); Professional Competencies (PC); Innovative Pedagogical Practices (IPP); Learning Skills (LS).

The Sobel test was applied to explore the direct and indirect associations in the model, as shown in Table 1. The direct association between Individualized Education (IE) and Professional Competencies (PC) was found to be significant ($a \times b = 0.428$, Sobel test *t*-value = 1.274, $p < .001$). This shows that individualized education has a positive impact on the development of professional competencies among the students. Moreover, the direct association between

Innovative Pedagogical Practices (IPP) and Learning Skills (LS) was also statistically significant ($c \times d = 0.319$, Sobel test *t*-value = 2.274, $p < .05$). This shows that an increase in innovative pedagogical practices leads to a positive influence on the enhancement of learning Skills. The model summary indicates a good fit with an R-value of .832 and a standard error of 1.2461. The significance levels for the reported *p*-values are denoted as follows: ****p* < .001; **p* < .05.

Table 2: Pearson correlation

	IE	PC	IPP	LS
IE	1			
PC	.753**	1		
IPP	.867**	.642**	1	
LS	.732**	.732**	.635**	1

** Correlation is significant at the 0.01 level (2-tailed). *N* = 523
Individualized Education (IE); Professional Competencies (PC);
Innovative Pedagogical Practices (IPP); Learning Skills (LS)

Table 2 presents the association between Individualized Education (IE), Professional Competencies (PC), Innovative Pedagogical Practices (IPP), and Learning Skills (LS). Moreover, a strong positive correlation was observed between IE and PC ($r = 0.753$), suggesting that higher levels of individualized education are linked with higher professional competencies. Furthermore, an even stronger correlation was identified between IE and IPP ($r = 0.867$), which shows a strong positive relationship. Additionally, a strong positive

correlation was also found between IE and LS ($r = 0.732$), which shows that higher levels of individualized education are associated with increased learning skills. Furthermore, a moderately positive correlation was found between PC and IPP ($r = 0.642$), showing that higher levels of professional competencies are linked with increased innovative pedagogical practices. Moreover, a strong positive correlation between PC and LS ($r = 0.732$) shows the association between professional competencies and enhanced learning Skills. Lastly, a strong positive

correlation was found between IPP and LS ($r = 0.635$), practices is linked with improved learning skills. showing that an increase in innovative pedagogical

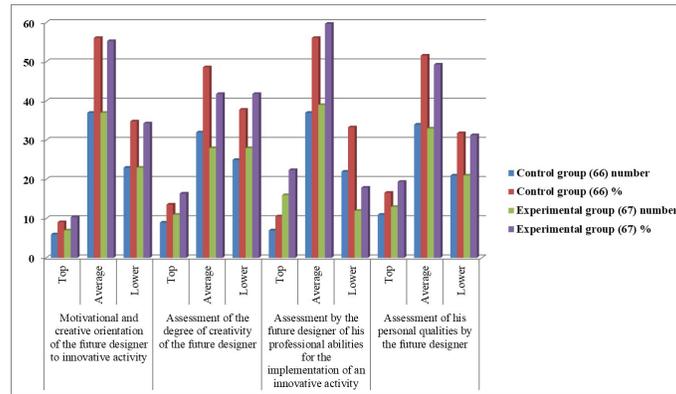


Figure 3: Results of survey

Hypothesis H1 (Individualized education - Professional competencies)

Direct effect (a × b): The estimate is 0.428 with a Sobel test t -value of 1.274 ($p < .001$).

Decision: The Sobel test indicates a significant indirect effect, supporting Hypothesis H1 that individualized education has a positive impact on professional competencies. Therefore, this hypothesis is accepted.

Hypothesis H2 (Innovative pedagogical practices: Learning skills)

Direct Effect (c × d): The estimate is 0.319 with a Sobel test t -value of 2.274 ($p < .05$).

Decision: The Sobel test suggests a significant indirect effect, supporting Hypothesis H2 that innovative pedagogical practices positively influence learning skills. Thus, this hypothesis is accepted.

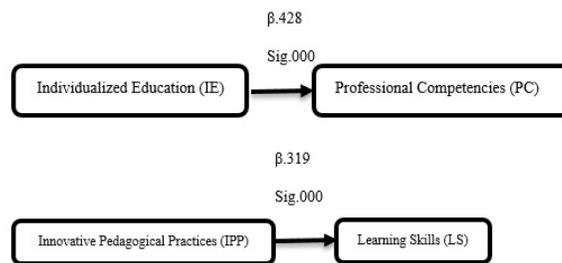


Figure 4: Diagrammatically

Table 2 presents the Pearson correlation coefficients among the key variables in the study, namely Individualized Education (IE), Professional Competencies (PC), Innovative Pedagogical Practices (IPP), and Learning Skills (LS). The table reveals significant correlations that offer valuable insights into the relationships between these constructs. Firstly, a highly positive correlation of .753 between IE and PC indicates a strong association between individualized education approaches and the development of professional competencies. This finding suggests that tailoring educational

experiences to individual student needs is closely linked to the enhancement of skills and attributes deemed crucial in professional contexts. Additionally, the strong correlation of .867 between IE and IPP shows the strength of the association between individualized education and innovative pedagogical practices. This shows that educational institutions are more likely to engage in innovative technologies to boost the effectiveness of teaching methodologies. Moreover, the results generated from PC and IPP (.642) show a moderately positive association. This shows that educational institutions focusing on

professional competencies are more engaged in innovative teaching methodologies. The association between these two constructs shows the importance of developing competencies along with innovative teaching methods within educational institutes. Furthermore, the strong positive correlation (.732) between PC and LS shows the importance of possessing professional competencies and innovative learning skills.

Furthermore, the correlation (.732) between IPP and LS shows a strong positive association. This means that students engaged in innovative pedagogical practices generate higher, more advanced levels of learning skills. This shows the importance of innovative teaching methodologies in the development of essential skills for students to become future specialists.

Table 3: Self-assessment of the ability and qualities of future design specialists in innovative activities

Characteristics of the teacher's readiness for innovative activity	Level	Control Group (66)		Experimental Group (67)	
		number	%	number	%
Motivational and creative orientation of the future designer to innovative activity	Top	6	9,1	7	10,4
	Average	37	56,1	37	55,3
	Lower	23	34,8	23	34,3
Assessment of the degree of creativity of the future designer	Top	9	13,6	11	16,4
	Average	32	48,6	28	41,8
	Lower	25	37,8	28	41,8
Assessment by the future designer of his professional abilities for the implementation of an innovative activity	Top	7	10,6	16	22,4
	Average	37	56,1	39	59,7
	Lower	22	33,3	12	17,9
Assessment of his personal qualities by the future designer	Top	11	16,6	13	19,4
	Average	34	51,6	33	49,3
	Lower	21	31,8	21	31,3

According to the results of the survey, the respondent's motivational and creative orientation to innovative activity was confirmed by their answers in the experimental group by 10.4% at the high level, 55.3% at the middle level, and 34.3% at the low level. We noted that the assessment of the degree of creativity of the future designer has a high level of 16.4%, a medium level of 41.8%, and a low level of 41.8%. An assessment of the future designer's own professional abilities to carry out an innovative activity shows that there are 22.4% at the high level, 59.7% at

the middle level, and 17.9% at the low level. It has been observed that the future designer has the character to assess his personal qualities at 19.4% high level, 49.3% medium level, and 31.3% low level. Next, in order to determine the level of innovative activity of design specialists working in production, respondents were instructed to answer the following questionnaire: "Determining the level of innovative activity of design specialists". During the analysis of the responses of design specialists, the following (Table 3) results were revealed.

Table 4: The result of a survey to determine the level of innovative activity of design specialists

	Inquisitive	Curiosity	Confidence	Confidence	Unreliable
Top	27,7	13,2	17,9	14,8	29,4
Average	38,8	42,7	52,7	39,3	31,2
Lower	33,3	44,1	29,4	45,9	39,4

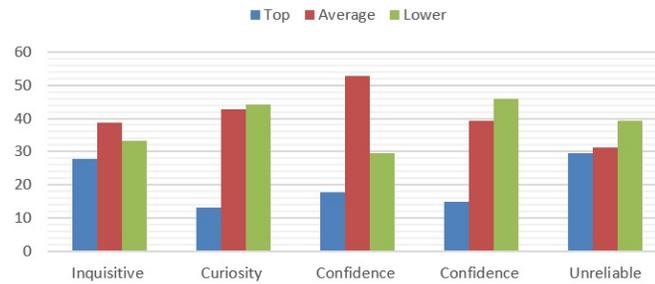


Figure 5: Indicators of the level of innovative activity of design specialists

The above diagram shows the level of interest in innovation dimensions, that is, those who do not believe in innovative methodologies versus those who consider traditional methodologies to be more reliable. In the next step of the experiment, cross-sectional tasks were performed in order to determine how much they attach importance to innovative activity, how much they understand the innovative nature of student-centred learning, and to test their understanding of innovation and innovative activity. It was found that the majority of students place specific emphasis on the development of innovative teaching methodologies as a main factor in becoming design specialists. This shows the importance of innovative activities in teaching methodologies.

DISCUSSION AND CONCLUSION

The results of the study highlighted the internal mechanisms between individualized education (IE), professional competencies (PC), innovative pedagogical practices (IPP), and learning skills (LS). Moreover, the strong positive association between IE and PC shows the significant impact of educational methodologies on developing professional competencies. Moreover, educational institutions need to focus more on individualized education. An individualized educational platform fosters innovative skills among future specialists in diverse educational fields. These findings are aligned with the principles highlighted in the State Program for the Development of Education and Science in the Republic of Kazakhstan (2020-2025). Moreover, these results highlight the importance of educational reforms based on the advancement of technology. In previous studies, the association between innovation and the future specialist was not

covered under the scope of the individualist learning approach (e.g., Abdurakhmonova, 2022; Shutova and Andryushchenko, 2020).

Furthermore, the strong associations between IE and IPP are an important indicator. These results represent the need for individualized education mechanisms. Moreover, the need for innovative pedagogical practices is important in developing specialist skills among the students. Meanwhile, the strong correlation between IE and LS further stresses the positive association of individualized education. The importance of innovative activities through the integration of modern educational applications and methodologies is an essential factor in the development of future specialists. Additionally, previous studies do not associate innovation with a self-based concept but rather with institutional policies (e.g., Lim et al., 2009; Santos et al., 2019; Turcsányi-Szabó et al., 2012).

Managerial implications

Educational institutions need to adopt the latest teaching methodologies that focus on innovative activities by fostering critical skills among the administrators. Furthermore, the administration needs to change traditional educational practices to modern technology-based educational approaches. Developing innovative skills is important not only for students but also for educational institutions, managers, and policymakers.

Theoretical implications

The study's findings contributed substantially to the theoretical perspective that gives a broader perspective on individualized education, professional competencies, innovative pedagogical practices, and learning skills. In the first phase, the strong association between individualized educational methodologies and professional competencies,

along with innovative pedagogical practices, provides theoretical solid foundations. Moreover, the strong positive association focused on the importance of crafting educational methodologies from an individual learning perspective. This represents the importance of the specialized learning culture contributing positively to the fostering of professional competencies through innovative teaching methodologies.

The study also provides strong evidence based on current theories linking professional competencies and specialities through innovative pedagogical practices. This highlights the importance of the institutions' development regarding professional competencies. Moreover, innovative teaching approaches address the importance of professional competencies and pedagogical innovation. Furthermore, the strong results between innovative pedagogical practices and learning skills enhance the theoretical discussions on the impact of teaching methodologies on student outcomes. The findings of the study contribute positively to the existing body of literature, which includes theories and assumptions regarding the educational system and the development of future specialists.

Future recommendations

The study was conducted specifically among secondary educational institutions in Kazakhstan. The applicability of the findings can be enhanced by adding higher education to the study. Furthermore, in the future, comparative studies between different educational institutes can yield valuable results.

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