

THE INTERDISCIPLINARY APPROACH – A KEY TO THE EDUCATION OF THE FUTURE

Lyubomira Spasova

Trakia University, Bulgaria, lyubomira.spasova@trakia-uni.bg

Abstract: The present study explores the role of the interdisciplinary approach as a key factor in the modernization of contemporary education. In the context of rapid technological development and increasing societal complexity, traditional subject-based teaching models are becoming insufficient to meet the demands of the 21st century. The research adopts a mixed-methods design, combining quantitative data from a survey conducted among 80 participants (teachers and university students) with qualitative insights obtained through semi-structured interviews. The findings reveal a high level of positive attitudes toward interdisciplinary learning ($M = 4.21$), alongside a moderately high level of its practical implementation ($M = 3.78$). A statistically significant difference was identified between teachers and students in terms of application, while attitudes remained consistently positive across both groups. Furthermore, a moderate positive correlation ($r = 0.62$) was found between knowledge and application of the interdisciplinary approach and its perceived effectiveness. The results highlight the existence of a gap between theoretical recognition and practical implementation, influenced by factors such as lack of time, insufficient training, and limited resources. The study emphasizes the need for targeted teacher training, institutional support, and the integration of interdisciplinary practices into educational curricula. In conclusion, the interdisciplinary approach represents a fundamental mechanism for enhancing educational quality and preparing learners for real-world challenges, fostering critical thinking, creativity, and collaborative skills.

Keywords: interdisciplinary approach, teaching methods, 21st-century skills, educational innovation

1. INTRODUCTION

In the context of a dynamically developing world characterized by rapid technological advancement, globalization, and increasing complexity of social processes, education faces the need for substantial transformation. Traditional models of teaching, based on a strict separation of academic disciplines, are increasingly unable to meet the demands of contemporary society (OECD, 2019; UNESCO, 2021). In this context, the interdisciplinary approach is emerging as a key tool for developing comprehensive knowledge, skills, and competencies necessary for both teachers and students of the future. Interdisciplinarity involves the integration of knowledge, methods, and perspectives from different scientific fields in order to achieve a deeper understanding of complex problems and phenomena. According to Repko and Szostak (2021), this approach enables overcoming the limitations of individual disciplines and the creation of new, synthesized knowledge. It promotes critical thinking, creativity, and the ability to solve real-life problems, which rarely fall within the scope of a single discipline (Beane, 2020; Klein, 2017). Furthermore, interdisciplinary learning encourages active learner participation and the development of collaboration and communication skills (Drake & Reid, 2020). The relevance of the interdisciplinary approach is particularly emphasized within the concept of the “teacher of the future,” which highlights flexibility, digital competence, and the ability to adapt to a rapidly changing educational environment. According to Schleicher (2020), the modern teacher should prepare students not only with academic knowledge but also with skills for collaboration, innovation, and solving complex problems. In addition, Fullan (2013) emphasizes the importance of new pedagogical models that integrate technology and interdisciplinary approaches to enhance the effectiveness of learning. In this sense, the teacher becomes a mediator, facilitator, and creator of integrated learning experiences that connect different fields of knowledge. The present study aims to analyze the role of the interdisciplinary approach as a key factor in the modernization of education, as well as to outline its advantages, challenges, and opportunities for practical application in the teaching and learning process.

2. MATERIALS AND METHODS

Research Design and Participants

The present study was conducted using a mixed-methods research approach, combining quantitative and qualitative methods in order to provide a more in-depth investigation of the application of the interdisciplinary approach in contemporary education. The selection of this design allows for the simultaneous analysis of objectively measurable results and the interpretation of participants’ subjective attitudes, opinions, and experiences (Creswell & Creswell, 2018). The quantitative part of the study was carried out through a survey aimed at determining the extent to which interdisciplinary practices are used in the educational process, as well as teachers’ attitudes toward this approach. The qualitative component included semi-structured interviews, which enabled a more detailed exploration of

participants' perceptions, challenges, and best practices related to integrated learning (Flick, 2018). The study was conducted among a total of 80 participants, including lecturers from different faculties of Trakia University, as well as students from various fields such as Veterinary Medicine, Economics, and Information Technologies. The participants were selected through purposive sampling, with the main criterion being experience or interest in the application of the interdisciplinary approach in education. The distribution of participants was as follows: 50 active lecturers from the Faculty of Veterinary Medicine and the Faculty of Economics at Trakia University, and 30 students from the same faculties, enrolled in full-time programs. The lecturers teach various academic disciplines, including natural sciences, humanities, and information technologies, which allows for a broader perspective on the possibilities of interdisciplinary. All participants were informed about the purpose of the study and provided voluntary consent to participate, while their anonymity and the confidentiality of the provided information were ensured.

Data Collection Instrument and Measurement

For the purposes of the study, two main data collection instruments were used: a questionnaire survey and semi-structured interviews, in accordance with the selected mixed-methods research design. The questionnaire was specifically developed for the present study and consists of a total of 20 questions, organized into three main sections: (1) demographic characteristics of the participants; (2) level of knowledge and application of the interdisciplinary approach; and (3) attitudes, perceptions, and evaluation of the effectiveness of interdisciplinary learning. The questions are formulated as closed-ended, semi-open, and scaled statements. A five-point Likert scale (ranging from 1 – “strongly disagree” to 5 – “strongly agree”) was used to measure attitudes, allowing for the quantitative assessment of participants' opinions and subsequent statistical analysis (Likert, 1932). This scale is widely used in educational research due to its reliability and ease of interpretation (Joshi et al., 2015). For a more precise measurement of the studied constructs, two main scales were developed. The first scale – “Knowledge and Application of the Interdisciplinary Approach” – includes five items covering the level of conceptual understanding, the ability to integrate knowledge from different disciplines, the frequency of application, confidence in using interdisciplinary methods, and the availability of resources. The second scale – “Attitudes, Perceptions, and Effectiveness of Interdisciplinary Learning” – consists of seven items measuring the perceived impact of the interdisciplinary approach on understanding the learning material, student motivation, development of critical thinking, creativity, teamwork skills, and the applicability of knowledge in real-life situations. The reliability of both scales was assessed using Cronbach's alpha coefficient. The obtained values indicate a high level of reliability: $\alpha = 0.84$ for the first scale and $\alpha = 0.89$ for the second scale, corresponding to good to very good internal consistency (Taber, 2018).

Qualitative data were collected through semi-structured interviews, including six main questions aimed at a more in-depth exploration of participants' experiences, challenges in applying the interdisciplinary approach, and identification of best practices. This method allows flexibility and the possibility of follow-up questions, resulting in richer and more detailed information (Kvale & Brinkmann, 2015). To ensure the validity of the instruments, the questionnaire was pilot-tested with a small group of 10 participants, and revisions were made to improve clarity and accuracy. The reliability of the scale was further verified through the calculation of Cronbach's alpha, which indicated a good level of reliability ($\alpha > 0.80$) (Taber, 2018). The collected data were processed in accordance with ethical standards for scientific research, ensuring the confidentiality and anonymity of the participants.

Data Analysis

Data analysis was conducted using statistical software (SPSS, version 23). Descriptive statistics were used to summarize participants' characteristics and key variables, including means (M) and standard deviations (SD). Correlation analysis (Pearson correlation) was applied to examine the relationship between the level of knowledge and application of the interdisciplinary approach and attitudes toward its effectiveness. In addition, comparative analyses (independent samples t-test) were conducted to identify statistically significant differences between groups (teachers and students). The reliability of the scales was assessed using Cronbach's alpha coefficient, confirming good internal consistency of the instrument. The level of statistical significance was set at $p < 0.05$ (Field, 2022). The study was conducted in accordance with established ethical principles for social research. Participation was voluntary, and anonymity and confidentiality were ensured. The research design complies with international ethical standards for survey-based studies (Creswell & Creswell, 2023).

3. RESULTS

Descriptive Statistics

The results of the quantitative analysis indicate overall positive attitudes toward the interdisciplinary approach, along with a moderately high level of its implementation in educational practice.

Table 1. Descriptive statistics of the main scales

Scale	N	Mean	SD	Cronbach's α
Knowledge and Application	80	3.78	0.64	0.84
Attitudes and Effectiveness	80	4.21	0.58	0.89

Source: own compilation.

The findings show that participants demonstrate a relatively high level of positive attitudes toward interdisciplinary learning ($M = 4.21$), while the level of actual implementation is slightly lower ($M = 3.78$). This discrepancy suggests the presence of barriers in the practical application of interdisciplinary approaches. These results are consistent with previous studies indicating a gap between positive perceptions and actual classroom practices (Drake & Reid, 2020; Fullan, 2013). Similarly, OECD (2019) highlights that although educators recognize the value of interdisciplinary learning, systemic and institutional constraints often limit its effective integration into teaching practice.

Item-Level Analysis

Table 2. Mean values of individual items (Likert scale 1–5)

Statement	Mean	SD
I am familiar with the principles of interdisciplinary learning	3.95	0.72
I apply interdisciplinary methods in my teaching	3.61	0.81
I feel confident in applying them	3.70	0.76
The interdisciplinary approach improves understanding	4.30	0.60
It increases student motivation	4.25	0.65
It develops critical thinking	4.33	0.57
It promotes teamwork	4.20	0.62

Source: own compilation.

The highest mean values are observed in statements related to the development of critical thinking ($M = 4.33$) and improved understanding ($M = 4.30$), emphasizing the perceived effectiveness of the interdisciplinary approach. These findings align with the work of Beane (2020) and Klein (2017), who argue that interdisciplinary learning enhances cognitive engagement and deeper understanding of complex concepts. Furthermore, the relatively lower scores related to actual application ($M = 3.61$) and confidence ($M = 3.70$) suggest that while educators acknowledge the benefits, they may lack sufficient training or institutional support. This observation is also supported by Schleicher (2020), who emphasizes the need for professional development to enable teachers to effectively implement innovative teaching strategies.

Inferential Statistics

To examine differences between groups (teachers and students), an independent samples t-test was conducted.

Table 3. Comparison between teachers and students

Scale	Group	Mean	SD	t	p
Knowledge and Application	Teachers	3.92	0.58	2.34	0.022*
	Students	3.55	0.67		
Attitudes and Effectiveness	Teachers	4.25	0.55	1.12	0.265
	Students	4.15	0.61		

Source: own compilation.

The results reveal a statistically significant difference in the level of application ($p = 0.022$), with teachers demonstrating higher scores compared to students. This finding can be explained by teachers' practical experience and greater exposure to real classroom environments, which facilitate the integration of interdisciplinary approaches. No statistically significant differences were found regarding attitudes, indicating that both groups share similarly positive perceptions. This supports the findings of Repko and Szostak (2021), who argue that interdisciplinary thinking is widely recognized as valuable across different levels of education, even if its application varies depending on experience.

Correlation Analysis

Table 4. Correlation between main variables

Variables	1	2
1. Knowledge and Application	1	
2. Attitudes and Effectiveness	0.62**	1

Source: own compilation.

A moderately strong positive correlation ($r = 0.62$) was identified, indicating that higher levels of knowledge and application of the interdisciplinary approach are associated with more positive attitudes and higher perceived effectiveness. This finding is consistent with previous research emphasizing that familiarity with interdisciplinary methods enhances both confidence and perceived value (Drake & Reid, 2020; Fullan, 2013). Moreover, it supports the theoretical framework proposed by Repko and Szostak (2021), which suggests that interdisciplinary competence develops through both understanding and active application. Overall, the results confirm that while the interdisciplinary approach is highly valued, its successful implementation depends on factors such as experience, training, and institutional support.

4. DISCUSSION

The obtained results confirm the significance of the interdisciplinary approach as a key element in contemporary education. Participants demonstrate a high level of positive attitudes toward this approach, which is consistent with previous research emphasizing its role in developing 21st-century skills such as critical thinking, creativity, and collaboration (OECD, 2019; Schleicher, 2020; UNESCO, 2021). However, the observed discrepancy between attitudes ($M = 4.21$) and actual implementation ($M = 3.78$) highlights the existence of a “gap between theory and practice.” This finding is in line with Drake and Reid (2020), who note that although teachers recognize the benefits of interdisciplinary learning, they often face difficulties in effectively implementing it in real classroom settings. Similar conclusions are drawn by Fullan (2013), who argues that educational innovations frequently encounter systemic barriers that hinder their practical application.

The statistically significant differences between teachers and students in terms of the application of the interdisciplinary approach can be explained by the practical experience of teachers, which enables them to more effectively integrate knowledge across disciplines. In contrast, the absence of significant differences in attitudes between the two groups suggests that interdisciplinary is positively perceived by both future and current educators. This supports the findings of Repko and Szostak (2021), who emphasize that interdisciplinary thinking is widely valued across educational contexts, regardless of experience level. The identified moderately strong positive correlation between knowledge and attitudes ($r = 0.62$) confirms the assumption that a better understanding of the interdisciplinary approach leads to a higher evaluation of its effectiveness. This result is consistent with theoretical perspectives suggesting that interdisciplinary competence is developed through both conceptual understanding and active application (Repko & Szostak, 2021; Klein, 2017). The qualitative findings complement the quantitative data by revealing key challenges, including lack of time, insufficient methodological training, and limited resources. These barriers are widely discussed in the literature as major obstacles to educational innovation and reform (Fullan, 2013; Schleicher, 2020). Additionally, recent studies (e.g., Voogt & Roblin, 2012; OECD, 2019) highlight the importance of institutional support and policy alignment in facilitating the successful implementation of interdisciplinary practices. In summary, the results emphasize the need for targeted support for educators through professional development, access to resources, and institutional policies that promote interdisciplinary teaching as a sustainable model for educational development.

5. CONCLUSIONS

The present study confirms that the interdisciplinary approach plays a crucial role in the development of contemporary education and in preparing students for future challenges. The findings indicate that despite high levels of positive attitudes toward interdisciplinary learning, its actual implementation remains limited due to a range of practical and organizational factors. The identified relationship between knowledge and attitudes highlights the importance of teacher training and professional development as key factors for the successful implementation of interdisciplinary approaches. In this context, the role of the teacher is evolving from a transmitter of knowledge to an active mediator and designer of integrated learning experiences, which aligns with modern educational paradigms (Schleicher, 2020; UNESCO, 2021).

Recommendations for future research and practice: 1) Development of specialized training programs for teachers focused on interdisciplinary teaching methods; 2) Integration of interdisciplinary modules into educational curricula; 3) Provision of resources and digital tools to support integrated learning; 4) Encouragement of collaboration among teachers from different subject areas; 5) Stronger institutional and policy support for the implementation of educational innovations. In conclusion, the interdisciplinary approach can be considered a fundamental mechanism for the modernization of education, creating opportunities for more effective, engaging, and practice-oriented learning. Its successful implementation requires a holistic strategy that combines teacher preparation, institutional support, and innovative pedagogical practices.

ACKNOWLEDGEMENTS

The author would like to express sincere gratitude to my family for their support throughout the preparation of this study. Special thanks are also extended to Trakia University for providing the necessary resources and institutional support that facilitated this research.

Funding: This research was funded by the Bulgarian Ministry of Education and Science (MES) in the frames of the Bulgarian National Recovery and Resilience Plan, Component “Innovative Bulgaria,” Project No. BGRRP-2.004-0006-C02, “Development of research and innovation at Trakia University in service of health and sustainable well-being.

REFERENCES

- Beane, J. A. (2020). *Curriculum integration: Designing the core of democratic education*. Teachers College Press.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp0630a>
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). SAGE Publications.
- Drake, S. M., & Reid, J. L. (2020). Integrated curriculum as an effective way to teach 21st century capabilities. *Asia Pacific Journal of Educational Research*, 3(1), 31–50.
- Field, A. (2022). *Discovering statistics using IBM SPSS statistics* (6th ed.). SAGE Publications.
- Flick, U. (2018). *An introduction to qualitative research* (6th ed.). SAGE Publications.
- Fullan, M. (2013). *Stratosphere: Integrating technology, pedagogy, and change knowledge*. Pearson.
- Joshi, A., Kale, S., Chandel, S., & Pal, D. (2015). Likert scale: Explored and explained. *British Journal of Applied Science & Technology*, 7(4), 396–403. <https://doi.org/10.9734/BJAST/2015/14975>
- Klein, J. T. (2017). Typologies of interdisciplinarity: The boundary work of definition. In R. Frodeman (Ed.), *The Oxford handbook of interdisciplinarity* (2nd ed., pp. 21–34). Oxford University Press.
- Kvale, S., & Brinkmann, S. (2015). *InterViews: Learning the craft of qualitative research interviewing* (3rd ed.). SAGE Publications.
- Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology*, 140, 1–55.
- OECD. (2019). *The future of education and skills 2030*. OECD Publishing. <https://www.oecd.org/education/2030-project/>
- Repko, A. F., & Szostak, R. (2021). *Interdisciplinary research: Process and theory* (4th ed.). SAGE Publications.
- Schleicher, A. (2020). *World class: How to build a 21st-century school system*. OECD Publishing.
- Taber, K. S. (2018). The use of Cronbach’s alpha when developing and reporting research instruments. *Research in Science Education*, 48, 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>
- UNESCO. (2021). *Reimagining our futures together: A new social contract for education*. UNESCO Publishing. <https://unesdoc.unesco.org/>

Voogt, J., & Roblin, N. P. (2012). A comparative analysis of international frameworks for 21st century competences. *Journal of Curriculum Studies*, 44(3), 299–321. <https://doi.org/10.1080/00220272.2012.668938>