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Technology for Achieving Learning Objectives Through a System-Activity Approach and the Development of Critical Thinking in Geography Studies

Bakhadurkhan Abdimanapov[1], Sanat Kumarbekuly[2], Ilgizar Gaisin[3]

Abstract

This article explores the integration of technology through a system-activity approach to enhance critical thinking and achieve learning objectives in geography education. The system-activity approach, grounded in constructivist learning theory, emphasizes active learning, student engagement, and critical thinking development. By incorporating digital tools such as Geographic Information Systems (GIS) and Virtual Reality (VR), the approach enables students to explore complex geographical phenomena, analyze spatial data, and engage with real-world problems interactively. This study employs survey methodology to assess the impact of technology-enhanced, activity-based learning on students' critical thinking and overall learning outcomes. The findings underscore the effectiveness of the system-activity framework in improving geography education by fostering deeper engagement and understanding of geographical concepts. This paper contributes to the ongoing discourse on educational innovation, offering insights for educators aiming to integrate modern technologies into geography studies to enhance student competencies in navigating modern information spaces and developing essential 21st-century skills.

Keywords: *System-Activity Approach, Critical Thinking, Learning Objectives, Educational Technology, Quantitative Research, Geography Teaching Strategies.*

Introduction

In the rapidly evolving educational landscape, the integration of technology in curriculum delivery has emerged as a pivotal element in enhancing learning outcomes. The discipline of geography, with its inherent complexity and the need for a nuanced understanding of spatial relationships, presents unique challenges and opportunities for the application of innovative teaching methodologies (Metoyer, Bednarz, & Bednarz, 2015; Bednarz, Jo, & Shin, 2022). Therefore, our article introduces the system-activity approach as a structured framework that leverages technology to foster critical thinking and achieve learning objectives in geography studies, in order to bridge the gap between traditional pedagogical techniques and the demands of modern educational paradigms.

The advent of digital tools and resources has transformed the educational arena, offering unprecedented opportunities for interactive learning and engagement. However, the effective integration of these technologies into teaching practices requires a deliberate and systematic approach to ensure that the potential benefits are fully realized. The system-activity approach, rooted in constructivist learning theory, emphasizes active learning, student engagement, and the development of critical thinking skills through structured activities and tasks. In geography education, this approach is particularly pertinent, as it enables students to explore complex geographic phenomena, analyze spatial data, and engage with real-world problems in an immersive and interactive manner (Kerimbayev et al., 2023).

The development of geography as an academic discipline highlights the duality of sections within physical geography, rooted in the Earth sciences, and social geography, emphasizing human behavior and spatial activities (Winchell, 2000). This dualistic nature of geography defines the interdisciplinary character of the field, encompassing both natural and social sciences to provide a comprehensive understanding of the Earth's physical and human landscapes. By employing a systems approach, geographers can analyze and

[1] Department of Geography and Ecology, Abai Kazakh National Pedagogical University, Almaty, Kazakhstan, Email: bahadur_66@mailru
[2] Sarsen Amanzholov University of East Kazakhstan, Ust-Kamenogorsk, Kazakhstan, Email: sanat_kv@mail.ru, (Corresponding author)
[3] Kazan federal university, Kazan, Russia, Email: Gaisinilgizar@yandex.ru

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understand the interconnection of various geographical phenomena, contributing to a more integrated and detailed perspective in geographical research.

Moreover, this article outlines the theoretical underpinnings of the system-activity approach and its applicability to geography studies. The systems-activity approach in teaching geography encompasses the integration of theoretical foundations with practical activities for students to enhance their critical and spatial thinking as well as their overall academic performance. By adopting a systems perspective, geographers can navigate the complexities of geographical phenomena, fostering a more interconnected and holistic understanding of the world around us. The systems-activity approach plays a key role in improving student learning outcomes and comprehension of geographical concepts. Said and Ahmad (2021) highlight the pedagogical preferences of geography teachers regarding teacher-centered learning activities as opposed to the challenges of student-centered learning (Said & Ahmad, 2021). This understanding emphasizes the importance of aligning teaching methods with the systems-activity approach to optimize student engagement and learning outcomes, highlighting the role of educators in facilitating meaningful learning in geography classrooms. Therefore, several researchers stress the importance of incorporating activities into geography textbooks that promote the development of student skills to positively impact academic achievement in geography lessons (Şanli, C. and Çetin, 2022]. Hashim et al. (2019) note the importance of aligning the development of the geography curriculum with the systems-activity approach to support student learning progress and foster a holistic educational experience at different levels [Hashim, M.,2019].

It discusses the methodology employed to examine the impact of technology-enhanced, activity-based learning on students' critical thinking abilities and overall learning outcomes. Through a comprehensive analysis of empirical data gathered from educational institutions employing this approach, the paper presents key findings that highlight the effectiveness of integrating technology with a system-activity framework in geography education. The introduction sets the stage for a detailed exploration of how technology, when used within a structured pedagogical framework, can significantly enhance the teaching and learning of geography. It posits that the system-activity approach, complemented by the thoughtful use of technological tools, can lead to improved critical thinking skills, deeper engagement with the subject matter, and superior educational outcomes. This paper aims to contribute to the ongoing dialogue on educational innovation and provide valuable insights for educators seeking to optimize the use of technology in geography studies (Yamagata-Lynch, 2010; Alemán de la Garza L. et al., 2019).

Further in this section, we will delve into the current challenges facing geography education and explore the potential of technology to effectively address these challenges, paving the way for enhanced learning experiences.

In the field of geographic education, the development of critical thinking skills in students is of paramount importance, as it helps them understand and navigate the complex and dynamic conditions of the modern world. Various studies have delved into innovative approaches to fostering critical thinking in geographic studies. For example, Silviarza et al. (2020) advocate for the use of a spatial problem-based learning model to enhance critical thinking skills in geographic education. This model is seen as a tool for preparing students for the dynamic changes anticipated in the 21st century. [Silviarza et al. 2020]. It is also important to use field laboratories, which have become valuable tools for developing critical thinking skills in geographic education. As'ari et al. (2021) emphasize the significance of field laboratories in developing students' skills in analysis and synthesis, problem-solving, and evaluation [As'ari et al., 2021]. The integration of social learning materials based on geographic literacy is effective in enhancing critical and creative thinking skills. For example, Sugiyanto (2022) highlights that modules based on geographic literacy can stimulate high levels of critical, creative, and collaborative thinking among students, thereby contributing to a broader perspective [Sugiyanto, 2022]. The comparison method in teaching geography has also been identified as a catalyst for the development of critical thinking skills. Thus, Grmusa et al. (2022) highlight the role of the comparison method in developing critical thinking, allowing students to effectively discuss and defend their viewpoints within the context of geographic education [Grmusa et al., 2022].

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Geographic education is fundamental for shaping students' geographic understanding of the world and achieving specific educational goals. To improve geography learning outcomes, it is essential for teachers to employ various strategies and approaches that address the diverse needs of students. One effective method is integrating modern materials and technologies into the curriculum. [Syarif et al., 2023]. By incorporating these materials, teachers can provide students with a more comprehensive and engaging learning experience, ultimately leading to improved academic performance. Assessment of geographic skills is another crucial aspect of geographic education [Astuti, 2017]. Assessing students' proficiency in various geographic skills allows teachers to adapt teaching methods to address specific educational needs. This process helps refine the curriculum and instructional strategies to better align with the learning objectives set for geography education. Incorporating research activities and web platforms, such as WebGIS, into geography lessons can make the learning experience more interactive and practical for students [Csachová, 2020]. By engaging in practical activities that include real-world applications, students can develop a deeper understanding of geography and its relevance to everyday life.

The integration of system-activity approaches and critical thinking into geography studies is essential for educational modernization in Kazakhstan, particularly for enhancing students' functional literacy and competencies in navigating modern information spaces. Kumarbekuly and Abdimanapov (2022) emphasize the significance of this approach in preparing students for independent problem-solving and effective communication, aligning with Kazakhstan's educational goals of developing comprehensive knowledge, practical skills, and a creative, active learning approach. This methodological shift is integral to fostering the intellectual and moral development of students, highlighting the broader educational strategy of Kazakhstan to cultivate a well-rounded, critically thinking individual capable of navigating contemporary challenges (Kumarbekuly & Abdimanapov, 2022).

Moreover, the integration of system-activity approaches and critical thinking in geography studies is underscored by the importance of interdisciplinarity in the modern educational landscape, as detailed by Suhodimtseva, Vorozheikina, and Eremina (2019). Their research highlights the necessity of fostering creative and critical thinking skills in students to navigate the complexities of a post-industrial society and enhance their professional competitiveness. By adopting an interdisciplinary approach, geography education can benefit from integrative processes that promote a comprehensive understanding of global challenges and solutions, facilitating the development of well-rounded individuals capable of making significant, responsible decisions (Suhodimtseva, Vorozheikina, & Eremina, 2019).

Integrating system-activity approaches and critical thinking in geography studies aligns with the educational shift towards project-based activities that foster interdisciplinary learning, as emphasized by Luneeva and Zakirova (2017). This approach not only enhances subject knowledge but also develops essential meta-subjective abilities such as teamwork, communication, and self-organization, demonstrating the value of inter-subject projects in broadening students' educational experiences (Luneeva, O. L., & Zakirova, V. G., 2017).

The integration of system-activity approaches and critical thinking in geography studies can significantly benefit from the insights provided by Major et al. (2022), who investigate the nuanced role of digital technology in supporting classroom dialogue through the lens of enacted affordances. Their methodological framework, demonstrated in the context of using the Talkwall microblogging platform, offers a novel approach to analyzing how digital tools can facilitate meaningful dialogue and interaction in educational settings. This research underscores the potential of digital technology to enhance learning experiences by fostering critical engagement and interactive learning processes in geography and beyond (Major et al., 2022).

Burbules, Fan, and Repp (2020) discuss the transformative potential of new digital technologies in geography education, highlighting how these innovations are reshaping educational objectives, processes of learning and teaching, and even the governance and policy surrounding education. They emphasize that while technology offers new possibilities for enhancing the quality of education and supporting sustainable development goals, there is also a need for cautious reform that acknowledges the potential risks and challenges associated with these trends. This dual perspective underscores the importance of integrating

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technology in geography education with an awareness of both its benefits and potential drawbacks (Burbules, N. C., Fan, G., & Repp, P. 2020).

The development of web-based media learning offers an opportunity to leverage technology to enhance geographic education [Rachmawati, 2024]. By using platforms like Moodle, teachers can create interactive and engaging learning experiences that cater to various learning styles. Similarly, incorporating spatial thinking modules within geographic information systems can enhance students' spatial abilities and stimulate their interest in geography [Mayalagu et al., 2018]. Media tools such as 3D models and virtual reality offer innovative ways to present geographic information and engage students in an immersive learning experience [Prasetya et al., 2018; Putra et al., 2022]. By incorporating these technologies into geography lessons, teachers can create dynamic and stimulating environments that enhance student learning outcomes. Additionally, instructional strategies that promote effective learning play a vital role in engaging students and creating a positive educational atmosphere [Dewi, 2020].

Discovery-based learning strategies offer a student-centered approach to geographic education that encourages active exploration and critical thinking. [İlhan & Gülersoy, 2019]. Utilizing resources like YouTube can also enhance student motivation and engagement by presenting geographic content in a dynamic and accessible format [Fenika, 2024].

Bagoly-Simó, Hartmann, and Reinke's (2020) exploration into the impacts of the COVID-19 pandemic on geography education in Germany reveals significant challenges and adjustments needed in teaching methods and curriculum content. The study underscores the necessity for geography education to adapt to the constraints of remote learning, emphasizing the role of digital technology in maintaining educational standards and facilitating the acquisition of geographical knowledge amidst unprecedented disruptions. This research highlights the potential of technology to mitigate administrative and educational challenges, suggesting a reevaluation of educational media usage and communication strategies to ensure effective learning experiences in geography education (Bagoly-Simó, P., Hartmann, J., & Reinke, V., 2020).

Criollo-C, Guerrero-Arias, Jaramillo-Alcázar, and Luján-Mora (2021) discuss the transformative impact of mobile learning technologies on geography education, highlighting the shift from traditional memorization-based models to more dynamic, student-centered approaches. They emphasize the importance of addressing the challenges associated with mobile technology integration to enhance the educational experience. By centering the student in the learning process and leveraging the vast resources available through mobile devices, educators can foster a more engaging and effective learning environment for geography studies (Criollo-C, S. et al., 2021).

Schaal (2020) highlights the transformative potential of location-based games in geography and environmental education, leveraging mobile devices' ubiquity and positioning technologies. These games, which adapt content and actions based on the player's geographic location, offer novel ways to engage students by encouraging them to explore and interact with their surroundings. However, Schaal also notes the need for these educational games to move beyond simple navigation tasks, echoing Puentedura's (2014) call for technology to enhance and transform learning experiences, indicating a promising yet underexploited area in geography education (Schaal, S. 2020).

Field-based learning provides students with the opportunity to explore and study various geographic phenomena in their natural environment, fostering a deeper understanding of geographic concepts [Sahrina et al., 2022]. Field studies offer a hands-on approach to learning, allowing students to apply theoretical knowledge in practical settings, thereby reinforcing their understanding of geographic principles [Kusumawati & Mukminan, 2019]. Incorporating local landscapes and other environmental elements can serve as a valuable educational resource, enriching students' geographic experience [As'ari & Mulyanie, 2019]. Integrating the use of the environment as an educational resource can enrich geographic education by immersing students in practical, real-world scenarios that promote active learning and critical thinking [Apriani & Rahmanelli, 2018].

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The contextual approach to studying geography emphasizes the importance of linking classroom content to real-world contexts [Puastuti & Sinthiya, 2021]. By presenting geographic concepts in an understandable way, teachers can enhance students' comprehension and retention of material. The application of contextual learning provides a foundation for connecting theoretical concepts with practical applications, improving students' understanding and retention of geographic knowledge [Oroh & Karwur, 2023]

Prisille and Ellerbrake (2021) discuss the integration of Virtual Reality (VR) into geography education, highlighting its potential to enhance media literacy and provide immersive experiences of remote locations within the classroom setting. They emphasize the importance of digital media in modern geography education, given its prevalence in students' lives outside school, and suggest that constructivist theories serve as a solid theoretical foundation for incorporating VR. However, they also note that the full potential of VR in geography education is still a subject for future research (Prisille, C., & Ellerbrake, M., 2021).

Wilmot and Brooks (2023) critically analyze the contributions of the CGE Springer book series to geography education, highlighting its engagement with critical global challenges such as climate change, globalisation, and the need for powerful knowledge. Despite these efforts, they identify significant gaps in the diversity of knowledge production and the geographical origins of scholarship. They argue that while the series has the potential to significantly influence the development of transformative pedagogies and curriculum renewal, there's a pressing need for more comprehensive approaches to fully address the complexities of future geographical education challenges (Wilmot, D., & Brooks, C., 2023).

Lee (2023) examines the integration of advanced technologies such as open data, big data, Artificial Intelligence (AI), and Geographic Information Systems (GIS) in geography education, proposing an inquiry-based learning approach to incorporate these technologies into high school geography lessons. This study underscores the unexplored educational potential of these emerging technologies and suggests a framework for developing geospatial inquiry activities aligned with the Korean Geography curriculum. By doing so, Lee argues that incorporating these technologies into geography education can provide students with a deeper, more realistic understanding of geographical concepts and equip them with essential 21st-century skills (Lee, J., 2023).

Peter and Sprenger (2022) explore the impact of digitalization on geography education through a detailed curriculum analysis across various school types in every German federal state. Their study highlights the alignment (or lack thereof) between the current state of subject-specific digitalization in education and societal needs. Furthermore, they provide insights into the crucial role digitalization plays in enhancing geography education, emphasizing its potential to address both new opportunities and challenges presented by our increasingly digital society (Peter, C., & Sprenger, S. 2022).

Meadows (2020) emphasizes the critical role of geography education in addressing the climate crisis and promoting sustainable development. He advocates for geography as an integrating discipline that spans across sciences, social sciences, and humanities, uniquely positioning it to develop a holistic understanding of global environmental challenges. Meadows also highlights the significance of initiatives like the International Year of Global Understanding and the activities of the International Geographical Union in fostering a sustainable future through education, emphasizing geography's pivotal role as "the science for sustainability" in equipping future generations with necessary adaptation and mitigation skills (Meadows, M. E., 2020).

González et al. (2021) discuss the critical gap in integrating Geographic Information Systems (GIS) education within development studies programs, particularly in the Global South, despite GIS's growing importance in supporting evidence-based decisions across various sectors. Through a case study of a Vietnamese undergraduate curriculum, they explore the challenges and opportunities of implementing a GIS module, drawing on feedback from both students and academic staff. The paper concludes with recommendations aimed at enhancing GIS education in development studies, fostering a broader discussion on how to effectively incorporate this essential tool in higher education contexts (González, A. et.al, 2021).

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Selialia and Kurata (2023) examine the hurdles to integrating technology within Lesotho's secondary geography education, pinpointing issues such as inadequate funding, insufficient professional development for teachers, inconsistent technology use across schools, and vague policies. They propose leveraging Atabek's comprehensive interventionist framework to tackle these barriers, suggesting the development of clear policies by Lesotho's Ministry of Education and Training, alongside strategic planning and budgeting for technology integration. Their recommendations aim to enhance geography education's alignment with 21st-century educational demands through effective technology integration (Selialia, M., & Kurata, L., 2023).

Rakuasa (2023) delves into the integration of Artificial Intelligence (AI) in geography learning, highlighting both the potential for enhanced interactive visualization and personalized learning, and the challenges such as equitable access and the need for teacher training. The study, grounded in a descriptive methodology with a literature review, underscores AI's capabilities in geographic data analysis and its contribution to tackling global issues like climate change. This research offers insights into the transformative effects of AI on geography education and society, proposing a framework for educators and researchers to fully leverage AI's benefits while addressing its challenges (Rakuasa, H. 2023).

The current landscape of geography education is marked by both significant challenges and immense opportunities, as illustrated by the diverse array of studies reviewed. From the integration of system-activity approaches to the implementation of advanced technologies like artificial intelligence and geospatial information systems, geography education is at a pivotal juncture. The literature suggests a concerted move towards making geography education more interactive, engaging, and relevant to contemporary global challenges such as sustainable development, climate change, and the digital revolution.

The potential of technology in transforming geography education is evident, with innovations like virtual reality, mobile learning, and location-based games offering new ways to experience and understand geographical concepts. However, these advancements are not without their challenges. Issues such as equitable access to technology, the need for teacher training in digital tools, and the integration of these technologies into existing curricula are recurrent themes. Moreover, the push towards digitalization in geography education necessitates a reevaluation of curricular content to ensure it aligns with the rapid changes in our society and environment.

The system-activity approach in geography education represents a dynamic integration of theoretical knowledge with practical engagement, aiming to deeply root students' understanding of geographical concepts through direct involvement in their learning processes. At the core of this approach lies the identification of essential geographical concepts that not only align with the curriculum but also resonate with real-world issues such as climate change, urbanization, and natural resource management. To bring this approach to life, educators design a variety of activities, ranging from fieldwork and project-based learning to simulations and case studies, all of which require students to apply theoretical concepts to practical, real-world contexts. The integration of technology, such as Geographic Information Systems (GIS), virtual reality (VR) tours, and online research databases, plays a crucial role in enriching these activities. These technologies offer interactive and immersive platforms for students to explore, analyze, and understand geographical data, thereby fostering a deeper engagement with the subject matter. The approach also emphasizes collaborative learning, where students work in groups to solve problems, conduct research, and present their findings, thereby nurturing essential skills like communication, teamwork, and critical thinking. Reflection and feedback sessions are integral to this approach, providing students with opportunities to discuss their learning experiences, challenges encountered, and the strategies they employed, while also receiving constructive feedback to guide their learning journey.

Technology's role in enhancing critical thinking and achieving learning objectives within geography education cannot be overstated. It offers dynamic and interactive platforms that encourage students to engage more deeply with the content, analyze complex data, and develop informed solutions to geographical problems. For example, Geographic Information Systems (GIS) empower students to visualize, manipulate, and analyze geographic data, thus promoting spatial thinking and problem-solving skills. Virtual reality (VR), on the other hand, provides immersive experiences that transport students to

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distant locations, allowing them to explore and understand geographic concepts within their real-world contexts. These technological tools stimulate students to question, analyze, synthesize information, and develop hypotheses, which are key components of critical thinking. Furthermore, technology facilitates access to a vast array of data sources and scholarly materials, enabling students to conduct thorough research, compare perspectives, and develop well-informed arguments. As such, technology not only enhances the learning experience but also equips students with the critical thinking skills necessary for understanding and addressing the complexities of our world.

Thus, the synthesis of pedagogical and methodological research highlights the importance of innovative teaching methods, such as SPBL (Spatial Problem-Based Learning), field laboratories, and specialized educational materials, which contribute to the use of the systems-activity approach in teaching and the development of critical thinking skills in geographic education. By employing these approaches, educators can teach students to think critically and creatively, analyze information effectively, and develop a deeper understanding of the world around them.

Overall, achieving educational goals in geography requires a multifaceted approach that combines advanced teaching methods and technologies, practical activities, and innovative instructional strategies. By adopting a student-centered and holistic approach to geographic education, teachers can create a dynamic learning environment that fosters curiosity and interest in learning, motivation, and critical thinking among students.

As geographic education continues to evolve, it must leverage these technologies and pedagogical approaches to prepare students for the realities and challenges of the 21st century. By adapting to changes in the natural and social environments, geographic education ensures that students are not only consumers of geographic knowledge but also active participants in its creation, application, and integration into everyday life.

Methodology

This study employs a survey methodology to explore the implementation and challenges of the system-activity approach in geography education among educators. The survey comprises structured questions designed to gather comprehensive insights from geography educators across various educational settings, including schools, colleges, and higher education institutions. The survey queries participants about their familiarity and engagement with the system-activity approach, professional development experiences, perceived importance and challenges of implementing this approach in geography lessons, and suggestions for enhancing criterion-based learning and professional development opportunities.

Data collection is conducted online, ensuring anonymity and voluntary participation, to encourage honest and uninhibited responses from educators. This method allows for a broad geographical and institutional representation, enriching the study's data with diverse educational perspectives and experiences. The survey's structured nature facilitates quantitative analysis of responses to questions about educators' awareness, experiences, and perceptions of the system-activity approach, as well as qualitative insights from open-ended questions regarding difficulties encountered, methods and techniques used, and recommendations for improvement. This dual focus enables a comprehensive understanding of the current state of system-activity learning in geography education, highlighting both its strengths and areas requiring attention.

Data analysis combines quantitative methods to statistically assess the prevalence of specific views and experiences among participants, and qualitative content analysis to extract themes and patterns from open-ended responses. This mixed-methods approach allows for a nuanced interpretation of how geography educators perceive and implement the system-activity approach, the challenges they face, and the solutions they propose. The analysis aims to identify correlations between educators' professional development experiences and their confidence in employing the system-activity approach, as well as to uncover any gaps in knowledge or resources that may hinder its effective application. Ultimately, the study seeks to offer actionable insights and recommendations for improving geography education through the system-activity approach, guided by the firsthand experiences of educators in the field.

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Results

The survey conducted on the implementation of the system-activity approach in geography education revealed significant insights into its effectiveness and the role of technology in fostering critical thinking and achieving learning objectives. A substantial majority of the participants (89.7%) were school teachers, highlighting the approach's relevance at the school level. Awareness of the system-activity approach varied, with a notable 37% of educators possessing high awareness, yet nearly 10% had low awareness, indicating a clear need for more extensive educational programs focused on this methodology.

Challenges in implementing the system-activity approach were extensively reported, ranging from unstable curriculums and inadequate subject development to the lack of necessary information, technological resources, and suitable learning environments. These challenges underscore the critical need for improved infrastructure, access to technology, and curriculum development to effectively utilize the system-activity approach in geography education. Despite these obstacles, a significant majority (72.1%) of educators recognized the approach's importance in geography lessons, stressing the need for educational programs that cater to systematic learning methodologies.

Figure 1 illustrates the distribution of educators' awareness and knowledge concerning the organization of a systematic approach to learning, as obtained from a comprehensive survey. The data reveals a significant variance in understanding among the participants, with 37% indicating a high level of awareness, thus demonstrating a solid grasp of the principles and methodologies associated with the systematic approach. Conversely, a smaller segment, 9.7%, reported low awareness, highlighting a notable gap in understanding or exposure to this educational strategy. The remaining educators fall into the middle categories, with 20% having sufficient awareness and a considerable 33.3% possessing an average level of understanding. This diverse spectrum of awareness underscores the pressing need for more structured and widespread educational programs specifically designed to enhance educators' knowledge and application of the systematic approach in teaching. The figure serves as a visual quantification of the current state of educators' familiarity with the approach, emphasizing the imperative for targeted professional development initiatives to elevate the collective competency in employing systematic methodologies in education.

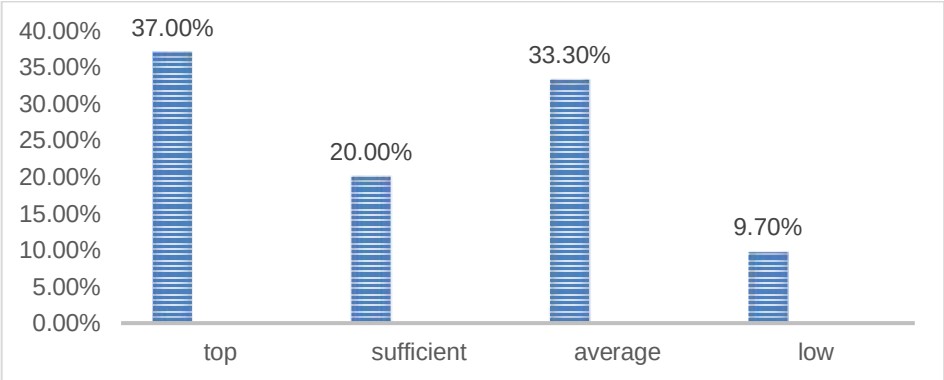

Figure 1. Awareness and Knowledge on Organizing a Systematic Approach to Learning

Figure 2 illustrates the distribution of teachers based on their participation in advanced training courses focused on the systematic approach to teaching. The data reveal that 40% of respondents have successfully completed such courses, indicating a robust foundation in the principles and practices of the systematic approach within their educational methodologies. Conversely, 15.8% of the teachers have not yet had the opportunity to engage in these courses, highlighting a gap in professional development. Significantly, a notable 44.2% express a desire to undertake these courses in the future, reflecting a widespread recognition of the value and necessity of this training among educators. This data underscores the pressing need for structured professional development programs that cater to the current demand for expertise in the systematic approach to teaching, emphasizing its critical role in enhancing educational practices.

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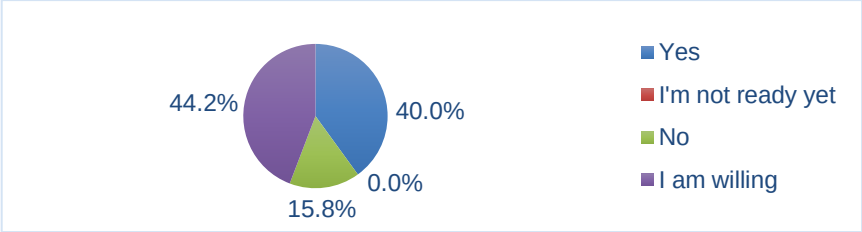

Figure 2. Participation in Advanced Training Courses on the Systematic Approach to Teaching

Figure 3 presents the perspectives of teachers on whether the learning objectives of typical geography programs are aligned with the principles of the systematic activity approach. A majority (51.5%) perceive these objectives as insufficiently oriented towards such an approach, suggesting a significant disconnect between current curriculum designs and the pedagogical strategies advocated by proponents of systematic activity learning. Meanwhile, 40.6% of respondents consider the alignment sufficient, indicating a level of satisfaction with how current programs incorporate the approach. A smaller segment (6.7%) views the objectives as quite sufficiently aligned, suggesting a more optimistic assessment of the current state of integration. However, a minimal proportion (1.2%) believe that the systematic activity approach is not considered at all in the learning objectives. This data highlights a prevailing sentiment among educators that typical geography programs require a more comprehensive integration of the systematic activity approach to meet educational goals effectively.

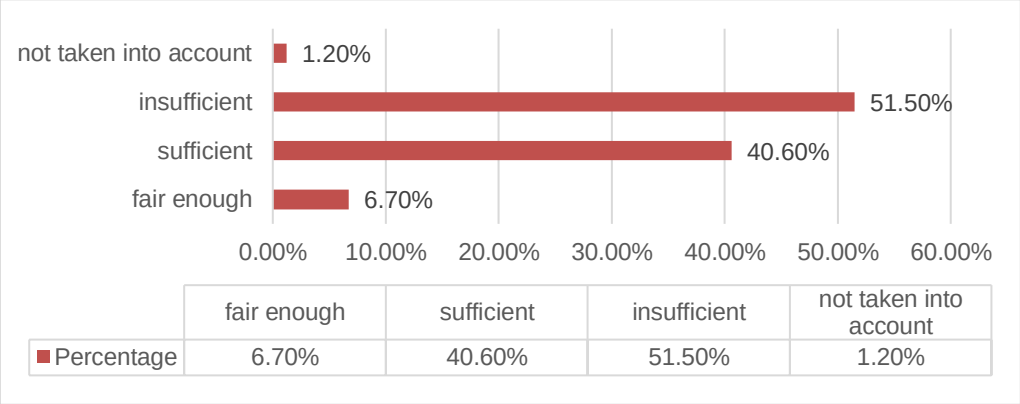

Figure 3. Alignment of Geography Program Objectives with Systematic Activity Approach

Figure 4 illustrates the varying perceptions among teachers regarding the fundamental principle of the systemic approach to learning. Notably, 32.1% of respondents mistakenly identified the development of higher thinking abilities as the core principle, highlighting a common misconception about the approach's primary focus. Another 26.1% attributed it to personal development, reflecting a broader interpretation of the approach's goals. However, only 22.4% of teachers correctly recognized that the essence of the systemic approach lies in enabling students to actively construct knowledge rather than passively receiving it pre-packaged. This correct understanding underscores the approach's emphasis on engaging students in the learning process as active participants. The survey results indicate a significant need for further education and clarification among educators regarding the systemic approach, suggesting that many teachers may benefit from additional resources and training to fully grasp and implement its methodologies effectively in their teaching practices.

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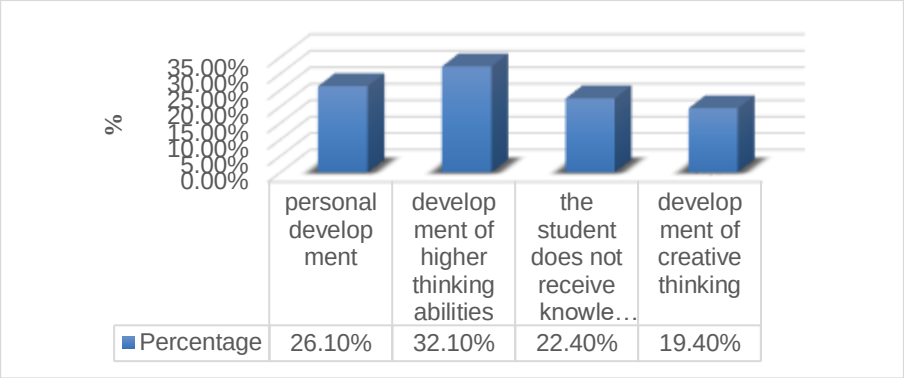

Figure 4. Understanding of the Main Principle of the Systemic Approach

Figure 5 illustrates teachers' understanding of the types of competencies that the systemic action approach helps to develop. A significant portion of respondents (46.7%) accurately recognized that this approach fosters both subject-specific and personal competencies, highlighting an awareness of its comprehensive impact on student development. Another 37% of participants pointed towards the development of personal and research competencies, indicating a perception of the approach as beneficial for enhancing inquiry skills alongside personal growth. A smaller group (9.1%) identified metadisciplinary competencies as the focus, reflecting an understanding of the approach's potential to transcend specific subject boundaries. Lastly, 7.3% of teachers saw the approach as primarily practice-oriented, underscoring its application in real-world contexts. This distribution of responses demonstrates a predominantly accurate grasp among educators of the competency development facilitated by the systemic action approach, suggesting a readiness to implement its principles in teaching practice.

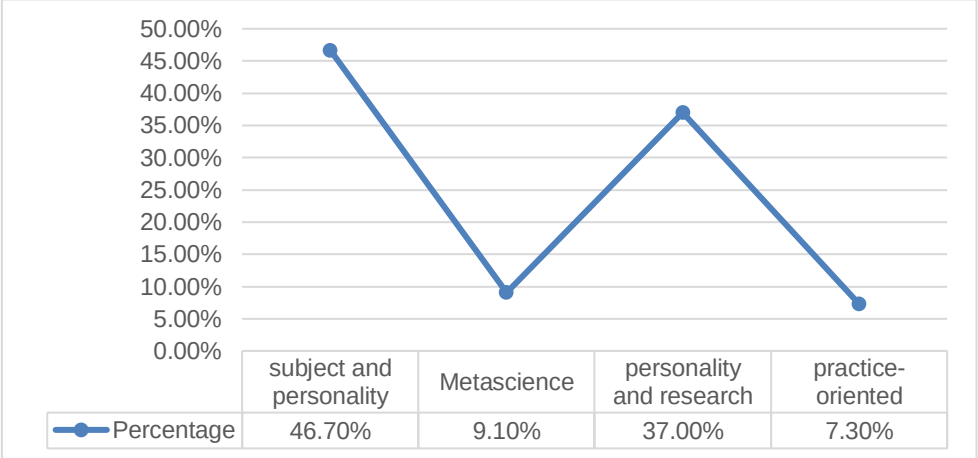

Figure 5. Understanding of Competence Development through Systemic Action Approach

Figure 6 reveals insights into teachers' perceptions of their role within the action method of teaching. A majority (53.9%) accurately identified their role as creating conditions that enable students to independently discover and understand learning problems, based on previously acquired knowledge. This response underscores a correct understanding of the teacher as a facilitator of learning rather than a direct instructor. Conversely, 24.2% of respondents focused on the formation and control of learning outcomes, suggesting a more traditional view of the teacher's role as overseeing and evaluating student progress. A smaller fraction, 15.2%, erroneously believed that the teacher's role is primarily motivational, involving the generation of task analogies that prompt independent student discovery. This response indicates a misunderstanding of the action method's emphasis on teacher facilitation. Lastly, 6.7% of teachers did not provide a correct answer, reflecting a need for further clarification and professional development in the action method's pedagogical strategies. These findings highlight the diverse interpretations of the teacher's

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role in an action-oriented educational approach, pointing towards areas for enhancement in teacher training programs.

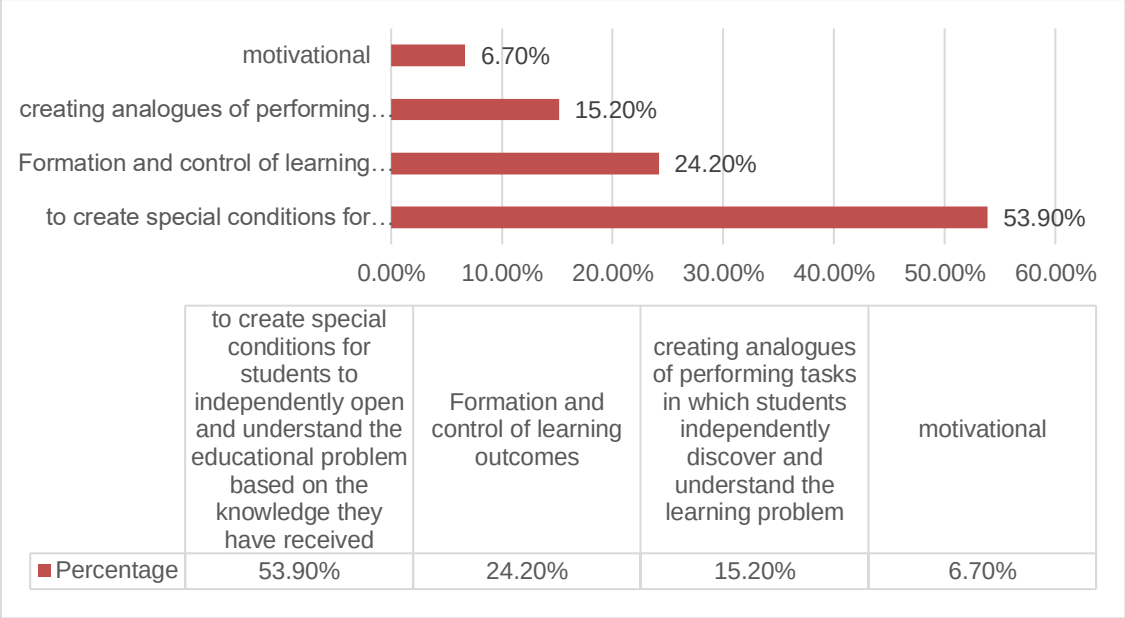

Figure 6. Understanding of the Teacher's Role in the Action Method of Teaching

The data further revealed a gap between the current educational goals of geography programs and the requisites of a system-activity approach, with 51.5% of respondents finding the goals insufficiently oriented towards systematic learning. This discrepancy calls for a curriculum overhaul to align more closely with the principles of the system-activity approach. Suggestions for improvement predominantly focused on the need for more targeted professional development courses, an increase in geography-specific courses, and the organization of subject-specific courses, reflecting a consensus on the necessity for educator support and curriculum enhancement to facilitate the approach's integration.

Overall, the results from the survey highlight both the potential and the hurdles of integrating the system-activity approach and technology into geography education. While there is evident enthusiasm and recognition of the approach's importance among educators, the challenges of inadequate resources, curriculum limitations, and the need for professional development are significant barriers that must be addressed to harness the full benefits of this educational strategy in developing students' critical thinking skills and achieving comprehensive learning objectives.

Discussion

The research findings illuminate a complex landscape regarding the system-activity approach in geography education, juxtaposed against broader educational paradigms. The survey responses reveal a significant awareness gap among educators about the system-activity approach, with only a fraction possessing a high level of understanding. This aligns with existing literature that emphasizes the necessity for continuous professional development in innovative teaching methodologies to enhance geography education effectiveness (Kumarbekuly & Abdimanapov, 2022; Luneeva & Zakirova, 2017).

The data indicating that a substantial proportion of teachers have not undergone professional development courses specific to the system-activity approach, yet express a desire to do so, underscores a critical need. This need reflects broader discussions in geography education literature about the importance of equipping teachers with not only content knowledge but also pedagogical content knowledge that includes innovative approaches like the system-activity method (Major et al., 2022; Schaal, 2020).

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The challenges identified by the survey participants, such as curriculum rigidity, insufficient educational materials, and technology access issues, mirror concerns highlighted in contemporary geography education research. These challenges underscore the urgency of integrating technology and innovative pedagogies to make geography education more relevant and engaging (Criollo-C et al., 2021; Prisille & Ellerbrake, 2021). The emphasis on the system-activity approach, which promotes active learning and the development of critical thinking skills, is particularly resonant with the current educational focus on fostering 21st-century skills among students (Lee, 2023; Meadows, 2020).

The implications of these findings for teachers and educators in geography are profound. Firstly, there is a clear imperative for educational authorities and institutions to invest in comprehensive professional development programs. These programs should not only introduce the principles of the system-activity approach but also offer practical strategies for its implementation in geography lessons. Additionally, there is a need for curriculum reform that accommodates more flexible and innovative teaching approaches, allowing teachers to tailor their teaching to the needs and interests of their students more effectively.

Moreover, the findings point to the need for a systemic overhaul that includes the enhancement of digital infrastructure in schools, ensuring equitable access to technology, and developing digital competencies among both teachers and students. This aligns with the broader educational discourse on the role of technology in enhancing learning outcomes and preparing students for a rapidly changing world (González et al., 2021; Rakuasa, 2023).

In conclusion, the survey results underscore a critical juncture in geography education. To navigate this juncture effectively, concerted efforts are required from educational policymakers, teacher educators, and geography teachers themselves. By embracing innovative teaching approaches and leveraging technology, geography education can evolve to meet the demands of the 21st century, fostering a generation of learners equipped with the knowledge, skills, and competencies to address global challenges.

Conclusion

The study has revealed a nuanced understandin of the system-activity approach in geography education, shedding light on its potential to enhance critical thinking skills and achieve learning objectives. Key findings indicate a substantial gap in teachers' awareness and knowledge regarding the implementation of this approach, coupled with a strong desire among educators for professional development in this area. Challenges such as curriculum constraints, lack of resources, and insufficient technological infrastructure have emerged as significant barriers to the effective integration of the system-activity approach and technology in geography education. Nonetheless, the enthusiasm among teachers for adopting this approach underscores its perceived importance in fostering a more engaged and effective learning environment.

Challenges such as deficiencies in curricula, a lack of educational resources, and inadequate technological infrastructure in schools have become significant barriers to the effective integration of the systems-activity approach and technologies in geographic education. Nevertheless, the willingness and motivation of teachers to apply this approach highlight its importance for creating a more engaging and effective learning environment.

The significance of these findings lies in their contribution to the ongoing discourse on improving geography education through innovative pedagogical strategies. By highlighting specific areas of need, such as professional development and resource allocation, this study provides a roadmap for educators, policymakers, and researchers to enhance the quality and relevance of geography education in the 21st century.

For future research, a deeper exploration into the pedagogical practices that effectively integrate the system-activity approach within diverse educational contexts is recommended. Comparative studies across different regions and educational systems could offer valuable insights into the universal and context-specific challenges and opportunities associated with this approach. Additionally, longitudinal studies examining the

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long-term impacts of the system-activity approach on student outcomes in geography education would contribute to a more comprehensive understanding of its efficacy.

In terms of practice, there is a clear need for targeted professional development programs that equip teachers with the knowledge and skills to implement the system-activity approach effectively. Such programs should not only focus on the theoretical aspects of the approach but also provide practical strategies and resources for its application in the classroom. Furthermore, educational policymakers should consider curriculum reforms that allow for greater flexibility and innovation in teaching methodologies. Lastly, enhancing digital infrastructure and access to technology in schools is crucial to support the integration of the system-activity approach and other innovative pedagogical strategies in geography education.

In conclusion, this study underscores the potential of the system-activity approach to transform geography education by fostering critical thinking and active learning. By addressing the identified challenges and leveraging the opportunities for professional development and curriculum innovation, educators and policymakers can enhance the effectiveness and relevance of geography education for future generations.

References

As'ari R, Maryani E, Rohmat D. and Nandi. Develop Critical Spatial Thinking by Utilizing Local Landscapes: Geography Field Laboratory Studies. IOP Conference Series: Earth and Environmental Science (2021) 683: 012028. doi:10.1088/1755-1315/683/1/012028

Astuti Y. Assessment concept of geographical skills on senior high school in indonesia. American Journal of Educational Research. (2017) 5(8):879-886. doi:10.12691/education-5-8-7

As'ari R. and Mulyanie E. The use of local landscape as a field laboratory for geography of education. Jurnal Spatial Wahana Komunikasi Dan Informasi Geografi. (2019) 19(2):1-7. doi:10.21009/spatial.192.1

Apriani R. and Rahmanelli R. Environmental utilization as learning resource by geography teacher to apply religius characteristic in public high school (sman) lombok timur. Sumatra Journal of Disaster Geography and Geography Education. (2018) 2(1):129. doi:10.24036/sjdgge.v2i1.125

Alemán de la Garza L, Anichini A, Antal P, Beaune A, Crompton H, Tsinakos A and et al. Rethinking Pedagogy: Exploring the Potential of Digital Technology in Achieving Quality Education Teaching & Learning Faculty Publications. (2019) 114. Available online at: https://digitalcommons.odu.edu/teachinglearning_fac_pubs/114 (Accessed May 12, 2024).

Bagoly-Simó P, Hartmann J, & Reinke V. School Geography under COVID-19: Geographical Knowledge in the German Formal Education. Tijdschrift voor Economische en Sociale Geografie, (2020) 111(3):224-238. doi:10.1111/tesg.12452

Bednarz SW, Jo I, Shin E. Spatial Thinking in Primary Geography. In: Teaching Primary Geography. Cham: Springer International Publishing (2022) p.133-144. doi:10.1007/978-3-030-99970-4_9

Burbules NC, Fan G & Repp P. Five trends of education and technology in a sustainable future. Geography and Sustainability. (2020) 1(2):93-97. doi:10.1016/j.geosus.2020.05.001

Csachová S. Using webgis platforms and inquiry-based activities to teach about world political map and world population. Review of International Geographical Education Online (RIGEO). (2020) 10(2):72-91. doi:10.33403/rigeo.678026

Criollo-CS, Guerrero-Arias A, Jaramillo-Alcázar Á, & Luján-Mora S. Mobile Learning Technologies for Education: Benefits and Pending Issues. Applied Sciences. (2021) 11(9):4111. doi:10.3390/app11094111

Dewi R. Geography teachers' instructional strategies to promote effective learning. Manajemen Pendidikan. (2020) 15(2):99-108. doi:10.23917/jmp.v15i2.12612

Fenika M. Using youtube to increase learning motivation as a resource for learning geography in the digital age. Jurnal Multidisiplin Indonesia. (2024) 3(5):3996-4000. doi:10.58344/jmi.v3i5.1198

González A, Bonnin C, O'Mahony E, Nguyen Hong N & Nguyen Thi Minh T. Challenges and Prospects of Integrating GIS Education in Development Studies in a Global South Context. Journal of Geography. (2021) 120(1):12-22. doi:10.1080/00221341.2020.1825773

Grmusa M, Musa S & Pavićević M. Elementary school students' attitudes towards comparison as a method of teaching geography. SYNESIS. (2022) 3(1):9–22. doi:10.7251/sin2201001g

Hashim M, Mahat H, Nayan N, Saleh Y & See K. Relationship matrix comparing university geography courses and secondary school standard curriculum in Malaysia. International Journal of Academic Research in Progressive Education and Development. (2019) 8(2):54-68. doi:10.6007/ijarped/v8-i2/5641

İlhan A. and Gülersoy A. Discovery learning strategy in geographical education: a sample of lesson design. Review of International Geographical Education Online. (2019) 9(3):523-541 doi:10.33403/rigeo.672975

Kaldybay, K. ., Kumarbekuly, S. ., Sharipkhanova, A. ., Dautova, Z. ., Afanasenkova, I. ., & Tarlaubay, M. . (2024). Identifying the Factors that Influence Students' Academic Performance as a Function of Teaching Qualities in Ahmed Yasawi International Kazakh-Turkish University. Journal of Ecohumanism, 3(6), 859–868. https://doi.org/10.62754/joe.v3i6.4056

Kerimbayev N, Umirzakova Z, Shadiev R. & Jotsov V. A student-centered approach using modern technologies in distance learning: a systematic review of the literature. Smart Learning Environments. (2023) 10(1):61. doi:10.1186/s40561-023-00280-8

Kumarbekuly S. & Abdimanapov B. Formation diagnostics of educational achievements and role of the system-activity approach in improving the quality of geographical knowledge of students. Pedagogy and Psychology. (2022) 4(53). pp.296–303. doi:10.51889/2364.2022.91.44.013

Kusumawati E. Mukminan Geography field study: the 21st century learning innovation. Advances in Social Science, Education and Humanities Research. (2019) 326:156-161. doi:10.2991/iccie-18.2019.28

Lee J. Beyond Geospatial Inquiry – How Can We Integrate the Latest Technological Advances into Geography Education? Education Sciences. (2023) 13(11):1128. doi:10.3390/educsci13111128

Luneeva OL, & Zakirova VG. Integration of Mathematical and Natural-Science Knowledge in School Students' Project-Based Activity. Eurasia Journal of Mathematics, Science and Technology Education. (2017) 13(7):2821-2840. doi:10.12973/eurasia.2017.00720a

Mayalagu G, Jaafar M, & Choy L. Validity of module geographic information system-spatial thinking skills (gis-sts). International Journal of Engineering & Technology. (2018) 7(4.34):427. doi:10.14419/ijet.v7i4.34.26902

Major L, Smørdal O, Warwick, P, Rasmussen I, Cook V, & Vrikki M. Investigating digital technology's role in supporting classroom dialogue: Integrating enacted affordance into analysis across a complex dataset. International Journal of Research & Method in Education. (2022) 46(1):37-55. doi:10.1080/1743727X.2022.2032632

Meadows ME. Geography Education for Sustainable Development. Geography and Sustainability. (2020) 1(1): 88-92. doi:10.1016/j.geosus.2020.02.001

Metoyer SK, Bednarz SW, Bednarz RS. Spatial Thinking in Education: Concepts, Development, and Assessment. In: Muñiz Solari, O., Demirci, A., Schee, J. (eds) Geospatial Technologies and Geography Education in a Changing World. Advances in Geographical and Environmental Sciences. Tokyo: Springer (2015). doi:10.1007/978-4-431-55519-3_3

Oroh H. and Karwur H. Application of contextual learning in learning socio-economic geography on students of the geography study program, faculty of social sciences, manado state university. Proceedings of the Unima International Conference on Social Sciences and Humanities (UNICSSH 2022) Series Advances in Social Science, Education and Humanities Research. (2023) 698:1909-1915. doi:10.2991/978-2-494069-35-0_229

Peter C, & Sprenger S. Digitalization and Geography Education: A Curriculum Analysis. Erdkunde. (2022) 76(1): 3-20. Available online at: https://www.jstor.org/stable/27163431 (Accessed May 10, 2024).

Prisille C, & Ellerbrake M. Virtual Reality (VR) and Geography Education: Potentials of 360° 'Experiences' in Secondary Schools. In Modern Approaches to the Visualization of Landscapes. Stadt – Region – Landschaft book series. Wiesbaden: Springer VS (2021). p. 321–332.

Prasetya S. and Budiyanto E. Media development effectiveness of geography 3d muckups. Journal of Physics Conference Series. (2018) 953:012172. https://doi.org/10.1088/1742-6596/953/1/012172

Putra A, Islam M, Hilmi R, Khairunisa T, & Huda I. Geography virtual reality for learning about ecotourism and rural sustainability. KnE Social Sciences. (2022) 7(16):307–318. doi:10.18502/kss.v7i16.12176

Puastuti D. and Sinthiya I. A contextual approach to geography learning in school. Journal of Learning and Character Education. (2021) 1(2): 83-90. doi:10.56327/jlcedu.v1i2.29

Quilty A. Special Species of Space: making room for Geography within Education an Inter-disciplinary conceptual Exploration. Doctoral dissertation, National University of Ireland Maynooth (2010)

Rachmawati E. Development of web-based geography learning media for high school students. Journal Evaluation in Education (Jee). (2024) 5(1):34-41. doi:10.37251/jee.v5i1.824

Rakuasa H. Integration of Artificial Intelligence in Geography Learning: Challenges and Opportunities. Sinergi International Journal of Education. (2023) 1(2):75-83. doi:10.61194/education.v1i2.71

Said M. and Ahmad M. Pedagogy for sustainable development among geography teachers towards implementing sustainable developmnet goals (sdgs). Jurnal Pendidikan Geosfer. (2021) 6(2):134-142. doi:10.24815/jpg.v6i2.23651

Şanli C. and Çetin T. Analysis of geography textbook activities in the context of units and critical thinking skills. International Journal of Geography and Geography Education. (2022) 47:20-31. doi:10.32003/igge.1137990

Sanat, K.., Nurbol, U., Bakhadurkhan, A., Anargul, S., Zukhra, D., & Gulfat, K. . (2022). Teachers' opinions about technological pedagogical content knowledge used in geography lessons. World Journal on Educational Technology: Current Issues, 14(4), 1217–1224. https://doi.org/10.18844/wjet.v14i4.7731

Sahrina A, Sumarmi S, Rosyida F, Fadlan M, Prasetyo D, & Withuda F. A study of tourism objects in supporting fieldwork-based geography learning in sumbermanjing wetan, malang regency, Indonesia. Iop Conference: Earth and Environmental Science. (2022) 1066(1):012003. doi:10.1088/1755-1315/1066/1/012003

Shaikhova, B. ., Kumarbekuly, S. ., Igissinova, Z. ., Manapova, S. ., & Tantybayeva, B. . (2024). Attainment and the Development of the Teaching Competence of Newly Hired University Teachers. Journal of Ecohumanism, 3(4), 2387–2394. https://doi.org/10.62754/joe.v3i4.3762

Silviarza W, Sumarmi S, & Handoyo B. Using of Spatial Problem Based Learning (SPBL) model in geography education for developing critical thinking skills. Journal for the Education of Gifted Young Scientists. (2020) 8(3):1045-1060. doi:10.17478/jegys.737219

Sugiyanto S. Implementation of Geoliteracy In Schools as a Foundation 21st Century Skill Development and Achievement of The SDGs. Social, Humanities, and Educational Studies (SHES): Conference Series. (2022) 4(5):124-129. doi:10.20961/shes.v5i4.68979

Schaal S. Location-based games for geography and environmental education. In Geography Education in the Digital World (1st ed.,). Routledge (2020). p. 11. doi:9780429274909

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DOI: https://doi.org/10.62754/joe.v3i8.5797

Selialia, M., & Kurata, L. Practical challenges of integrating technology within Lesotho's secondary geography education: A conceptual analysis. International Journal of Science and Research Archive. (2023) 10(02):1016–1022. doi:10.30574/ijsra.2023.10.2.1079

Suhodimtseva A. P., Vorozheikina NI, & Eremina J. B. Integration approach to solving problems of interdisciplinary nature in the conditions of post-industrial education. In Smart Technologies and Innovations in Design for Control of Technological Processes and Objects: Economy and Production. Springer, Cham (2019). p.501-510. doi:10.1007/978-3-030-15577-3_50

Syarif E, Maddatuang M, & Saputro A. Geography learning: teacher understanding about advance materials. E3s Web of Conferences. (2023) 400:01006. doi:10.1051/e3sconf/202340001006

Winchell D. Humanistic geography. The Humanistic Psychologist. (2000) 28(1-3):343-352. doi:10.1080/08873267.2000.9977000

Wilmot D, & Brooks C. Addressing global challenges in geographical education: Perspectives from the CGE Springer book series. International Research in Geographical and Environmental Education. (2023) 1–17. https://doi.org/10.1080/10382046.2023.2281696. doi:10.1080/10382046.2023.2281696

Yamagata-Lynch L.C. Understanding Cultural Historical Activity Theory. In: Activity Systems Analysis Methods. Boston: Springer (2010) p.13–26 doi:10.1007/978-1-4419-6321-5_2.