

The Essential Competencies in Education: An Article Content Review

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Received: November 2023, Accepted: December 2023, Published: December 2023

Abstract

This article conducts a comprehensive content review of 20 scholarly articles published in the International Journal of Essential Competencies in Education (IJECE) between June 2022 and December 2023, focusing on the evolving landscape of essential competencies in education. Grounded in the context of Agenda 2030 and Sustainable Development Goal 4, emphasizing inclusive and equitable quality education, the study investigates the temporal evolution, emerging themes, key findings, and global perspectives within the realm of essential competencies. The content analysis reveals a dynamic shift in research themes, marked by transitioning from traditional pedagogies to innovative, technology-integrated teaching models. Authors from diverse geographical backgrounds collaborate to contribute to the discourse, emphasizing the universal relevance of essential competencies in diverse educational contexts. The emergent themes from article titles showcase a multidimensional understanding of competencies, with a particular focus on STEM disciplines and the integration of advanced teaching methodologies. Study highlights consistently underscore the positive impact of technology integration on competency development, emphasizing the transformative potential of active, student-centered approaches. The findings and implications presented contribute to the ongoing dialogue on preparing individuals for success in the 21st century, providing educators, policymakers, and researchers with valuable insights into the multifaceted nature of essential competencies in education. The collaborative and global nature of research in this field highlights the need for adaptable frameworks and strategies encompassing diverse educational landscapes.

Keywords: Essential competencies in education, Innovative teaching models, Technology integration in education, Global perspectives on education

How to cite: Prayogi, S., & Asy'ari, M. (2023). The Essential Competencies in Education: An Article Content Review. *Lensa: Jurnal Kependidikan Fisika*, 11(2), 75-88. doi:<https://doi.org/10.33394/j-lkf.v11i2.10456>

INTRODUCTION

Contemporary and prospective individuals encounter evolving challenges, including heightened complexity, uncertainty, individualization, social diversity, economic and cultural expansion, and the degradation of essential ecosystem services. These challenges underscore the significance of addressing complexity and uncertainty, aligning with the core principles of Agenda 2030, particularly embodied in the 17 Sustainable Development Goals (SDGs), with a special focus on SDG4, which emphasizes inclusive and equitable quality education and lifelong learning opportunities. To navigate these challenges successfully, individuals across diverse demographics, spanning youth and adults, men and women, and professionals in various fields, must cultivate essential competencies. These competencies empower them to engage responsibly with the contemporary world and actively contribute to transformative processes, aligning with the principles of Education for Sustainable Development (ESD) and Education for Global Citizenship (EGC) (Anderson & Helms, 2001; Lozano et al., 2017).

Promoting these competencies necessitates a departure from traditional teaching methods. While conventional approaches remain effective, certain 21st-century skills prove challenging to impart solely through these means. Instead, individuals must autonomously develop these skills through experiential learning, action, and reflective practices (Anderson & Helms, 2001). Integrating Sustainable Development Goals into educational curricula requires a holistic perspective, incorporating systemic thinking, interdisciplinary methods, and innovative pedagogies that facilitate interactive, experiential, transformative, and real-world learning experiences (Lozano et al., 2017). The evolution from 20th-century skills to 21st-century skills is notably influenced by the emergence of advanced information and communications technologies (González-Salamanca et al., 2020).

Education for Sustainable Development (ESD) is a transformative educational approach that prioritizes content, learning outcomes, pedagogy, and the learning environment. Its goal is to equip citizens with the knowledge, skills, values, and attitudes necessary for collaborative engagement in sustainable development. This demands a pedagogical shift towards transformative, action-oriented methods that foster autonomous learning, participation, collaboration, problem-solving, interdisciplinarity, and the integration of formal and informal learning. Only through such pedagogical approaches can individuals develop the key competencies essential for promoting sustainable development in the 21st century. The concept of the pedagogy of sustainability (Stratton et al., 2015), closely linked to ESD and EGC, receives limited attention in current discourses on education. Teaching sustainable development poses challenges, requiring knowledge across multiple disciplines. 21st-century skills become crucial reference points for developing ambitious profiles of knowledge and skills, envisioning students and teachers as future 'problem solvers,' 'agents of change,' and 'transition managers' (Foucrier & Wiek, 2019; Wiek et al., 2011).

In this context, the integration of Information and Communication Technologies (ICT) is fundamental within 21st-century skills frameworks. The concept of learning extends beyond conventional paradigms, emphasizing the importance of individual learners, deep learning, and the transformative potential of ICT, culminating in the notion of personalized learning (Keane et al., 2016; Silva Quiroz & Lázaro-Cantabrana, 2020). A pivotal aspect in leveraging digital technologies is design flexibility, enabling student-centered pedagogical methodologies. Participatory design concepts, such as co-creation, co-production, or co-design, converge with the notion of autonomous lifelong learning, emphasizing flexible learning paths in different contexts.

Various organizations, including the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Organization for Economic Co-operation and Development (OECD), Partnership for 21st Century Skills (P21), and Assessment and Teaching of 21st Century Skills (ATC21S), propose different conceptions of 21st-century skills, positioning them at the core of individual learning. These skills, diverging from traditional academic skills, focus on transversal, multifunctional competencies independent of context. Categorized into three main areas—Learning and innovation skills, digital literacy skills, and personal and professional life skills—21st-century skills encompass critical aspects like communication, collaboration, critical thinking, and creativity (the 4Cs) (Keane et al., 2016). Organizations advocating for these skills converge on broad frameworks for curriculum enhancement, although specific emphasis may vary. The OECD underscores the link between meeting Sustainable Development Goals and ensuring digital accessibility (OECD, 2023), while P21 highlights life and career skills, learning and innovation skills, information skills, media and technology, alongside core curricular subjects and 21st-century themes. This background ultimately inspired the context of "The Essential Competencies in Education."

The concept of "The Essential Competencies in Education" refers to a framework or set of fundamental skills, knowledge areas, and capabilities deemed crucial for individuals involved in the field of education. These competencies go beyond subject-specific expertise and encompass a broader range of qualities that educators, administrators, and other stakeholders should possess to effectively contribute to the educational process. These may include pedagogical skills, communication abilities, adaptability, cultural competence, and a deep understanding of educational theories and practices. The development and application of such competencies aim to enhance the overall quality of education, address diverse learner needs, and foster a dynamic and responsive educational environment.

Understanding and exploring the context of "The Essential Competencies in Education" is of paramount importance to research for several reasons. Firstly, it provides a foundational framework for examining the professional requirements and expectations in the field of education. Exploration into the various dimensions of these competencies to identify gaps, assess their implementation in educational settings, and propose strategies for improvement. Secondly, as education is a dynamic field, constantly evolving to meet the demands of changing societies, researching essential competencies allows for the adaptation of educational practices to contemporary needs. This context serves as a guide for educational policymakers, institutions, and practitioners to align their efforts with the overarching goal of fostering effective and meaningful

learning experiences. In essence, investigating "The Essential Competencies in Education" contributes to the ongoing dialogue about how to best prepare individuals for successful and impactful roles in the diverse and evolving landscape of education. Specifically, this study aims to explore the results of studies related to "The Essential Competencies in Education" by conducting a literature review of the study content.

METHOD

This study employed a rigorous content analysis approach to investigate the essential competencies in education, drawing insights from a comprehensive review of 20 articles published in the International Journal of Essential Competencies in Education (IJECE). The IJECE serves as a reputable source for scholarly articles, offering a platform for researchers and practitioners to contribute to the discourse on fundamental skills and knowledge areas necessary for professionals in the field of education. The selected articles for this analysis span the period from June 2022 to December 2023, reflecting the most recent research endeavors in the domain. The research methods encompassed a meticulous examination of various facets, including authorship, publication year, article title, and study highlights, to glean a nuanced understanding of the current landscape of essential competencies in education.

To initiate the content analysis, the first step involved accessing the IJECE journal through the provided link: <https://journal-center.litpam.com/index.php/ijece/index>. The chosen timeframe ensured the inclusion of the latest research findings, capturing the most recent perspectives on essential competencies in education. The content analysis methodology was crucial for extracting valuable information from each article, as it allowed for the systematic examination of key components. The analysis focused on identifying patterns, trends, and recurring themes across the selected articles to derive meaningful insights into the current state of research on essential competencies in education. By employing content analysis, this study aimed to provide a comprehensive overview of the scholarly contributions within the specified timeframe, shedding light on the evolving nature of essential competencies in the field.

The criteria for inclusion in the analysis comprised articles directly addressing essential competencies in education, ensuring that the selected studies aligned with the primary focus of this research. Each article underwent a meticulous review process, with a keen eye on methodological rigor, relevance, and depth of insights. This thorough selection process ensured that the final dataset accurately represented the diverse perspectives and approaches within the realm of essential competencies in education. This comprehensive approach to article selection aimed to capture a holistic view of essential competencies in education, encompassing a wide range of perspectives and insights from the global academic community.

The content analysis specifically examined authorship patterns to identify prolific contributors and potential collaborations in the field. Understanding the authorship dynamics provides valuable insights into the networks and communities engaged in the exploration of essential competencies in education. Additionally, the analysis considered the distribution of publication years to discern any emerging trends or shifts in focus over time. This temporal analysis aimed to highlight the evolution of research themes within the specified period, offering a nuanced understanding of the trajectory of essential competencies in education research. The article titles were scrutinized to discern prevalent themes and topics, guiding the identification of key areas of interest and concern within the scholarly discourse. Furthermore, the study highlights section of each article was meticulously examined to distill key findings, methodologies employed, and implications for practice, contributing to a comprehensive synthesis of the state of knowledge in the field.

In conclusion, the research methods employed in this content analysis of essential competencies in education encompassed a systematic and thorough examination of 20 articles published in the IJECE journal. The use of content analysis facilitated the extraction of valuable insights from each article. The criteria for article inclusion ensured a focused and relevant dataset, while the examination of authorship, publication years, article titles, and study highlights provided a holistic view of the current landscape of research in this field. This study aimed to contribute to the ongoing dialogue on essential competencies in education by synthesizing and presenting the most recent and relevant findings from the scholarly community.

RESULTS AND DISCUSSION

Authorship Patterns and Collaboration Trends

The analysis of authorship patterns across the 20 articles published in the International Journal of Essential Competencies in Education (IJECE) revealed a diverse and collaborative landscape. Prolific contributors emerged, indicating individuals who have significantly contributed to the discourse on essential competencies in education, as displayed in Table 1. The data highlighted a mix of seasoned researchers and emerging scholars, showcasing a healthy blend of experience and fresh perspectives. Moreover, a notable trend in collaboration was observed, with several articles featuring co-authored contributions. Collaborative research in this field underscores the interdisciplinary nature of essential competencies in education, emphasizing the need for expertise from various domains to comprehensively address the multifaceted challenges and opportunities within the educational landscape.

Table 1. Authorship, year, article title and study highlights related to the theme "The Essential Competencies in Education" published in IJECE

Authorship, Year	Article Title	Study Highlights
(Bilad, Anwar, et al., 2022)	Nurturing Prospective STEM Teachers' Critical Thinking Skill through Virtual Simulation-Assisted Remote Inquiry in Fourier Transform Courses.	The study results confirm that the virtual simulation-assisted remote inquiry significantly improved PST CT in Fourier transform courses. The virtual simulation-assisted remote inquiry learning was better than courses with online learning without inquiry and simulation. The virtual simulation-assisted remote inquiry provided conceptual formation and application of concepts. It strengthened the opportunities for the PSTs to train their CT skills.
(Verawati et al., 2022)	The Experimental Experience of Motion Kinematics in Biology Class Using PhET Virtual Simulation and Its Impact on Learning Outcomes.	The results of the descriptive analysis showed that the average score of student learning outcomes increased from pretest to posttest with successive criteria from "less" to "good," an increase in student learning outcomes with high criteria with an n-gain score of 0.71. The results of the statistical test showed that there was a significant difference in the average score of student learning outcomes before and after the motion kinematics experiment using PhET virtual simulation. The results in this study provide a learning experience related to ways of conducting physics concepts that are more meaningful in the learning process that can be widely used in routine physics teaching in the classroom.
(Asy'ari & Da Rosa, 2022)	Prospective Teachers' Metacognitive Awareness in Remote Learning: Analytical Study Viewed from Cognitive Style and Gender.	Based on gender differences, PST metacognitive awareness was not significantly different ($p > 0.05$), while based on cognitive style, PST metacognitive awareness was significantly different ($p < 0.05$) on indicators of procedural knowledge and conditional knowledge. In addition, PST metacognitive awareness was significantly different on indicators of procedural knowledge, conditional knowledge, planning,

Authorship, Year	Article Title	Study Highlights
		monitoring, debugging, and evaluation based on a review of cognitive styles and gender differences.
(Fitriani et al., 2022)	Development of Evaluative-Process Learning Tools Integrated with Conceptual-Problem-Based Learning Models: Study of Its Validity and Effectiveness to Train Critical Thinking.	The validity test results show that all the elements that make up the learning tools in the aspect of content and construct validity have been declared valid. Furthermore, at the implementation stage in the classroom, evaluative-process learning tools integrated with the CPBL model have been effective in training students' critical thinking skills compared to teaching that relies on lectures and discussion. This Effectiveness is based on two aspects, (1) the conceptual framework of the CPBL model, which is constructed and arranged from a problem-based learning model with five learning steps, namely prior knowledge, organize, investigate, analyze, and evaluation; (2) the concept of evaluative-process which is integrated with the CPBL model. These two aspects support capacity in training students to think critically.
(Biazus & Mahtari, 2022)	The Impact of Project-Based Learning (PjBL) Model on Secondary Students' Creative Thinking Skills.	The result shows that students' CT significantly improved after learning for the experimental group ($n\text{-gain} = 0.47$; $p < 0.05$) and the control group ($n\text{-gain} = 0.25$; $p < 0.05$). However, students' CT in the experimental group was significantly different compared to the control group achievement ($p < 0.05$). Thus, the conclusion proposed that the PjBL model significantly impacts secondary school students' CT skills on the temperature and expansion material.
(Bilad, Doyan, et al., 2022)	Analyzing STEM Students' Critical Thinking Performance: Literacy Study on the Polymer Film Fabrication Process Irradiated with Gamma Rays.	By employing valid critical thinking instruments and adequate methods of analysis, the findings show that literacy on the assigned topic significantly improved STEM students' CT skills. It was proven that the mean scores of CT indicators have increased in all aspects of the CT assessed. The statistical analysis confirmed that there were significant differences in the CT skills of STEM students between the observations before and after the learning process intervention.
(Hidayat & Evendi, 2022)	The Intervention of Mathematical Problem-Solving Model on the Systems of Linear	The results of the study indicate that the model of solving mathematical problems in the materials of linear equation systems has a significant impact on improving students' creative thinking abilities. This finding

Authorship, Year	Article Title	Study Highlights
	Equation Material: Analysing its Impact on Increasing Students' Creative Thinking.	becomes a reference in its application in the routine of learning mathematics, not only on linear equation systems but on other calculus materials.
(Ekayanti et al., 2022)	• Efforts to Drill the Critical Thinking Skills on Momentum and Impulse Phenomena Using Discovery Learning Model.	• The results of the study show that students' critical thinking skills have increased after learning using the discovery learning model. Based on the size of the pre-post test, students' critical thinking skills increased from quite critical to critical, the increase (gain) was in the moderate category. Unlike the case with traditional teaching, students' critical thinking skills remain with less critical criteria. The difference in the improvement of critical thinking between the two groups (discovery learning vs. traditional teaching) was statistically analyzed. The results of the analysis confirm the research hypothesis tested that there are significant differences in critical thinking skills between groups (discovery learning model vs. traditional teaching) in the material of momentum and impulse.
(Suhirman & Ghazali, 2022)	• Exploring Students' Critical Thinking and Curiosity: A Study on Problem-Based Learning with Character Development and Naturalist Intelligence.	• The findings revealed that: (a) PBL-CD had a positive impact on students' CT abilities and curiosity; (b) the naturalist intelligence did not significantly influence students' CT abilities and curiosity; and (c) there was no significant impact observed on students' CT abilities and curiosity when examining the interaction between PBL-CD and naturalist intelligence. Thus, PBL-CD presents itself as a viable strategy to cultivate students' critical thinking skills and inquisitiveness, offering an alternative pathway in routine learning in the classroom.
(Wirzal et al., 2022)	• Bibliometric Analysis of Research on Scientific Literacy between 2018 and 2022: Science Education Subject.	• The results of the research show (1) scientific publications on the topic of scientific literacy in science education subject have increased significantly in the last five years; (2) research results on this topic are published in reputable scientific journals (ranked Q1 and Q2); (3) United States is the country with the highest number of documents, citations, and institutions; and (4) there are six groups of keywords used, namely scientific literacy, science education, nature of science, students, education, and teacher education. This study recommends that research at the primary and secondary education levels by taking into

Authorship, Year	Article Title	Study Highlights
		account aspects of SL traits can be carried out in future research.
(Prayogi et al., 2023)	The Analysis of Students' Design Thinking in Inquiry-Based Learning in Routine University Science Courses.	The findings revealed that students exposed to inquiry-based learning demonstrated significant improvements in their design thinking skills compared to those taught through conventional methods. Furthermore, interviews with lecturers provided additional support for the positive impact of inquiry-based learning on students' design thinking abilities.
(Salim et al., 2023)	Integrating Game-Based-Learning to Improve Students' Essay Writing in High School Sociology.	Findings from the study have shown that the implementation of games that utilize civilization-building elements such as city building and resource management in a sociology lesson had a significant impact on students' performance in essay writing, specifically the quality of their argument, provided that they were used within the right context. The study also found an increase in students' motivation, collaboration, and enjoyment of learning, attributing this to the games' designs and their easy accessibility via smartphones. Students' perceptions of the use of GBL indicated a willingness to use it again as a learning tool in the near future.
(Verawati et al., 2023)	Examining STEM Students' Computational Thinking Skills through Interactive Practicum Utilizing Technology.	The findings show that both groups of students achieved "good" scores for computational thinking skills. However, students in the virtual labs group demonstrated superior skills compared to the physical labs group. The aspects of problem reformulation and abstraction received the highest scores in both groups, while problem decomposition received the lowest scores. A MANOVA test confirmed statistically significant differences in computational thinking skills between the two practicum environments. The study suggests that the use of virtual labs can positively impact students' computational thinking abilities. The results have implications for educators and institutions seeking to enhance students' computational thinking skills and design effective STEM practicums.
(Bilad, 2023)	Enhancing Engineering Electromagnetics Education: A Comparative	In terms of overall performance, the results indicate that synchronous and asynchronous learning methods were equally effective, as no significant difference was found. However, individual student grades revealed a variety of

Authorship, Year	Article Title	Study Highlights
	Analysis of Synchronous and Asynchronous Learning Environments.	outcomes for the asynchronous learning method, suggesting that students have different learning preferences and levels of adaptability. Positive feedback for asynchronous learning included the ability to adjust the pace of learning and conveniently access course materials. Students valued the availability of recorded lectures for reviewing difficult subject matter. Students with lower study motivation or limited experience with independent learning were negatively affected by the absence of scaffolding and immediate feedback in the asynchronous learning approach.
(Sarkingobir et al., 2023)	Bibliometric Analysis of the Thinking Styles in Math and Its' Implication on Science Learning.	Fundamentally, articles pertinent to the bibliometric analysis theme, 'mathematical thinking styles and their implications for science learning,' underscore the significance of delving into students' mathematical thinking styles. Variances in these cognitive styles pose significant challenges for educators' pedagogical approaches in both mathematics and science instruction. This constitutes a pivotal implication of the present study, necessitating educators to adeptly navigate diverse mathematical thinking styles when structuring pedagogy in science and mathematics.
(Yakob et al., 2023)	The Effects of Flipped Classroom in English Language Communicative Skills.	This research found that this instructional method was effective in teaching speaking skills, as there were improvements in the post-test in comparison with the pre-test, where only three students managed to score above 50% while the rest failed. This study also revealed that the flipped classroom was beneficial to students as it helped them improve their speaking skills. Despite the problems they faced in class, their speaking skills improved tremendously.
(Yazidi, 2023)	Utilizing Social Reality Videos in Mobile Apps to Enhance Electronic Learning: Examining the Influence on Cognitive Learning Outcomes Among Students.	In summary, the findings of this study reveal that the integration of e-learning with social reality videos significantly enhances students' learning outcomes, surpassing the effectiveness of the expository method. Consequently, the researchers recommend the simultaneous incorporation of this innovative approach into conventional classroom lectures.

Authorship, Year	Article Title	Study Highlights
(Aliyu et al., 2023)	Problem-Based Learning in Remote Learning Scenario Utilizing Climate Change Virtual Reality Video in Mobile Application to Train Critical Thinking.	The study's overall findings indicate that the PBL approach integrated with climate change VR videos in mobile applications effectively enhances students' critical thinking skills, surpassing the outcomes of traditional teaching methods. Moreover, the feedback received from teachers who took part in the teaching interventions was overwhelmingly positive, reinforcing the efficacy of the learning approach. This research highlights the significance of implementing PBL and VR experiences to cultivate CT among students, particularly in the context of climate change education.
(Bilad & Doyan, 2023)	Involving STEM Students in Critical Analysis Tasks on the Processes of Modifying Optical Properties of Materials.	The results of the critical analysis task indicated that STEM students were able to complete the task effectively. Overall, the findings of this study demonstrate the success of STEM students in conducting critical analysis of the optical characteristics of polymer films blends irradiated by gamma rays.
(Salvetti et al., 2023)	Surmounting Obstacles in STEM Education: An In-depth Analysis of Literature Paving the Way for Proficient Pedagogy in STEM Learning.	Several key aspects contribute to effective pedagogy in STEM education and learning, including: (a) cultivating an innovative learning environment that nurtures inquiry, experimentation, and critical thinking; (b) utilizing a diverse range of authentic learning methods and relevant educational resources; (c) facilitating a collaborative learning environment that encourages teamwork and knowledge sharing; (d) creating an inclusive learning environment that accommodates the diverse needs of students; and (e) encouraging continuous reflection on and improvement of teaching practices to optimize learning outcomes.

Temporal Evolution of Research Themes

The temporal evolution of research themes in the field of essential competencies in education, as evidenced by the articles analyzed, reflects a dynamic and evolving landscape. The content analysis spanning the period from June 2022 to December 2023 indicates a consistent and sustained interest in exploring competencies across various educational domains. Notably, the articles demonstrate a shift in focus from traditional pedagogical approaches to more contemporary and technology-integrated methods. For instance, Bilad, Anwar, et al. (2022) and Verawati et al. (2022) highlight the use of virtual simulations and interactive practicums, respectively, as effective tools for enhancing critical thinking and computational thinking skills. This shift aligns with the broader trend in education toward incorporating technology to cater to diverse learning styles and foster a more engaging and immersive educational experience.

The temporal analysis also suggests an increasing recognition of the importance of competencies beyond subject-specific knowledge, with a growing emphasis on metacognitive

awareness (Asy'ari & Da Rosa, 2022) and problem-solving abilities (Hidayat & Evendi, 2022). The inclusion of studies exploring design thinking (Prayogi et al., 2023) and thinking styles in mathematics (Sarkingobir et al., 2023) further underscores the evolving nature of research themes, acknowledging the multifaceted dimensions of essential competencies. This temporal evolution reflects an adaptive response to the changing demands of education and the need to prepare students for the complexities of the modern world.

Emerging Themes from Article Titles

The analysis of article titles reveals emerging themes that underscore the multidimensional nature of essential competencies in education. A noteworthy theme is the integration of innovative teaching models, such as project-based learning (Biazus & Mahtari, 2022), evaluative-process learning tools (Fitriani et al., 2022), and inquiry-based learning (Salim et al., 2023). These approaches not only focus on subject matter expertise but also aim to cultivate critical thinking, creativity, and problem-solving skills among students. The emergence of terms like "design thinking" (Prayogi et al., 2023) and "computational thinking" (Verawati et al., 2023) in the article titles reflects an increasing awareness of the need to nurture skills that go beyond traditional academic knowledge, aligning with the demands of a rapidly evolving workforce.

Additionally, the use of terms like "motion kinematics" (Verawati et al., 2022) and "engineering electromagnetics" (Bilad, 2023) in the article titles indicates a growing interest in applying essential competencies in specific STEM (science, technology, engineering, and mathematics) disciplines. This suggests a recognition of the discipline-specific nuances in competency development, emphasizing the need for tailored approaches to different fields of study. The diversity of emerging themes in article titles reflects a broader conceptualization of essential competencies, encompassing a spectrum of skills and knowledge areas essential for success in various educational and professional contexts.

Key Findings and Implications from Study Highlights

The study highlights of the analyzed articles provide valuable insights into key findings and their implications for educational practice. A recurring theme across several studies is the positive impact of innovative teaching models on students' critical thinking skills. For example, project-based learning (Biazus & Mahtari, 2022), discovery learning (Ekayanti et al., 2022), and problem-based learning (Aliyu et al., 2023) were found to significantly enhance critical thinking abilities. These findings underscore the importance of pedagogical approaches that actively engage students in problem-solving and inquiry-based activities, fostering the development of essential competencies.

Moreover, the analysis of study highlights reveals a consistent emphasis on the effectiveness of technology integration in competency development. Virtual simulations (Bilad, Anwar, et al., 2022; Verawati et al., 2022), interactive practicums utilizing technology (Verawati et al., 2023), and game-based learning (Salim et al., 2023) are identified as tools that contribute positively to students' learning outcomes and competency development. These findings highlight the transformative potential of technology in enhancing educational experiences and preparing students for the digital age.

The implications drawn from the study highlights emphasize the need for a paradigm shift in teaching methodologies. The effectiveness of evaluative-process learning tools integrated with conceptual-problem-based learning models (Fitriani et al., 2022) and the impact of project-based learning on creative thinking skills (Biazus & Mahtari, 2022) underscore the importance of active, student-centered approaches in competency development. Additionally, the recognition of the impact of problem-solving models on creative thinking abilities (Hidayat & Evendi, 2022) suggests that targeted interventions in specific content areas can yield significant improvements in competency outcomes.

Global Perspectives

The analysis of authorship and the diverse geographical origins of the studies suggest a global perspective on essential competencies in education. Authors from various countries, including Brazil, Brunei Darussalam, Indonesia, Malaysia, Republic of Korea, Italy, UK, Morocco, South Africa, and others, contribute to the discourse, reflecting a shared interest in understanding and enhancing competencies across diverse cultural and educational contexts. The inclusion of studies

exploring scientific literacy (Wirzal et al., 2022) and climate change education (Aliyu et al., 2023) further underscores the global relevance of essential competencies, extending beyond subject-specific skills to address broader scientific literacy and socio-environmental challenges.

The global perspectives embedded in the analyzed articles contribute to a more comprehensive understanding of essential competencies, considering the contextual nuances that shape educational practices worldwide. This inclusivity is crucial for developing frameworks and strategies that are adaptable and applicable across diverse educational settings. The collaborative nature of essential competencies research, as evidenced by co-authored contributions from authors of different nationalities, highlights the importance of international cooperation in advancing knowledge and practices related to essential competencies in education.

In conclusion, the analysis of temporal evolution, emerging themes from article titles, key findings, and global perspectives based on the content analysis of Table 1 demonstrates a dynamic and multifaceted landscape of research on essential competencies in education. The evolving focus on technology integration, innovative teaching models, and discipline-specific competencies reflects a responsiveness to the changing demands of education. The findings and implications from the study highlights underscore the transformative potential of active, student-centered approaches and the positive impact of technology on competency development. The global perspectives embedded in the studies contribute to a richer understanding of essential competencies, acknowledging the diversity of educational contexts and the need for adaptable frameworks.

CONCLUSION

The comprehensive content analysis of articles related to "The Essential Competencies in Education" published in the International Journal of Essential Competencies in Education (IJECE) from June 2022 to December 2023 provides valuable insights into the dynamic landscape of research in this field. The temporal evolution of research themes reveals a significant shift from traditional pedagogical approaches to more contemporary, technology-integrated methods. The emergence of innovative teaching models, such as project-based learning, evaluative-process learning tools, and inquiry-based learning, reflects a commitment to cultivating competencies beyond subject-specific knowledge. The findings emphasize the positive impact of these pedagogical approaches on critical thinking skills, creativity, and problem-solving abilities, highlighting the importance of active, student-centered methodologies.

Authorship patterns and collaboration trends indicate a diverse and collaborative landscape, involving both seasoned researchers and emerging scholars. The global perspectives embedded in the studies, with contributions from authors across various countries, underscore the universal relevance of essential competencies in education. This inclusivity is crucial for developing adaptable frameworks and strategies that consider the contextual nuances shaping educational practices worldwide. The collaborative nature of essential competencies research, as evidenced by co-authored contributions from authors of different nationalities, highlights the importance of international cooperation in advancing knowledge and practices in this domain.

Furthermore, the analysis of article titles reveals emerging themes that underscore the multidimensional nature of essential competencies in education. Integrating innovative teaching models and addressing specific competencies in STEM disciplines reflect a nuanced understanding of the diverse skills and knowledge areas essential for success in various educational and professional contexts. The study highlights consistently emphasize the positive impact of technology integration on competency development, reinforcing the transformative potential of technology in enhancing educational experiences and preparing students for the digital age.

In conclusion, the synthesis of research findings and trends contributes to the ongoing dialogue on essential competencies in education. The evolving focus on technology, innovative pedagogies, and discipline-specific competencies provides valuable insights for educators, policymakers, and researchers seeking to enhance the quality and relevance of education in the 21st century. As the educational landscape continues to evolve, the exploration of essential competencies remains a critical avenue for fostering effective and meaningful learning experiences that prepare individuals for success in a rapidly changing world.

IMPLICATIONS FOR FUTURE RESEARCH

This content analysis sheds light on essential competencies in education, emphasizing the evolving landscape shaped by technology integration and innovative teaching models. Future research could delve deeper into the nuanced impact of these competencies on specific disciplines, exploring how tailored approaches enhance learning outcomes. Additionally, investigating the longitudinal effects of technology-integrated pedagogies on competency development could provide insights into sustained effectiveness. Comparative studies across diverse educational contexts and cultures would further enrich our understanding, fostering the development of universally applicable frameworks for essential competencies in education.

ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to the International Journal of Essential Competencies in Education (IJECE) for providing a platform to disseminate scholarly research on essential competencies in education. Additionally, appreciation is extended to the contributors and researchers whose valuable insights have enriched the discourse on this crucial topic. This acknowledgment recognizes the collaborative efforts that have collectively contributed to advancing knowledge and understanding in the field of essential competencies in education.

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