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Effective Components of a Research-Oriented Curriculum

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A B S T R A C T

Purpose: This study aims to identify and synthesize the key components influencing a research-oriented curriculum in education.

Methods and Materials: The study follows a synthesis research (meta-synthesis) approach using the inductive content analysis model. The Sandelowski and Barroso (2007) method was employed, consisting of seven stages: formulating the research question, conducting a systematic review of literature, selecting relevant studies, extracting data, analyzing and synthesizing findings, performing quality control, and presenting results. A total of 719 articles were identified through systematic searches in major databases such as ERIC, ScienceDirect, Taylor & Francis, and Springer. After filtering and quality assessment, 25 studies from the period 2010-2024 were selected for final analysis.

Findings: The study identified five key categories influencing the research-oriented curriculum: individual acceptance, educator competency, school-related factors, educational system flexibility, and cultural considerations. Each category is subdivided into multiple dimensions, such as technological acceptance, professional competencies of educators, school management, and the culture of quality and evaluation. In total, 75 codes and 20 sub-categories were identified, showing the need for a multi-layered approach, integrating managerial, psychological, and sociological perspectives in curriculum development.

Conclusion: The findings underscore the importance of systemic support, teacher competency, and cultural shifts to effectively implement a research-oriented curriculum. The study highlights the need for institutional flexibility, adequate resources, and teacher training in research facilitation. By addressing individual, institutional, and societal dimensions, the proposed curriculum model offers a structured and adaptable framework that promotes research-based learning in educational systems.

Keywords: *Curriculum planning, Research-oriented, Educational model*

1. Introduction

In contemporary education systems, the curriculum serves as the fundamental backbone upon which teaching strategies, educational goals, and learner outcomes are based (Buschor & Kamm, 2015; Garshasbi et al., 2020; Omale, 2024; Sun et al., 2024; Yao et al., 2024). The structure and content of a curriculum reflect not only the educational priorities of a given society but also the pedagogical beliefs and approaches of educational policymakers (Bezi et al., 2024; Fel Araghi et al., 2024; Kafshchian Moghadam et al., 2024; Khosravi & Mehrmohammadi, 2023; Mahdian et al., 2022; Tajeddini, 2016; Tajeddini & Trueman, 2016). Over the past several decades, the evolution of curriculum development has increasingly prioritized a research-oriented approach, especially as the global educational landscape continues to shift towards knowledge economies. This shift emphasizes the integration of research into every aspect of the curriculum, ensuring that students are not merely passive recipients of knowledge but active participants in the construction of it (Barrere-Cain, 2022; Webster & Kenney, 2011).

A research-oriented curriculum goes beyond traditional teaching methods, placing the student at the center of learning by fostering critical thinking, problem-solving, and inquiry-based learning. As Forbes and Davis (2010) point out, such a curriculum mobilizes resources to engage students in deep exploration of topics, encouraging them to connect their learning with real-world applications (Forbes & Davis, 2010). The development of such a curriculum is critical in higher education, where the goal is to produce graduates capable of contributing meaningfully to their fields and societies (Annala, 2022; Karami et al., 2022). However, the effectiveness of a research-oriented curriculum is influenced by several components, including teacher competency, institutional support, cultural context, and educational policies (Alishiri et al., 2018; Amiri et al., 2016).

One of the most critical components of a successful research-oriented curriculum is the competency of the educators implementing it. Teachers are not only transmitters of knowledge but also facilitators of research-based learning. According to Buschor and Kamm (2015), supporting teachers in adopting a reflective and research-oriented stance is essential for fostering a research-driven curriculum (Buschor & Kamm, 2015). Educators must be equipped with both the knowledge and tools to guide students through the research process, helping them to develop skills that extend beyond rote memorization and into critical analysis and inquiry.

Teacher competency is also tied to their ability to adapt the curriculum to meet the needs of diverse learners. In an intercultural educational setting, this becomes even more pronounced. Abdzadeh and Baker (2020) emphasize the importance of cultural awareness in the classroom, particularly in settings where cultural norms may be more conservative (Abdzadeh & Baker, 2020). For a research-oriented curriculum to succeed, educators must navigate these cultural nuances while still promoting an environment of inquiry and exploration (Puustinen & Khawaja, 2020).

Furthermore, teacher training programs play a crucial role in preparing educators for the challenges of a research-based curriculum. According to Heidarpoor and Yazdani (2023), community-engaged medical education, for instance, offers a comparative framework for developing health promoters through a research-oriented curriculum (Heidarpoor & Yazdani, 2023). The study underlines the importance of equipping educators with the necessary research skills to guide students in real-world problem-solving scenarios, thus bridging the gap between theoretical knowledge and practical application.

While teacher competency is paramount, institutional support is equally vital in fostering a research-oriented curriculum. Educational institutions must provide the necessary infrastructure, resources, and policies that support research-based learning. In their study on science and technology parks, Alishiri et al. (2018) discuss the role of business incubators in fostering innovation and research within educational settings. These incubators, particularly in universities, act as critical support structures that enable students and faculty to engage in cutting-edge research (Alishiri et al., 2018).

Furthermore, a well-structured curriculum that aligns with institutional goals and broader educational policies is essential for the success of a research-oriented approach. In countries like China, for instance, the senior high school chemistry curriculum has undergone significant reform to emphasize intellectual demands and research-based learning (Wei, 2020). Similar reforms are being seen globally as educational institutions recognize the need to integrate research more deeply into their curricula (Law, 2014).

However, the implementation of such curricula faces challenges, particularly in developing countries where resources may be limited (Ghazavi et al., 2016). Institutions in these settings must find ways to innovate within

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constraints, ensuring that students still have access to research opportunities despite systemic limitations. The study by Mansoori (2018) on Iran's health research system illustrates the evolution of research-focused curricula within resource-constrained environments (Mansoori, 2018). Despite challenges, these systems have managed to develop robust research capabilities by strategically prioritizing certain areas of study and leveraging international collaborations.

The cultural context in which a curriculum is developed and implemented cannot be overlooked, particularly when considering the global push for research-oriented education. In countries like Iran, where traditional educational models may be more entrenched, the shift towards a research-based curriculum must account for cultural sensitivities (Rezapour & Purbaghban, 2014). As highlighted by Abdzadeh and Baker (2020), the success of curriculum reform is often tied to how well it aligns with the cultural values of the society it serves (Abdzadeh & Baker, 2020).

Additionally, the hidden curriculum—those unspoken or implicit lessons learned through the educational experience—also plays a significant role in shaping student attitudes towards research and inquiry. Ahvan (2021) explores the effectiveness of the hidden curriculum in shaping students' affective attitudes towards learning, suggesting that these implicit lessons can significantly influence a student's engagement with research-based learning (Ahvan, 2021). In cultures where inquiry and questioning may not be traditionally encouraged, educators must find ways to subtly integrate these skills into the curriculum, ensuring that students develop the necessary research competencies without overtly challenging cultural norms (Khoirinindyah & Astutik, 2021).

Finally, the success of a research-oriented curriculum is deeply influenced by the broader educational policies and curriculum reform initiatives at the national level. Countries like Turkey have undertaken significant efforts to modernize their science curriculum, emphasizing research and inquiry as central components (Öztürk-Akar, 2022). These reforms are often driven by a recognition of the need for students to develop the skills necessary to thrive in a globalized, knowledge-based economy (Sundby & Rødnes, 2023).

In this regard, curriculum reform is not merely a matter of updating content but involves a comprehensive overhaul of teaching methods, assessment strategies, and educational goals. As noted by Annala (2022), cross-institutional curricula in higher education must be designed with a focus on what knowledge counts, ensuring that students are equipped with the skills and knowledge necessary to navigate complex, real-world challenges (Annala, 2022).

The case of China's curriculum reform (Law, 2014) provides a clear example of how educational policies can drive the shift towards research-oriented learning. By focusing on intellectual demands and inquiry-based learning, China's educational reforms aim to produce graduates capable of contributing to the country's growing knowledge economy. Similar trends are being observed in countries around the world, as policymakers recognize the need for curricula that prioritize research, innovation, and critical thinking (Singh et al., 2011).

In conclusion, the shift towards a research-oriented curriculum is both a necessary and complex process. It requires the integration of multiple components, including teacher competency, institutional support, cultural awareness, and educational policy reform. By fostering a culture of inquiry and research within the curriculum, educational institutions can better prepare students for the demands of the 21st century, equipping them with the skills necessary to contribute meaningfully to their fields and societies. This study aims to identify and synthesize the key components influencing a research-oriented curriculum in education.

2. Methods and Materials

The present study falls under the category of synthesis research (meta-synthesis), utilizing an inductive content analysis model. To examine and answer the research question, the Sandelowski and Barroso (2007) method was employed. This method comprises seven steps: (1) formulation of the research question, (2) systematic review of the literature, (3) search and selection of relevant articles, (4) data extraction, (5) qualitative analysis and synthesis of findings, (6) quality control, and (7) presentation of results.

Step One: Formulating the Question: The research question is designed in two parts: "what" and "when." Accordingly, the question of this study is: "What are the characteristics of a research-oriented curriculum model?" In terms of the time frame, the study focused on the years 2010 to 2024.

Step Two: Systematic Review of Literature: In reviewing the relevant documents, past research in the meta-synthesis method is examined, and these documents are treated as valid as interview texts. Therefore, after searching the databases ERIC, ScienceDirect, Taylor & Francis, and Springer based on the mentioned keywords, and after

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eliminating duplicate articles, 719 initial articles were identified. Through careful reevaluation and based on the evaluation criteria, 89 articles met the quality assessment criteria. In this stage, after a rigorous quality control process, 25 articles were selected for the final review.

Step Three: Search and Selection of Articles: The search list was based on inclusion criteria such as the presence of the keyword in the title, keywords, or text of the research. This criterion was used to evaluate the relevance of the documents to the research topic. It is noteworthy that the retrieved sources were searched using the Boolean operators (AND, NOT, OR, ""). For international studies, keywords were searched in databases using these search strategies. The search terms for this study included: The time range considered for the search spanned articles from 2011 to 2021 for English papers and from 2010 to 2021 for Persian papers.

Step Four: Data Extraction from Articles: All selected articles were classified based on the research methods reviewed. Studies with similar conditions were grouped together. The selected articles were divided into three categories: (1) articles that offered a new definition of design thinking, (2) articles that presented new models, and (3) articles that applied models in the implementation of the design.

Step Five: Qualitative Analysis and Synthesis of Findings: During the analysis, the researcher seeks themes or concepts that have emerged from the existing studies in the meta-synthesis. In this phase, 75 codes and 20 final categories were identified from the reviewed studies.

Step Six: Quality Control: The quality evaluation of the articles was conducted based on relevance and assessed by expert researchers. The criteria included relevance, accuracy of information, comprehensiveness, and accessibility. Based on a purposive sampling model and data saturation, 25 studies were finalized.

Step Seven: Presentation of Findings: Finally, the results were presented after completing all prior steps.

3. Findings and Results

In order to ensure the validity of this qualitative study, four criteria proposed by Guba and Lincoln (1994) were employed: credibility, transferability, dependability, and confirmability. To address credibility, input from individuals with practical experience in this field was sought, ensuring that the extracted codes were accurate and free from bias. For transferability, a detailed description of the research process and its execution was provided to allow replication and the possibility of broader application. To ensure dependability, a session was conducted to review the research process, and discussions were held to enhance the design of the theoretical framework. Lastly, confirmability was achieved through a thorough review of the data and findings, supported by comprehensive researcher notes taken during the study.

An overall review of the research conducted in this area suggests that curriculum planning must be grounded in a foundational, needs-assessment-based, and specialized approach. The first identified category regarding curriculum components influencing research-oriented education is the necessity of individual acceptance of the research-oriented model.

Table 1

Dimensions related to individual acceptance of technology

Categories	Codes
Individual – Personal – Research Knowledge	Awareness, insight, education, capabilities, personality traits
Attractiveness	Visual appeal, content appeal, communication appeal, practical appeal
Effective Evaluation	Educational effectiveness, outlook based on it, implementation perspective
Motivation Enhancement	Individual motivation, job motivation, implementation motivation

Based on Table 1, the four main categories—individual knowledge, attractiveness, effective evaluation, and motivation enhancement—are the most important factors related to the research-oriented educational curriculum model in the educational system based on individual acceptance.

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Table 2

Dimensions related to the educator

Categories	Codes
Cognitive Competency	Correct understanding of the research-oriented model in education, attention to research-oriented educational needs, policy-making based on learners' mental capabilities in research
Emotional Competency	Establishing relationships with learners, guiding research structures in the educational model, empathy, emotional positioning in education, fostering a research-oriented mindset
Scientific Competency	Ability to apply operational knowledge, implementation capabilities, capability to adapt, research-based educational model, establishing continuous research-oriented education
Technological Competency	Ability to innovate in education, mastery of research-oriented educational structures, expertise in research technology tools
Effective Evaluation	Research-based evaluation, encouragement of research-oriented assessments, specialized research-oriented perspective on performance, providing operational feedback in targeted research

The five main categories—cognitive competency, emotional competency, scientific competency, technological competency, and effective evaluation—are related to the educator in the research-oriented educational curriculum model, which was defined based on 20 key codes.

Table 3

Dimensions and codes related to schools

Categories	Codes
School Management	Research-oriented management, managerial expertise, management training for adapting to curriculum changes, management training for adapting to content changes
School Educational Planning	Understanding the mission, setting operational missions, formulating research-based educational policies, adapting to research-oriented needs
School Structure	System coordination, interaction between school, students, and teachers, structural flexibility to accommodate changes
School Facilities	Technological resources, operational facilities, facilities to meet research-oriented needs

Based on Table 3, the four main categories—school management, school educational planning, school structure, and school facilities—are connected to the research-oriented educational curriculum model in the educational system, defined by 14 key codes.

Table 4

Dimensions and codes related to the educational system

Categories	Codes
Flexibility in Macro-Educational Policies	Research-oriented needs assessment, redefinition of educational policies, emphasis on research-orientation, encouragement of research-orientation, entrepreneurial educational system, curriculum planning based on tools
Flexibility in School Structures	Emphasis on divergent thinking, redefinition of modern structures, infrastructure development, expansion of the roles of staff in relation to research-orientation
Flexibility in Teacher Instruction	Active teaching, research-oriented teaching, flexible and adaptable teaching
Flexibility in the Educational Model	Changing instructional hours, a 24-year education model, connection with industry sectors, adapting research-oriented education to industry needs

Based on Table 4, the four main categories—flexibility in macro-educational policies, flexibility in school structures, flexibility in teacher instruction, and flexibility in the educational model—are part of the research-oriented educational curriculum model in the educational system, defined by 17 key codes.

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Table 5

Dimensions and codes related to culture

Categories	Codes
Creating Belief	Valuing research-orientation, believing in the importance of research-orientation, shifting perspectives on education
Culture of Quality	Moving towards quality, feedback-based reforms, flexibility based on educational needs
Culture of Evaluation	Educational transparency, educational accountability, educational responsibility

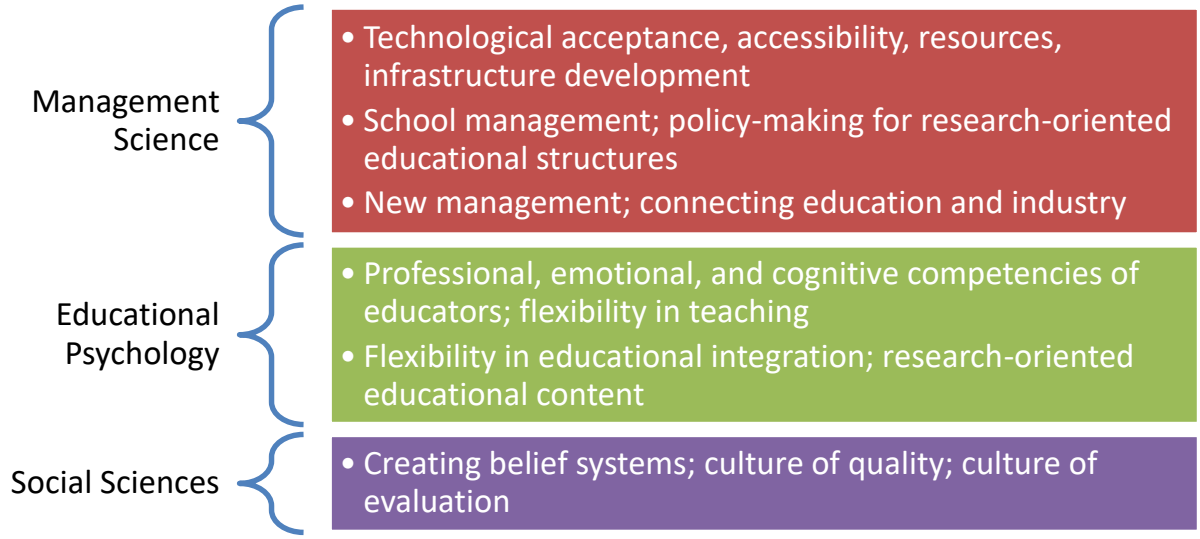
As per Table 5, the three main categories—creating belief, culture of quality, and culture of evaluation—address cultural issues related to the research-oriented educational curriculum model in the educational system, based on 9 key codes.

By analyzing and creatively examining the identified categories and codes, they can be divided into layers of application within managerial, educational psychology, and sociological structures. Each of these layers, which includes codes from various levels, presents a new classification in this area. For example, the managerial layer includes the first four categories: individual acceptance, the educator, schools, and the educational system, with the educational system having the greatest role in this layer based on the identified components. In the psychological layer, the category of the educator and the educational model, based on professional competencies, is the most important, with schools and the educational system also playing key roles. In the sociological layer, the educational system and culture are relevant, with the creation of a research-oriented culture having the most significant and critical role in this layer. A review of these layers shows that the educational system plays an active and influential role in all layers, making it the most important factor in shaping a research-oriented educational approach.

Thus, based on the identified structures, the components influencing research-oriented education can be examined through managerial, psychological, and sociological lenses. This structure offers a novel, layered approach to the issue.

Figure 1

Final Research Model



4. Discussion and Conclusion

The findings of this study offer significant insights into the components that influence a research-oriented curriculum, categorizing these components into five distinct areas: student acceptance, teacher competency, school-related factors, educational system factors, and cultural factors. These categories align with existing literature, which highlights the multi-faceted nature of curriculum development and implementation (Alishiri et al., 2018). In

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particular, the identification of cultural and educational system factors as influential components echoes previous research on the challenges of integrating research-based learning into educational contexts, especially in cultures where traditional methods of instruction dominate (Abdzadeh & Baker, 2020; Rezapour & Purbaghban, 2014).

The role of student acceptance in the success of a research-oriented curriculum is well-documented. Students who are willing to embrace inquiry-based learning tend to perform better in research-oriented environments (Vauderwange et al., 2022). This study's findings highlight the importance of fostering a student culture that values research and inquiry. This is consistent with the work of Jiménez-Chávez et al. (2018), who found that community-based participatory research curricula enhanced student engagement and led to more effective learning outcomes (Jiménez-Chávez et al., 2018). The present study's findings support this, demonstrating that students who accept and actively participate in research-oriented curricula are more likely to develop critical thinking and problem-solving skills, both of which are crucial in today's knowledge-based economies.

However, it should also be noted that student acceptance is not solely dependent on individual motivation but is also shaped by external factors such as school environment and teacher support (Agarwal et al., 2012). Research by Nargund-Joshi et al. (2011) showed that the level of support students receive from their educational institutions plays a significant role in their ability to engage with research-based learning (Nargund-Joshi et al., 2011). This study reinforces that view, suggesting that for students to fully embrace a research-oriented curriculum, schools must provide the necessary resources and support systems to guide them through the research process.

Teacher competency emerged as another crucial component of a research-oriented curriculum in this study. The literature consistently highlights the pivotal role that teachers play in the success of curriculum reforms, particularly those centered around research (Buschor & Kamm, 2015). According to studies such as those by Alishiri et al. (2018) and Forbes and Davis (2010), teachers must possess not only subject matter expertise but also the skills to facilitate inquiry-based learning (Alishiri et al., 2018; Forbes & Davis, 2010). The present study's findings are consistent with these earlier works, emphasizing the need for teachers to be well-versed in both research methods and pedagogical strategies that promote critical thinking.

This study also highlights the importance of teacher training and ongoing professional development in enhancing teacher competency. The findings align with the conclusions of Buschor and Kamm (2015), who argue that supporting teachers in developing a reflective and research-oriented stance is essential for the successful implementation of a research-oriented curriculum (Buschor & Kamm, 2015). The results from this study suggest that teacher competency should be continually nurtured through targeted professional development programs that focus on inquiry-based teaching methods and research facilitation.

Moreover, the findings of this study support the work of Vauderwange et al. (2022), who emphasized the need for dynamic and flexible teaching practices in research-oriented programs (Vauderwange et al., 2022). The results indicate that when teachers are empowered to adapt their teaching methods to fit a research-oriented curriculum, they can more effectively engage students and foster a learning environment that encourages inquiry and critical thinking.

School-related factors, such as institutional support and the availability of resources, were also found to significantly impact the implementation of a research-oriented curriculum. These findings are in line with earlier research by Alishiri et al. (2018), which identified institutional support as a key determinant of success in research-based educational programs (Alishiri et al., 2018). The current study reinforces the notion that schools must provide not only material resources, such as access to research tools and libraries, but also a supportive environment that encourages both teachers and students to engage in research.

For instance, the study found that schools that prioritize a research-based approach to education tend to foster a culture of inquiry and innovation. This observation is supported by Jiménez-Chávez et al. (2018), who reported that schools and universities that adopt research-oriented curricula often see improvements in student outcomes, particularly in fields like health and science (Jiménez-Chávez et al., 2018). However, as the findings of this study suggest, school-related factors are not limited to material resources. Institutional policies and administrative support also play a significant role in enabling the successful implementation of research-oriented curricula.

The findings of this study also underline the significant role that educational system factors and cultural context play in shaping the effectiveness of a research-oriented curriculum. These results are in agreement with studies such as those by Rezapour and Purbaghban (2014) and Abdzadeh and Baker (2020), which highlight the challenges of

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implementing research-based learning in cultures where traditional teaching methods are deeply entrenched (Abdzadeh & Baker, 2020; Rezapour & Purbaghban, 2014). In many educational systems, particularly in conservative or resource-limited settings, there is resistance to adopting new, research-oriented teaching methods (Amiri et al., 2016).

The present study's findings suggest that educational reforms aimed at fostering research-based learning must account for these cultural and systemic challenges. For instance, the study found that in environments where traditional education methods dominate, the introduction of a research-oriented curriculum requires not only changes in teaching methods but also broader institutional reforms that prioritize research as a core component of education. This supports the conclusions of Buschor and Kamm (2015), who argued that successful curriculum reform requires alignment between institutional goals and the broader cultural and educational context (Buschor & Kamm, 2015).

Moreover, the study found that educational systems that prioritize research-oriented learning tend to produce students who are better equipped to contribute to innovation and societal development. This is consistent with the findings of Vauderwange et al. (2022), who reported that dynamic curricular concepts in research-oriented programs in fields like optics and photonics contributed significantly to student learning outcomes (Vauderwange et al., 2022). The present study's findings suggest that for a research-oriented curriculum to succeed, it must be integrated into the educational system at all levels, from policy development to classroom implementation.

This study has several limitations that should be acknowledged. First, the research was conducted in a specific cultural and educational context, which may limit the generalizability of the findings to other regions or educational systems. While the study included both national and international research, the focus on certain regions means that the findings may not fully apply to countries with significantly different educational structures or cultural norms. Additionally, the study relied heavily on existing literature and secondary data, which may not fully capture the nuances of current educational practices in research-oriented curricula. Future studies could benefit from incorporating primary data, such as interviews with educators and students involved in research-based programs, to provide a more comprehensive understanding of the challenges and successes in implementing such curricula.

Another limitation of the study is its focus on formal education settings, such as schools and universities. The research does not account for the potential impact of informal educational environments, such as online learning platforms or community-based learning programs, which are increasingly becoming integral parts of modern education. As a result, the findings may not fully reflect the diversity of educational experiences available to students in a research-oriented learning environment.

Future research should aim to explore the implementation of research-oriented curricula in different cultural and educational contexts. Given the findings of this study, it would be valuable to examine how these curricula function in non-traditional learning environments, such as online courses or community-based educational programs. Investigating how students and educators in these settings engage with research-based learning could provide insights into how to adapt research-oriented curricula for a broader range of educational systems.

Moreover, future studies should incorporate primary data collection methods, such as surveys and interviews, to gain a deeper understanding of the practical challenges faced by educators and students in research-oriented learning environments. These studies could explore the specific barriers to implementation, such as resistance to change, lack of resources, or insufficient teacher training, and propose targeted strategies to address these issues. Finally, longitudinal studies that track student outcomes over time would provide valuable data on the long-term impact of research-oriented curricula on student learning, career readiness, and contributions to society.

Educational institutions looking to implement or enhance research-oriented curricula should focus on teacher competency and professional development as key areas for improvement. Teachers must be given the training and support necessary to facilitate research-based learning and to guide students through the inquiry process effectively. Institutions should also invest in the necessary resources, such as access to research tools, libraries, and digital databases, to support both teachers and students in their research efforts.

In addition, schools and universities should work towards creating a culture of inquiry and research by encouraging collaboration between students, educators, and researchers. This can be achieved through research partnerships, internships, and other opportunities for students to engage with real-world research projects. Finally, educational policymakers should prioritize research-oriented learning in their curriculum reform efforts, ensuring that institutional goals and policies align with the broader objective of

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fostering a research-driven educational system. By doing so, educational institutions can better prepare students for the challenges of the 21st-century knowledge economy.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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