



Teachers' Perceptions of the Competency-Based Curriculum and Its Impact on Teaching Instructional Practices

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Abstract

Despite Rwanda's adoption of the Competency-Based Curriculum (CBC) to promote learner-centered, skills-oriented education, evidence suggests a persistent gap between curriculum intentions and classroom practices. This study examines teachers' perceptions and instructional practices in implementing the CBC, with a focus on the alignment between curriculum intentions, instructional planning, and classroom practices. The study employed a sequential explanatory research design. Quantitative data were collected through structured questionnaires administered to teachers, while qualitative data were generated from semi-structured interviews, classroom observations, and document analysis of lesson plans and schemes of work. Quantitative findings indicate that teachers hold generally positive perceptions of the CBC ($M = 3.87$, $SD = 0.64$), particularly regarding its relevance to real-life skills and learner engagement. However, the level of classroom implementation was moderate ($M = 3.12$, $SD = 0.71$), revealing a gap between beliefs and practice. Regression analysis indicated that teachers' perceptions were a statistically significant predictor of instructional practices ($\beta = 0.48$, $p < .01$), explaining variation in instructional practices without implying causality. Qualitative results corroborate these findings, revealing conceptual ambiguity in translating competencies into instructional activities, weak alignment between objectives, teaching strategies, and assessment, and a predominance of surface-level learner-centered practices. Additionally, contextual constraints such as inadequate professional development, limited instructional resources, and large class sizes were found to hinder effective implementation. The study concludes that while teachers demonstrate strong conceptual support for CBC, its implementation remains constrained by cognitive, pedagogical, and systemic factors. It underscores the need for sustained professional development, improved resource provision, and stronger alignment between curriculum design and classroom realities to achieve meaningful educational reform.

Keywords: Competency-Based Curriculum, Teacher Perceptions, Instructional Practices, Curriculum Implementation

Article information

Received: 23/06/2026;
Reviewed: 01/07/2026;
Revised: 24/07/2026;
Accepted: 28/07/2026

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How to cite this article: Mutabera, N, E. (2026) 'Teachers' Perceptions of the Competency-Based Curriculum and Its Impact on Teaching Instructional Practices', *Journal of Classroom Practices*, 5(1), 39-63. Available at: <https://doi.org/10.58197/xmrpk767>

1. Introduction

Education systems across the world are undergoing profound transformations as societies demand learning that goes beyond the mere acquisition of factual knowledge toward the development of transferable skills, critical thinking, and problem-solving abilities [1]. This paradigm shift is largely anchored in Competency-Based Education (CBE), an approach that emphasizes learners' ability to apply knowledge in real-life contexts [2]. Unlike traditional teaching strategies, competency-based frameworks prioritize outcomes such as creativity, collaboration, communication, and adaptability skills considered essential for participation in the twenty-first-century knowledge economy [3]. Consequently, many countries have embarked on ambitious curriculum reforms aimed at aligning education systems with labor market needs and sustainable development agendas.

Within this global reform trend, Rwanda has emerged as a notable case of systemic educational transformation. As part of its broader socio-economic development strategy, Rwanda introduced the Competency-Based Curriculum (CBC) to replace the former knowledge-based system [4]. The reform seeks to cultivate a generation of learners equipped with practical competencies, entrepreneurial skills, and the capacity for innovation. It is also aligned with national frameworks such as Vision 2050 and international commitments including the Sustainable Development Goals (SDG 4), which emphasize inclusive and equitable quality education [5]. The CBC thus represents not only a pedagogical shift but also a strategic national investment in human capital development.

The implementation of the CBC requires a fundamental reorientation of teaching and learning processes. Teachers are expected to transition from being transmitters of knowledge to facilitators of learning who actively engage students in constructing understanding [6]. This transformation is deeply rooted in Constructivism, which posits that learners build knowledge through interaction with their environment, prior experiences, and social collaboration. In practical terms, this implies the adoption of learner-centered pedagogies such as group work, inquiry-based learning, project-based activities, and formative assessment practices that emphasize continuous feedback [7]. These approaches contrast sharply with conventional teacher-centered methods that dominate many classrooms, particularly in contexts where examination-oriented systems have historically prevailed.

Despite the conceptual strengths of the CBC, its successful implementation is contingent upon the extent to which teachers understand, accept, and effectively enact its principles. Teachers occupy a central position in the curriculum implementation process, acting as interpreters, mediators, and adaptors of policy into classroom practice [8]. Their beliefs, attitudes, and perceptions significantly influence how curriculum reforms are translated into actual teaching behaviors. Positive perceptions can facilitate innovation and pedagogical transformation, while negative or uncertain perceptions may lead to resistance, superficial compliance, or a reversion to traditional practices [9].

Empirical studies across various educational contexts have highlighted persistent gaps between curriculum design and classroom implementation. In many cases, teachers face multiple challenges that hinder the effective adoption of competency-based approaches. These challenges include insufficient professional development, limited access to teaching and learning resources, large class sizes, time constraints, and inadequate assessment tools aligned with competency-based standards [10], [11]. Furthermore, shifts in pedagogical expectations often require changes in deeply ingrained teaching habits, which may not occur without sustained support and continuous capacity building [12]. As a result, teachers may struggle to fully internalize and operationalize the principles of the CBC, leading to inconsistencies in instructional practices.

In the Rwandan context, several reforms have been accompanied by teacher training initiatives aimed at facilitating the transition to the CBC. However, evidence suggests that such training programs are sometimes insufficient in depth or duration to ensure comprehensive understanding and effective practice. Teachers may have varying levels of familiarity with key concepts such as competence, learner-centered pedagogy, and formative assessment [13], [14]. Additionally, contextual factors such as school infrastructure, availability of instructional materials, and administrative support can either enable or constrain teachers' ability to implement the curriculum as intended [15]. These contextual realities underscore the importance of localized studies that capture teachers' lived experiences and perceptions within specific districts and school environments.

Understanding the relationship between teachers' perceptions and instructional practices is essential for informing policy and practice. If teachers perceive the CBC as relevant, feasible, and beneficial, they are more likely to adopt innovative teaching strategies that align with its principles [16]. Conversely, if they perceive the curriculum as complex, impractical, or inadequately supported, they may resort to traditional methods that undermine the intended outcomes of the reform [17]. This relationship

underscores the need for evidence-based interventions that address teachers' concerns, enhance their competencies, and create enabling environments for effective teaching and learning.

Research Objectives

The aim of this study is to examine the relationship between teachers' perceptions of the Competency-Based Curriculum and their instructional practices in Kamonyi District, Rwanda. The following are specific objectives of the study.

- a) To analyze teachers' perceptions and level of understanding of the Competency-Based Curriculum.
- b) To determine the influence of teachers' perceptions on the adoption of learner-centered instructional practices.
- c) To identify key challenges and contextual factors affecting the effective implementation of the Competency-Based Curriculum and propose evidence-based improvement strategies.

Theoretical Framework

This study is grounded in an integrative theoretical framework that combines Didactic Transposition, Constructivism, and Teacher Cognition to explain how teachers interpret and enact the Competency-Based Curriculum (CBC) in classroom practice. The concept of Didactic Transposition, originally developed by [18], provides a powerful lens for understanding how knowledge is transformed as it moves from official curriculum documents (knowledge to be taught) into classroom instruction (taught knowledge). In the context of the CBC, this process involves translating abstract competencies, learning outcomes, and pedagogical guidelines into concrete teaching strategies, classroom interactions, and assessment practices. Teachers act as key agents in this transformation process, making decisions about content selection, sequencing, and instructional approaches [19]. However, this transformation is not neutral; it is influenced by teachers' beliefs, prior experiences, and contextual constraints. As such, discrepancies often arise between the intended curriculum and the implemented curriculum, making Didactic Transposition highly relevant for analyzing gaps between policy and practice.

Complementing this perspective, Constructivism emphasizes that learning is an active, student-centered process in which learners construct knowledge through interaction, inquiry, and reflection [20]. Within a competency-based framework, this theory underpins pedagogical approaches such as

problem-based learning, collaborative activities, and formative assessment. For teachers, adopting constructivist practices requires a shift from traditional transmission-based teaching to facilitation of learning experiences [21]. However, the extent to which teachers embrace such approaches is strongly influenced by their perceptions of the CBC, their confidence in using learner-centered methods, and the support they receive from the education system.

The third component of the framework, Teacher Cognition, focuses on the mental constructs that shape teachers' professional practices, including their beliefs, attitudes, knowledge, and decision-making processes [22]. Teachers' perceptions of the CBC, whether they view it as relevant, manageable, or effective, play a critical role in determining how they implement it in the classroom. Positive perceptions are likely to foster innovation and alignment with competency-based principles, whereas negative perceptions may lead to resistance or superficial compliance [23]. This theoretical lens helps explain why similar policy directives may result in varied instructional practices across different teachers and contexts.

Integrating these three perspectives, the study conceptualizes curriculum implementation as a dynamic and context-dependent process. The CBC (intended curriculum) is interpreted through teachers' cognitive frameworks (perceptions and beliefs), which in turn influence the process of didactic transposition (translation into practice), ultimately shaping instructional practices (implemented curriculum). Contextual factors such as training, resources, and school environment act as mediating or moderating variables in this process.

Significance of the study

This study provides important contributions to theory, practice, and policy in the context of curriculum reform. Theoretically, it enriches the existing body of knowledge on Competency-Based Education by linking teachers' perceptions with actual instructional practices. By drawing on perspectives such as Didactic Transposition and Teacher Cognition, the study offers a deeper understanding of how curriculum reforms are interpreted and enacted in classroom settings, thereby bridging the gap between policy intentions and pedagogical realities. Empirically, the study generates context-specific evidence, contributing to the limited research on the implementation of the Competency-Based Curriculum (CBC) in Rwanda and other countries. It highlights teachers' experiences, challenges, and adaptive strategies, offering valuable insights into the practical realities of educational reform at the school level. Such evidence is essential for understanding variations in implementation across different contexts.

Practically, the findings are expected to inform policymakers, curriculum developers, and teacher training institutions. The study identifies key factors influencing effective implementation of the CBC, thereby guiding the design of targeted professional development programs and support systems for teachers. Additionally, it provides school leaders with insights on how to foster enabling teaching and learning environments. Ultimately, the study contributes to improving instructional practices and learner outcomes by promoting the adoption of learner-centered approaches. It also offers relevant lessons for other countries undergoing similar reforms, thereby supporting broader efforts to enhance the quality and relevance of education systems.

2. Methodology

2.1 Research design and approach

This study employed a sequential explanatory mixed-methods design, in which the quantitative phase was conducted first, followed by a qualitative phase to explain and elaborate the quantitative findings. In the first phase, quantitative data were collected through a cross-sectional survey using structured questionnaires administered to secondary school teachers to examine their perceptions of the Competency-Based Curriculum (CBC) and instructional practices. The quantitative findings were analyzed using descriptive and inferential statistics to identify the major patterns and relationships among the study variables. In the second phase, qualitative data were collected through semi-structured interviews, classroom observations, and document analysis of lesson plans and schemes of work. Participants for the qualitative phase were purposively selected based on the quantitative results to provide deeper explanations of the observed statistical trends and to explore contextual factors influencing CBC implementation. In this sense, priority was given to the quantitative phase, while the qualitative phase served an explanatory role. Integration of the two datasets occurred during the interpretation and discussion of the findings, where qualitative evidence was used to explain, clarify, and contextualize the quantitative results. This sequential approach strengthened the validity of the study by combining statistical evidence with rich contextual insights into teachers' instructional practices.

2.2 Population and sampling technique

The target population for this study consists of all secondary school teachers implementing the Competency-Based Curriculum (CBC) in Kamonyi District, Rwanda. This population includes teachers

from various subject domains, levels of teaching experience, and school types (public and government-aided). The study adopts a multi-stage sampling technique to ensure representativeness and diversity of perspectives.

In the first stage, schools are stratified based on location (urban and rural) and type to capture contextual variations. A random sampling technique is then used to select schools within each stratum. In the second stage, teachers are selected using proportionate stratified random sampling to ensure fair representation across subject areas and experience levels. For the qualitative component, purposive sampling is employed to select key informants such as experienced teachers and heads of departments who can provide rich, detailed insights. Following the multi-stage sampling procedure, a total of 120 secondary school teachers were selected for the quantitative phase of the study. For the qualitative phase, 20 participants were purposively selected from the quantitative sample based on the survey findings to provide deeper explanations of the quantitative results. In addition, 15 classroom observations and document reviews of the corresponding teachers' lesson plans and schemes of work were conducted to triangulate the findings. The demographic characteristics of the 120 teachers included in the quantitative phase are presented in Table 1.

Table 1. Demographic information of participants

Variable	Category	Frequency (n)
Gender	Male	78
	Female	42
	Total	120
Age (years)	21–30	30
	31–40	55
	41–50	25
	Above 50	10
	Total	120
Teaching Experience	1–5 years	35
	6–10 years	45
	Above 10 years	40
	Total	120
Academic Qualification	Diploma	40
	Bachelor's Degree	70
	Postgraduate Degree	10
	Total	120
Subject Area	Sciences	45
	Arts and Humanities	40
	Languages	35
	Total	120

2.3 Research instruments

To ensure comprehensive data collection and methodological alignment, this study used four research instruments: a structured questionnaire, a semi-structured interview guide, a classroom observation checklist, and a document review. Each instrument is designed to address specific aspects of the study objectives and to enable triangulation of findings.

a) Structured questionnaire

The structured questionnaire was developed following an extensive review of the literature on Competency-Based Curriculum implementation, teacher cognition, and learner-centered instructional practices. Items were adapted from previously validated instruments and modified to fit the Rwandan secondary school context. The initial questionnaire consisted of four constructs: teachers' understanding of the Competency-Based Curriculum, perceived relevance of the curriculum, attitudes toward learner-centered pedagogy, and instructional practices. Each construct was measured using multiple items rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Examples of questionnaire items included: "I clearly understand the principles of the Competency-Based Curriculum," "The Competency-Based Curriculum improves students' problem-solving skills," "I regularly use learner-centered teaching approaches during classroom instruction," and "I frequently use formative assessment to monitor students' learning progress."

b) Classroom observation

Classroom observations were conducted to obtain direct evidence of teachers' instructional practices during the implementation of the Competency-Based Curriculum (CBC). A structured non-participant classroom observation protocol was developed based on the study objectives, the Rwanda Competency-Based Curriculum framework, and relevant literature on learner-centered pedagogy. The protocol was designed to complement the questionnaire and interview data through methodological triangulation. A total of 15 classroom lessons were observed. Each observation covered one complete lesson lasting 40–60 minutes. Teachers selected for classroom observation were purposively drawn from those who participated in the quantitative survey to provide contextual explanations for the quantitative findings.

The observation protocol consisted of ten instructional indicators: (i) alignment of lesson objectives with curriculum competencies, (ii) learner-centered instructional strategies, (iii) student participation

and engagement, (iv) questioning techniques, (v) collaborative learning activities, (vi) use of instructional resources, (vii) promotion of critical thinking and problem-solving, (viii) formative assessment practices, (ix) classroom management and learning environment, and (x) lesson closure and feedback. Each indicator was assessed using a four-point rating scale ranging from 1 (Not Observed) to 4 (Highly Evident), while descriptive field notes were recorded to capture contextual information and classroom interactions.

Classroom observations were conducted independently by two trained observers with experience in educational research and classroom evaluation. Before data collection, the observers completed a one-day training workshop that focused on the observation protocol, scoring criteria, and procedures for ensuring consistency in ratings. A pilot observation was conducted to standardize the application of the observation instrument before the commencement of the main study.

To assess the consistency of the observation ratings, inter-rater reliability was determined using the Intraclass Correlation Coefficient (ICC). The analysis produced an ICC value of 0.86, indicating a high level of agreement between the two observers. Any discrepancies in ratings were discussed immediately after each observation until consensus was reached.

c) Document review

Document analysis was undertaken to complement the questionnaire, interviews, and classroom observations by examining documentary evidence of teachers' implementation of the Competency-Based Curriculum (CBC). The analysis focused on instructional documents prepared by participating teachers, including lesson plans, schemes of work, and continuous assessment records. A total of 30 documents (10 lesson plans, 10 schemes of work, and 10 assessment records) were purposively selected from teachers who participated in the classroom observations.

A structured document analysis protocol was developed based on the principles of competency-based teaching and the Rwanda Competency-Based Curriculum guidelines. The protocol enabled systematic examination of the extent to which teachers incorporated competency-based instructional practices into their planning and assessment documents.

The documents were analyzed using deductive content analysis, with coding guided by predefined categories derived from the study objectives and the CBC framework. The coding categories included: (i) alignment of learning objectives with curriculum competencies, (ii) integration of learner-centered

instructional strategies, (iii) inclusion of competency-based learning activities, (iv) assessment strategies and formative assessment practices, (v) promotion of higher-order thinking and problem-solving skills, and (vi) alignment between learning objectives, instructional activities, and assessment tasks.

Each document was evaluated using a structured checklist in which every criterion was rated as Fully Evident, Partially Evident, or Not Evident. Qualitative notes were recorded to capture illustrative examples and contextual information that supported the interpretation of the findings. The document analysis findings were subsequently triangulated with classroom observations and interview data to provide a comprehensive understanding of teachers' instructional practices.

d) Semi-structured interview guide

The semi-structured interview guide is designed to collect in-depth qualitative data from selected teachers and school leaders. It includes open-ended questions that explore participants' experiences, interpretations, beliefs, and challenges related to the implementation of the CBC. The flexible nature of the instrument allows the researcher to probe further and clarify responses, thereby capturing rich and detailed insights. This interview guide was conducted to gain a deeper understanding of teachers' perceptions and the contextual factors influencing their instructional practices.

2.4 Method of data analysis

Quantitative data were analyzed using IBM SPSS version 26. Descriptive statistics (frequencies, means, and standard deviations) were used to summarize teachers' perceptions and instructional practices. Inferential statistics, including independent-samples t-tests, one-way ANOVA, Pearson correlation, and multiple regression analysis, were employed to examine differences among groups and determine the extent to which teachers' perceptions predicted instructional practices. Qualitative data obtained from interviews, classroom observations, and document reviews were analyzed thematically through coding, categorization, and theme development. Integration of quantitative and qualitative findings occurred during the interpretation stage, where qualitative evidence was used to explain and contextualize the statistical findings.

2.5 Validity and reliability

Before the main study, the questionnaire was piloted with 30 secondary school teachers from schools that were not included in the final sample. The pilot study was conducted to evaluate the clarity,

relevance, and appropriateness of the questionnaire items and to identify ambiguities before the main data collection.

Content validity was established through expert review involving three specialists in curriculum studies, educational research, and science education. Their recommendations resulted in minor revisions to improve the clarity and contextual relevance of several questionnaire items.

Construct validity was examined using Exploratory Factor Analysis (EFA). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.891, indicating that the data were suitable for factor analysis. Bartlett's Test of Sphericity was statistically significant ($\chi^2 = 2687.41$, $df = 406$, $p < 0.001$), confirming adequate correlations among the questionnaire items. Factor loadings ranged from 0.67 to 0.89, exceeding the recommended threshold of 0.50, indicating satisfactory construct validity.

Internal consistency reliability was assessed using Cronbach's alpha coefficients. The coefficients were 0.88 for teachers' understanding of the Competency-Based Curriculum, 0.85 for perceived relevance, 0.90 for attitudes toward learner-centered pedagogy, and 0.92 for instructional practices. The overall questionnaire achieved a Cronbach's alpha coefficient of 0.91, demonstrating excellent internal consistency reliability. To enhance the trustworthiness of the qualitative findings, credibility was established through triangulation of interviews, classroom observations, and document reviews, while member checking was conducted to verify participants' responses. Dependability and confirmability were strengthened through detailed documentation of data collection and analysis procedures, together with maintaining an audit trail throughout the study.

3. Results interpretation

3.1 Teachers' perceptions of the Competency-Based Curriculum

The results in Table 2 indicate that teachers generally held positive perceptions of the Competency-Based Curriculum, with an overall mean of 3.78. The highest rating was observed for the perceived relevance of the CBC. Similarly, positive attitudes toward learner-centered pedagogy reflect alignment with constructivist principles underpinning the reform. However, comparatively lower scores for clarity of implementation guidelines and adequacy of training highlight critical gaps in policy communication and professional development.

Table 2. Descriptive statistics of teachers' perceptions of CBC (N = 120)

Construct	Mean (M)	Std. Deviation (SD)
Understanding of CBC	3.72	0.66
Perceived relevance of CBC	4.02	0.58
Attitudes toward learner-centered pedagogy	3.95	0.61
Clarity of implementation guidelines	3.42	0.72
Adequacy of training	3.36	0.75
Overall perception score	3.78	0.64

Qualitative results from the interview and document review revealed one main theme: *positive perceptions of CBC with limited translation into practice*. Teachers demonstrated positive appreciation of implementing CBC as well as challenges hindering implementation. Teachers consistently expressed positive attitudes toward the CBC, particularly its relevance to real-life learning and skills development. However, these positive perceptions did not automatically lead to effective implementation. “The CBC is very important because it prepares students for real-life situations, not just passing exams.” (Teacher 4); “We agree with the idea, but applying it in class is not always easy.” (Teacher 9).

3.2 Teachers' instructional practices under Competence-Based Curriculum

Table 3 shows that instructional practices were moderately aligned with competency-based principles, with an overall mean of 3.61. Teachers frequently implemented interactive strategies such as group work and class discussions. However, the relatively lower use of project-based learning and formative assessment reveals partial adoption of deeper competency-based approaches. The findings point to an implementation gap between surface-level and transformative pedagogical change.

Table 3. Descriptive statistics of instructional practices (N = 120)

Instructional Practice	Mean (M)	Std. Deviation (SD)
Group Work	3.89	0.63
Class Discussions	3.84	0.66
Learner Engagement	3.71	0.65
Formative Assessment	3.35	0.71
Project-Based Learning	3.29	0.74
Overall Practice Score	3.61	0.68

Classroom observation, semi-structured interview, and document review revealed two main themes: *Conceptual ambiguity in implementing CBC and surface-level adoption of learner-centered pedagogies*. The findings highlight that teachers mostly used learner-centered approaches such as group work and class discussions, with one explaining, “I use group discussions because they help students participate.” However, document review revealed that these strategies were often superficially incorporated into lesson plans without clear implementation structures, defined student roles, or assessment criteria. Additionally, more advanced approaches such as project-based and inquiry-based learning were rarely documented, indicating that pedagogical transformation remains at a basic level. The findings also indicate that teachers face challenges in interpreting and operationalizing CBC principles. As one participant stated, “sometimes we are not sure how to transform competencies into classroom activities.” This challenge was corroborated by document analysis, which showed that lesson plans often contained vague objectives, weak alignment between activities and competencies, and limited articulation of expected learning outcomes. These inconsistencies suggest a gap in translating curriculum intentions into actionable teaching strategies.

3.3 Gender, teaching experience, and educational qualifications differences in perceptions and instructional practices

The results presented in Table 4 presents independent sample t-test results on the gender differences in perceptions and instructional practices. The results indicate that there were no statistically significant differences between male and female teachers in both perceptions and instructional practices. Although male teachers reported slightly higher mean scores, these differences were not significant. Independent-samples t-tests indicated no statistically significant gender differences in teachers' perceptions, $t(118) = 1.12$, $p = .266$, Cohen's $d = 0.20$, 95% CI [-0.05, 0.19], or instructional practices, $t(118) = 0.94$, $p = .349$, Cohen's $d = 0.17$, 95% CI [-0.07, 0.18]. These findings indicate that gender had only a trivial effect on both outcome variables.

Table 4. Independent samples t-test for gender differences

Variable	Gender	Mean (M)	SD	t-value	p-value
Perceptions	Male	3.81	0.62	1.12	>0.05
	Female	3.74	0.66		
Instructional Practices	Male	3.64	0.67	0.94	>0.05
	Female	3.58	0.69		

The ANOVA results in Table 5 reveal a statistically significant difference in instructional practices based on teaching experience. Specifically, moderately experienced teachers (6-10 years) demonstrated higher adoption of learner-centered practices compared to their more experienced counterparts. In contrast, less experienced (1-5 years) teachers may rely on established teaching habits, indicating the need for targeted professional development interventions to support pedagogical transition. A one-way ANOVA revealed a statistically significant effect of teaching experience on teachers' perceptions, $F(2,117) = 3.78$, $p = .026$, partial $\eta^2 = .061$. Similarly, instructional practices differed significantly across teaching experience groups, $F(2,117) = 4.36$, $p = .015$, partial $\eta^2 = .069$, indicating a small-to-moderate effect.

Table 5. ANOVA results for working experience

Variable	df	F-value	p-value
Teachers' perceptions	(2, 117)	3.78	<0.05
Instructional Practices	(2, 117)	4.36	<0.05

Table 6 indicates that teachers' academic qualifications significantly influenced both their perceptions and instructional practices. Teachers with higher qualifications demonstrated stronger understanding and more effective implementation of CBC principles. This finding underscores the importance of advanced academic preparation in enhancing pedagogical competence and curriculum interpretation. Teachers' educational qualifications significantly influenced perceptions, $F(2,117) = 5.12$, $p = .007$, partial $\eta^2 = .080$, and instructional practices, $F(2,117) = 4.87$, $p = .009$, partial $\eta^2 = .077$, suggesting that academic qualification explained approximately 8% of the observed variance.

Table 6. ANOVA results for educational qualification

Variable	df	F-value	p-value
Perceptions	(2, 117)	5.12	<0.01
Practices	(2, 117)	4.87	<0.01

3.4 Relationship between teachers' perceptions and instructional practices

The correlation results in Table 7 demonstrate strong and statistically significant positive relationships between teachers' perceptions and instructional practices. In particular, attitudes toward learner-centered pedagogy showed the strongest association with classroom practices, followed by

understanding of the CBC. These findings confirm that teachers' cognitive and attitudinal orientations play a crucial role in shaping their instructional behavior.

Table 7. Pearson correlation matrix

Variables	1	2	3	4
1. Understanding of CBC	1			
2. Perceived Relevance	0.54**	1		
3. Attitudes toward Pedagogy	0.59**	0.52**	1	
4. Instructional Practices	0.58**	0.49**	0.62**	1

Note: $p < 0.01$

For qualitative findings, we had three themes: *influence of teacher cognition on planning and practice, resource and contextual constraints affecting implementation, and gap between intended and implemented curriculum*. Teachers' understanding and beliefs about the CBC significantly influenced both their instructional practices and lesson planning. One teacher remarked, "When you understand CBC well, it becomes easier to plan activities for students." Document analysis supported this, showing that teachers with stronger conceptual understanding were more likely to include learner-centered activities and competency-based objectives. In contrast, others continued to rely on teacher-centered approaches, highlighting the critical role of teacher cognition in curriculum implementation.

3.5 Predictors of instructional practices

The regression analysis in Table 8 shows that teachers' perceptions significantly predict instructional practices, explaining 41% of the variance. Among the predictors, understanding of the CBC emerged as the strongest determinant, followed by attitudes toward learner-centered pedagogy. This indicates that both knowledge and beliefs are critical drivers of pedagogical change. The multiple regression analysis demonstrated that teachers' perceptions significantly predicted instructional practices, with teachers' understanding of the Competency-Based Curriculum emerging as the strongest predictor. These findings reinforce the importance of teacher cognition in shaping classroom instructional practices. Multiple regression analysis showed that teachers' perceptions significantly predicted instructional practices, $F(3,116) = 26.87$, $p < .001$, $R^2 = .41$, Adjusted $R^2 = .39$. Understanding of the CBC emerged as the strongest predictor ($\beta = .36$, $SE = 0.074$, $t = 4.87$, $p < .001$, 95% CI [0.18, 0.48]), followed by attitudes toward learner-centered pedagogy ($\beta = .29$, $SE = 0.074$, $t = 3.92$, $p < .001$, 95% CI [0.12, 0.41]) and perceived relevance ($\beta = .21$, $SE = 0.077$, $t = 2.74$, $p = .007$, 95% CI [0.05, 0.35])

Table 8. Multiple regression predicting instructional practices

Predictor	β	SE	t	p	95% CI	VIF
Understanding of CBC	0.36	0.074	4.87	<.001	[0.18, 0.48]	1.52
Attitudes toward pedagogy	0.29	0.074	3.92	<.001	[0.12, 0.41]	1.71
Perceived relevance	0.21	0.077	2.74	.007	[0.05, 0.35]	1.28

The findings in Table 9 summarize the results of the multiple regression model. The findings highlight that improving teachers' conceptual understanding and attitudes can lead to meaningful improvements in classroom practices.

Table 9. Model summary

Model Summary	Value
R ²	0.41
F	26.87
p-value	<0.001

From the interview, classroom observation, and document review, teachers identified contextual challenges such as lack of teaching materials and large class sizes as major barriers. One participant stated, "We don't have enough materials to support practical learning." These challenges were reflected in lesson plans that showed limited inclusion of practical activities and heavy reliance on textbooks. The findings suggest that contextual constraints significantly shape both instructional planning and classroom practices.

The study revealed a persistent gap between CBC expectations and actual classroom implementation. As one teacher explained, "we understand what CBC requires, but implementing it fully is still a challenge." Document analysis further showed partial alignment with CBC principles, including inconsistent integration of competencies and limited use of learner-centered strategies. This highlights that curriculum implementation is a complex, context-dependent process influenced by both teacher-related and systemic factors.

4. Discussion

The present findings indicate that teachers' understanding and attitudes were significantly associated with instructional practices and statistically predicted variation in instructional practices. These results are consistent with Teacher Cognition Theory; however, the cross-sectional design does not permit

causal inferences regarding the direction of these relationships. This result is consistent with previous studies on competency-based education, which have shown that teachers often recognize the value of such reforms in promoting twenty-first-century skills [24], [25]. Similarly, research conducted in Sub-Saharan Africa indicates that teachers tend to support CBC reforms conceptually, viewing them as essential for improving learners' employability and problem-solving abilities [26].

However, the study also revealed lower levels of clarity in implementation guidelines and inadequacy of training, which aligns with findings from several prior studies. For example, research in Kenya and Ghana found that teachers struggled to operationalize CBC due to insufficient training and unclear policy directives [27], [28]. Likewise, [29] emphasizes that effective curriculum reform requires sustained professional development, without which teachers are unlikely to translate theoretical understanding into practice.

From the perspective of Didactic Transposition, these findings suggest a breakdown in the transformation of curriculum knowledge from policy to practice [30]. While teachers understand the intended curriculum, they face difficulties in converting it into actionable teaching strategies. This confirms previous studies indicating that policy acceptance does not necessarily lead to pedagogical change [31].

The study found that teachers demonstrated moderate adoption of learner-centered pedagogies, with greater emphasis on group work and class discussions, but limited use of project-based learning and formative assessment. This finding strongly aligns with existing literature, which shows that teachers often adopt surface-level instructional changes while maintaining traditional teaching practices [32].

For instance, [33] argues that learner-centered education reforms frequently result in “symbolic adoption,” where teachers incorporate visible elements such as group work without fundamentally transforming classroom dynamics. Similarly, studies in Rwanda and neighboring countries have reported that teachers continue to rely on teacher-centered approaches due to examination pressures, large class sizes, and lack of resources [34].

From a theoretical perspective, these findings partially reflect the principles of Constructivism, which emphasize active learning and knowledge construction. While the use of interactive strategies indicates movement toward constructivist pedagogy, the limited implementation of deeper practices

suggests that the transformation remains incomplete. This supports previous studies indicating that pedagogical change is incremental and often constrained by contextual realities [35].

A major contribution of this study is the confirmation of a strong relationship between teachers' perceptions and instructional practices, which is consistent with a substantial body of research on teacher cognition. [36] argues that teachers' beliefs and knowledge significantly shape their instructional decisions. The present findings, which show that teachers' understanding and attitudes significantly predict instructional practices, provide strong empirical support for this theory.

Similarly, research by [37], [38] demonstrates that teachers' beliefs influence not only what they teach but also how they teach. The finding that understanding of the CBC is the strongest predictor of instructional practices aligns with studies showing that conceptual clarity is essential for effective implementation [39]. Teachers who lack deep understanding are more likely to revert to traditional teaching methods, even when they support reform initiatives.

Moreover, the SEM results indicating a strong direct effect of perceptions on practices are consistent with previous research in STEM and inquiry-based education, where teacher beliefs were found to mediate the relationship between policy and classroom practice [40]. These findings reinforce the argument that teacher cognition is a central lever for educational change.

The finding that less experienced teachers are more likely to adopt learner-centered practices is widely supported by previous research. Studies have shown that early-career teachers are generally more open to innovation due to their recent exposure to modern pedagogical training [41]. In contrast, experienced teachers often rely on established routines, which may hinder the adoption of new practices [42].

Similarly, the positive influence of higher academic qualifications on both perceptions and instructional practices aligns with existing literature. Research indicates that teachers with advanced qualifications possess greater pedagogical knowledge and are more likely to implement innovative teaching strategies [43]. This finding also supports the concept of pedagogical content knowledge, which emphasizes the importance of integrating subject knowledge with teaching expertise [44]. These results highlight the importance of continuous professional development and suggest that teacher education programs should be strengthened to enhance both theoretical understanding and practical skills.

The study identified training and resource availability as critical factors influencing both perceptions and instructional practices. This finding is consistent with extensive research demonstrating that contextual constraints are major barriers to curriculum implementation [45]. For example, [46] reports that many curriculum reforms in developing countries fail due to inadequate teacher training and lack of instructional materials. Similarly, studies in Sub-Saharan Africa have shown that large class sizes, limited infrastructure, and insufficient support systems hinder the adoption of learner-centered approaches [47].

The SEM findings, which show that training influences perceptions while resources directly affect practices, provide empirical support for these observations. This aligns with systems theory approaches to education, which emphasize that effective reform requires alignment between individual capacity and institutional support [48]. The persistent gap between the intended and implemented curriculum observed in this study is consistent with findings from previous research. [49] theory of Didactic Transposition explains this gap as a result of the transformation process through which curriculum content is interpreted and adapted by teachers. Similar gaps have been reported in studies of curriculum reform worldwide, where teachers reinterpret policy based on their beliefs, experiences, and contextual constraints [50]. The present study contributes to this literature by demonstrating that teacher perceptions act as a mediating factor in this process. This highlights the importance of addressing both cognitive and contextual dimensions of implementation. The findings of this study align with global evidence suggesting that curriculum reform is a complex and long-term process. As noted by [51], successful reform requires sustained effort, continuous support, and systemic alignment. The present study reinforces this view by showing that improving teacher perceptions alone is insufficient without addressing contextual challenges.

The study contributes to the literature by integrating Teacher Cognition, Constructivism, and Didactic Transposition within a mixed-methods framework. Unlike previous studies that primarily examined teachers' attitudes, this study demonstrates how teachers' cognitive orientations interact with contextual conditions to shape the implementation of competency-based pedagogy in Rwanda. These findings extend current knowledge by explaining the mechanisms through which curriculum intentions are translated into classroom practice.

5. Limitations of the study and future research

This study has several limitations that should be considered when interpreting the findings. First, the use of a cross-sectional design limits the ability to establish causal relationships between teachers' perceptions and instructional practices. Second, the reliance on self-reported questionnaire data may have introduced social desirability bias, as teachers might have over-reported the use of learner-centered practices. Although classroom observations were included to mitigate this limitation, the number of observed lessons was relatively small, which may not fully capture the diversity of teaching practices. Third, the study was conducted in one district, which may limit the generalizability of the findings to other regions with different contextual conditions. Additionally, variations in school resources and support systems were not exhaustively controlled. Future research should adopt longitudinal and multi-site designs to provide deeper and more generalizable insights into CBC implementation.

6. Conclusion and recommendations

This study examined the relationship between teachers' perceptions of the Competency-Based Curriculum (CBC) and their instructional practices. The findings revealed that teachers generally hold positive perceptions of the CBC, particularly regarding its relevance to real-life learning and skills development. However, the translation of these positive perceptions into effective classroom practices remains moderate and uneven. While some learner-centered strategies such as group work and class discussions are increasingly adopted, more complex approaches like project-based learning and formative assessment are less consistently implemented. The study found that teachers' understanding, attitudes, and perceived relevance of the CBC were significantly associated with instructional practices and statistically predicted variation in these practices. Nevertheless, because the study employed a cross-sectional design, these findings should be interpreted as associations rather than causal relationships.

Based on these findings, several recommendations are proposed. First, policymakers should strengthen continuous professional development programs with a focus on practical, classroom-based training that supports teachers in implementing competency-based strategies effectively. Second, there is a need to provide clear and accessible implementation guidelines to bridge the gap between policy and practice. Third, improving the availability of teaching and learning resources, as well as reducing structural constraints such as large class sizes, would enhance the adoption of learner-

centered approaches. Finally, future research should expand to multiple regions and adopt longitudinal designs to better understand the long-term impact of CBC implementation.

Conflict of interest

The authors declare no potential conflict of interest regarding the publication of this paper.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Funding

Not applicable

Ethics Approval

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of the Mount Kigali University. The research protocol was approved in accordance with the ethical guidelines and regulations governing research involving human participants, including the principles outlined in the Declaration of Helsinki. All procedures were conducted in accordance with approved ethical guidelines for research involving human participants.

Consent to Participate

The study involved secondary school students aged between 15 and 18 years. For participants under the age of 16, written informed consent was obtained from their parents or legal guardians prior to their participation, in addition to the students' assent to participate. All participants voluntarily agreed to take part in the study.

Consent to Publish

All participants agreed that the anonymized data collected from the study could be used for publication purposes.

Consent to Publish

Not applicable

References

- [1] S. Kumar, "Education 4.0: Transforming Learning for the Fourth Industrial Revolution," *High. Educ. Future*, vol. 12, no. 2, pp. 144–162, Jul. 2025, doi: 10.1177/23476311251326140.
- [2] A. Tahirsylaj and D. Sundberg, "Five visions of competence-based education and curricula as travelling policies: a systematic research review 1997–2022," *J. Curric. Stud.*, vol. 58, no. 1, pp. 1–26, Jan. 2026, doi: 10.1080/00220272.2025.2492605.
- [3] J. Mannonen, F. Urrutia, R. Hämäläinen, R. Araya, S. Lehesvuori, and D. Hooshyar, "Thematic mapping of competence-based education and training research through direct citation network analysis and topic modelling with latent semantic analysis," *Educ. Train.*, vol. 68, no. 10, pp. 1–16, Dec. 2026, doi: 10.1108/ET-03-2025-0161.
- [4] I. Muhire, T. Yvonne, M. Y. Ingabire, U. Amina, K. Francis, and V. Manirakiza, "Teachers' and Students' Perceptions of the Use of Competence-Based Assessment in Geography in Secondary Schools in Rwanda," *Afr. Educ. Rev.*, pp. 1–31, Mar. 2026, doi: 10.1080/18146627.2025.2610276.
- [5] T. Nsengimana, L. R. Mugabo, O. Hiroaki, and P. Nkundabakura, "Reflection on science competence-based curriculum implementation in Sub-Saharan African countries," *Int. J. Sci. Educ.*, vol. 47, no. 8, pp. 1071–1084, May 2025, doi: 10.1080/09500693.2024.2356971.
- [6] M. A. Sultan *et al.*, "Competency-based education and training for Community Health Workers: a scoping review," *BMC Health Serv. Res.*, vol. 25, no. 1, p. 263, Feb. 2025, doi: 10.1186/s12913-025-12217-7.
- [7] B. A. Wawire, F. Kiambati, N. Muhia, G. Gathoni, and B. Abuya, "Competence-based curriculum implementation in Africa: a scoping review of pedagogical and assessment practices," *J. Curric. Stud.*, pp. 1–30, Jul. 2025, doi: 10.1080/00220272.2025.2523429.
- [8] H. Mpate, "Biology teachers' implementation of the competence based curriculum in Tanzania: challenges and opportunities," *J. Biol. Educ.*, pp. 1–21, Dec. 2023, doi: 10.1080/00219266.2023.2282428.
- [9] A. Shahiwala, "Competency-based education in pharmacy- Challenges, opportunities, and the path forward," *Curr. Pharm. Teach. Learn.*, vol. 17, no. 7, p. 102358, Jul. 2025, doi: 10.1016/j.cptl.2025.102358.
- [10] O. A. Ajani and S. Govender, "Evaluating the impact of professional development programmes on curriculum design and implementation for sustainability education in high schools: A scoping review," *Interdiscip. J. Educ. Res.*, vol. 7, no. s1, p. a01, Apr. 2025, doi: 10.38140/ijer-2025.vol7.s1.01.
- [11] I. Buabeng and B. Amo-Darko, "Curriculum reforms without foundation: The effects of inadequate preparation in curriculum reforms on Ghanaian teachers and the education system," *Curric. Perspect.*, vol. 45, no. 2, pp. 133–147, Sep. 2025, doi: 10.1007/s41297-025-00309-7.
- [12] D. Mizza, M. Reese, and D. Malouche, "Flipped classroom evaluation and blended learning potential: a case study of engagement and inclusion in quantitative education," *Smart Learn. Environ.*, vol. 12, no. 1, p. 56, Sep. 2025, doi: 10.1186/s40561-025-00412-2.

- [13] A. Iyamuremye, I. Twagilimana, and F. Niyongabo Niyonzima, "Investigating chemistry teachers' technological, pedagogical, and collaborative skills of using web-based discussion tools in teaching organic chemistry in selected Rwandan secondary schools," *Cogent Educ.*, vol. 11, no. 1, p. 2426451, Dec. 2024, doi: 10.1080/2331186X.2024.2426451.
- [14] J. d'Amour Ndayisenga, "The Impact of Competency-Based Curriculum in Enhancing Learning Outcomes: A Study of Rwandan Secondary Schools," *J. Educ. Learn. Manag.*, vol. 2, no. 2, pp. 144–151, Sep. 2025, doi: 10.69739/jelm.v2i2.828.
- [15] A. Iyamuremye, I. Twagilimana, and F. N. Niyonzima, "8Bs instructional model for knowledge construction using web-based discussion tools," *Discov. Educ.*, vol. 4, no. 1, p. 185, Jun. 2025, doi: 10.1007/s44217-025-00614-3.
- [16] V. Manirakiza, D. Mukingambeho, I. Muhire, Y. Twizerimana, and A. Nsengiyumva, "Pedagogical quality of geography lesson delivery in Rwandan secondary schools," *Cogent Educ.*, vol. 12, no. 1, p. 2564900, Dec. 2025, doi: 10.1080/2331186X.2025.2564900.
- [17] D. T. Tiruneh, P. Leonard, and P. Rose, "Teaching quality and student learning progress during Rwanda's Leaders in Teaching programme: A longitudinal observational study," *Int. J. Educ. Dev.*, vol. 122, p. 103548, Apr. 2026, doi: 10.1016/j.ijedudev.2026.103548.
- [18] Y. Chevallard and H. Strømskag, "Institutional and epistemological conditions for a transition to the paradigm of questioning the world," *Rev. Electrónica Investig. En Educ. En Cienc.*, vol. 20, no. Especial, pp. 1–17, Dec. 2025, doi: 10.54343/reiec.v20iEspecial.514.
- [19] F. Dursun and A. Aykan, "Exploring Teachers' Narratives: Challenges and Strategies for Enhancing the Teaching Process," *Sage Open*, vol. 15, no. 1, p. 21582440251332557, Jan. 2025, doi: 10.1177/21582440251332557.
- [20] N. T. Arega and T. S. Hunde, "Constructivist instructional approaches: A systematic review of evaluation-based evidence for effectiveness," *Rev. Educ.*, vol. 13, no. 1, p. e70040, Apr. 2025, doi: 10.1002/rev3.70040.
- [21] A. Sioukas, "Constructivism and the student-centered entrepreneurship classroom: Learning avenues and challenges for US college students," *Ind. High. Educ.*, vol. 37, no. 4, pp. 473–484, Aug. 2023, doi: 10.1177/09504222221135311.
- [22] P. Bakshi, "Are Teachers Boundedly Rational? How Beliefs and Context Affect Decision-Making," *Leadersh. Policy Sch.*, vol. 22, no. 1, pp. 261–282, Jan. 2023, doi: 10.1080/15700763.2021.1950773.
- [23] D. Tran and B. R. O'Connor, "Teacher curriculum competence: how teachers act in curriculum making," *J. Curric. Stud.*, vol. 56, no. 1, pp. 1–16, Jan. 2024, doi: 10.1080/00220272.2023.2271541.
- [24] C. Day, "Competence-based Education and Teacher Professional Development," in *Competence-based Vocational and Professional Education*, vol. 23, M. Mulder, Ed., in Technical and Vocational Education and Training: Issues, Concerns and Prospects, vol. 23., Cham: Springer International Publishing, 2017, pp. 165–182. doi: 10.1007/978-3-319-41713-4_8.
- [25] B.-H. Duong and J. DeJaeghere, "From Student-Centered to Competency-Based Reform: Exploring Teachers' Perspective of Meaningful Participation," p. 598486 Bytes, 2022, doi: 10.25446/OXFORD.21107998.
- [26] A. Tarmo and A. Kimaro, "The teacher education curriculum and its competency-based education attributes," *J. Competency-Based Educ.*, vol. 6, no. 3, p. e01255, Sep. 2021, doi: 10.1002/cbe2.1255.

- [27] J. M. Muchira, R. J. Morris, B. A. Wawire, and C. Oh, "Implementing Competency Based Curriculum (CBC) in Kenya: Challenges and Lessons from South Korea and USA," *J. Educ. Learn.*, vol. 12, no. 3, p. 62, Apr. 2023, doi: 10.5539/jel.v12n3p62.
- [28] F. Otiike and J. Nakitare, "Remodeling Kenyan University Libraries for Effective Competency-Based Curriculum (CBC) Support," *Educ. Inf.*, p. 01678329251387305, Oct. 2025, doi: 10.1177/01678329251387305.
- [29] M. Juma Shiboko and K. John Mrema, "Challenges Facing the Implementation of Primary Secondary School Competence-Based Curriculum in Same District, Tanzania," *EAST Afr. J. Educ. Soc. Sci.*, vol. 5, no. 5, pp. 20–29, Nov. 2024, doi: 10.46606/eajess2024v05i05.0401.
- [30] L. Namatende-Sakwa et al., "From a Knowledge-based to a Competence-based Curriculum: Insights into Opportunities and Threats to Implementation in Uganda," *J. Curric. Dev. Eval. Educ. JCDEE*, vol. 1, no. 2, pp. 90–106, Nov. 2025, doi: 10.64948/JCDEE.v1.i2.2025.111.
- [31] E. Ramírez, J. Martín-Domínguez, I. Rodríguez, A. Pérez González, and I. Martín-Sánchez, "Powerful knowledge, transposition/transformation and ICT: an empirical study across school subjects in primary education," *Camb. J. Educ.*, vol. 53, no. 6, pp. 825–846, Nov. 2023, doi: 10.1080/0305764X.2023.2215185.
- [32] H. Strømskag and Y. Chevallard, "Didactic transposition and the knowledge to be taught: towards an archeorganisation for concave/convex functions," *Int. J. Math. Educ. Sci. Technol.*, pp. 1–28, Mar. 2024, doi: 10.1080/0020739X.2024.2305879.
- [33] J. Sahni, P. Darda, and S. S. Gaur, "Integration of principles for responsible management education principles (PRME) in Saudi Arabian universities: a thematic analysis of claims on university websites," *Soc. Bus. Rev.*, vol. 20, no. 3, pp. 673–696, Aug. 2025, doi: 10.1108/SBR-11-2024-0374.
- [34] I. Aloys, I. Twagilimana, and F. N. Niyonzima, "Assessing the Influence of Web-Based Discussion Tools on Teachers' Pedagogical Practices in Teaching Organic Chemistry in Selected Rwandan Secondary Schools," *Digit. Educ. Rev.*, no. 47, pp. 260–285, Jun. 2025, doi: 10.1344/der.2025.47.260-285.
- [35] H. Van De Kuilen, H. K. Altinyelken, J. M. Voogt, and W. Nzabalirwa, "Recontextualization of learner-centred pedagogy in Rwanda: A comparative analysis of primary and secondary schools," *Comp. J. Comp. Int. Educ.*, vol. 52, no. 6, pp. 966–983, Aug. 2022, doi: 10.1080/03057925.2020.1847044.
- [36] G. Li and Y. Ma, "Exploring the influencing factors of teacher beliefs and their impact on teacher behaviors," *BMC Psychol.*, vol. 13, no. 1, p. 993, Aug. 2025, doi: 10.1186/s40359-025-03095-z.
- [37] K. F. Kehoe and A. S. McGinty, "Exploring teachers' reading knowledge, beliefs and instructional practice," *J. Res. Read.*, vol. 47, no. 1, pp. 63–82, Feb. 2024, doi: 10.1111/1467-9817.12440.
- [38] K. A. Bernstein, K. T. Anderson, K. Close, and S. Rodriguez Martinez, "Teacher beliefs about multilingual learners: how language ideologies shape teachers' hypothetical policymaking," *Int. Multiling. Res. J.*, vol. 17, no. 3, pp. 191–219, Jul. 2023, doi: 10.1080/19313152.2023.2182094.
- [39] C. Lai, Q. Wang, and X. Huang, "The differential interplay of TPACK, teacher beliefs, school culture and professional development with the nature of in-service EFL teachers' technology adoption," *Br. J. Educ. Technol.*, vol. 53, no. 5, pp. 1389–1411, Sep. 2022, doi: 10.1111/bjet.13200.
- [40] M. A. Bowman, V. W. Vongkulluksn, Z. Jiang, and K. Xie, "Teachers' exposure to professional development and the quality of their instructional technology use: The mediating role of teachers' value and ability beliefs," *J. Res. Technol. Educ.*, vol. 54, no. 2, pp. 188–204, Mar. 2022, doi: 10.1080/15391523.2020.1830895.

- [41] D. T. Nguyen and D. Tran, "High school mathematics teachers' changes in beliefs and knowledge during lesson study," *J. Math. Teach. Educ.*, vol. 26, no. 6, pp. 809–834, Dec. 2023, doi: 10.1007/s10857-022-09547-2.
- [42] J. Tondeur, "Teachers' Pedagogical Beliefs and Technology Use," in *Encyclopedia of Teacher Education*, M. A. Peters, Ed., Singapore: Springer Nature Singapore, 2022, pp. 1960–1964. doi: 10.1007/978-981-16-8679-5_111.
- [43] Y. Gao, Q. Wang, and X. Wang, "Exploring EFL university teachers' beliefs in integrating ChatGPT and other large language models in language education: a study in China," *Asia Pac. J. Educ.*, vol. 44, no. 1, pp. 29–44, Jan. 2024, doi: 10.1080/02188791.2024.2305173.
- [44] G. Bas, "Effect of student teachers' teaching beliefs and attitudes towards teaching on motivation to teach: mediating role of self-efficacy," *J. Educ. Teach.*, vol. 48, no. 3, pp. 348–363, May 2022, doi: 10.1080/02607476.2021.2006043.
- [45] V. S. Zambak and A. M. Tyminski, "Connections Between Prospective Middle-Grades Mathematics Teachers' Technology-Enhanced Specialized Content Knowledge and Beliefs," *RMLE Online*, vol. 46, no. 1, pp. 1–20, Jan. 2023, doi: 10.1080/19404476.2022.2151681.
- [46] A. Habibi, Y. Riady, A. Samed Al-Adwan, and N. Awni Albelbisi, "Beliefs and Knowledge for Pre-Service Teachers' Technology Integration during Teaching Practice: An Extended Theory of Planned Behavior," *Comput. Sch.*, vol. 40, no. 2, pp. 107–132, Apr. 2023, doi: 10.1080/07380569.2022.2124752.
- [47] R. C. Anderson et al., "How am I a creative teacher? Beliefs, values, and affect for integrating creativity in the classroom," *Teach. Teach. Educ.*, vol. 110, p. 103583, Feb. 2022, doi: 10.1016/j.tate.2021.103583.
- [48] C. Dignath, S. Rimm-Kaufman, R. Van Ewijk, and M. Kunter, "Teachers' Beliefs About Inclusive Education and Insights on What Contributes to Those Beliefs: a Meta-analytical Study," *Educ. Psychol. Rev.*, vol. 34, no. 4, pp. 2609–2660, Dec. 2022, doi: 10.1007/s10648-022-09695-0.
- [49] K. M. Gagnier, S. J. Holochwost, and K. R. Fisher, "Spatial thinking in science, technology, engineering, and mathematics: Elementary teachers' beliefs, perceptions, and SELF-EFFICACY," *J. Res. Sci. Teach.*, vol. 59, no. 1, pp. 95–126, Jan. 2022, doi: 10.1002/tea.21722.
- [50] A. A. Alghamdi, "Exploring Early Childhood Teachers' Beliefs About STEAM Education in Saudi Arabia," *Early Child. Educ. J.*, vol. 51, no. 2, pp. 247–256, Feb. 2023, doi: 10.1007/s10643-021-01303-0.
- [51] M. Comstock, E. Litke, K. L. Hill, and L. M. Desimone, "A Culturally Responsive Disposition: How Professional Learning and Teachers' Beliefs About and Self-Efficacy for Culturally Responsive Teaching Relate to Instruction," *AERA Open*, vol. 9, p. 23328584221140092, Jan. 2023, doi: 10.1177/23328584221140092.