

Reimagining University Teaching: The Promise of Flipped Classrooms for Developing 21st-Century Pedagogical Skills among Pre-Service Teachers

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Abstract

The practicality of using learner-centred pedagogy in university teaching has received limited attention, with many practitioners dismissing its applicability in higher education settings. Yet, student teachers preparing for professional practice ought to experience and practise learner-centred and innovative pedagogies during their training, if they are to successfully implement them in their classrooms. This study assessed the extent to which pre-service teachers perceived the value of learner-centred and integrated pedagogies in developing their pedagogical skills through a pilot flipped-classroom approach in a pre-service teacher education course. Employing a descriptive study design, data were collected from 202 Level 100 pre-service teachers at the University of Education, Winneba (UEW) who experienced flipped classroom instruction in a professional education course. Findings indicate that pre-service teachers rated learner-centred and integrated pedagogies highly, describing them as authentic and meaningful ways of learning to teach. Students reported significant development of critical thinking skills, with more than 80% expressing increased self-efficacy and strong intention to use learner-centred pedagogies in their future teaching practice. Despite challenges in large-class implementation, the flipped classroom model offers a promising pathway to overcome these barriers by extending learning beyond classroom contact hours. The study recommends systematic training and support for higher education lecturers to build competence in employing learner-centred pedagogies, ensuring pre-service teachers are holistically developed and adequately equipped with pedagogical skills required for effective 21st-century teaching and learning.

Keywords: Flipped classroom, learner-centred pedagogy, pre-service teachers, teacher education, 21st-century skills, pedagogical competence

To cite this article: Addai-Munukum, R., Ashilley, J. A., Acquah, A., Mensah, W. A., & Amanfo, F. (2026). Reimagining university teaching: The promise of flipped classrooms for developing 21st century pedagogical skills among pre-service teachers. *Ghana Journal of Education and Teaching*, 14(3), 172-190.

Introduction

The 21st century has fundamentally transformed the demands placed on teachers, requiring them to move beyond the mere transmission of knowledge to facilitating the development of critical thinking, creativity, collaboration, and communication skills among learners (Voogt & Roblin, 2012; Almufarreh & Arshad, 2023). Educational systems worldwide have recognised that preparing students for an increasingly complex, technology-driven, and interconnected world necessitates a paradigm shift in pedagogical approaches (Kim et al., 2019). However, a growing concern persists that teacher educators continue to rely heavily on traditional lecture methods, leading to a critical disconnect between what pre-service teachers are taught to do and what they are expected to achieve in their own classrooms upon graduation (Annan, 2020; Sergeeva et al., 2020). Research across multiple contexts has documented significant gaps between desired competency levels in 21st-century skills and current teacher attainment, suggesting persistent challenges in effectively preparing educators for contemporary classroom demands (Varas et al., 2023).

This pedagogical misalignment has been extensively documented in educational research literature. Darling-Hammond and Oakes (2019) described what they termed the “Apprenticeship of Observation” problem, whereby teachers tend to teach as they were taught, regardless of the pedagogical theories they encounter during their training. When teacher education programmes predominantly employ lecture-based instruction while simultaneously advocating for learner-centred approaches, pre-service teachers receive conflicting messages about effective teaching. Korthagen (2017) emphasised that this contradiction undermines the development of innovative pedagogical competencies, as pre-service teachers lack authentic models of the very practices they are expected to implement. The persistence of traditional instructional methods, characterised by teacher-centred instruction where educators serve as the primary source of knowledge and students assume passive learning roles, represents a significant obstacle to educational transformation (Muniandy & Abdullah, 2023).

In Ghana, recent educational reforms, including the implementation of the Standards-Based Curriculum (SBC), have placed renewed emphasis on learner-centred pedagogies and competency-based instruction. These policy initiatives raise critical questions about the readiness of teacher education institutions to prepare pre-service teachers for these expectations. Specifically, how well are teacher education programmes modelling the pedagogies they expect pre-service teachers to use in their future classrooms? The answer to this question has significant implications for the quality of education in Ghanaian schools and the effectiveness of ongoing curriculum reforms.

Despite decades of global advocacy for learner-centred teaching approaches, teacher education remains predominantly lecture-driven across many contexts, including Ghana (Sivarajah et al., 2019). While considerable research has examined the implementation of innovative pedagogies in primary and secondary school contexts, limited scholarly attention has been paid to investigating the alignment between how teachers are trained during pre-service education and how they are expected to teach during in-service practice (Loughran, 2007). Furthermore, few studies have systematically examined the challenges that inhibit the adoption of learner-centred

pedagogies within teacher education programmes themselves. Adebola and Tsotetsi (2022) identified institutional and structural barriers that constrain teacher educators' ability to implement innovative instructional approaches, while Adedoja (2016) highlighted resource limitations and large class sizes as significant impediments. Owu-Ewie (2010) documented the prevalence of examination-oriented teaching cultures that prioritise content coverage over pedagogical innovation in Ghanaian teacher education.

However, these studies primarily adopted institutional or educator perspectives, leaving a critical gap in understanding how pre-service teachers themselves perceive the use of learner-centred pedagogies in their preparation programmes. Little is known about whether pre-service teachers recognise the value of experiencing innovative pedagogies during their training, whether such experiences enhance their confidence to implement similar approaches, and whether they develop intentions to transfer these practices into their future classrooms. This gap in the literature is particularly significant given that pre-service teachers' perceptions and self-efficacy beliefs are strong predictors of their subsequent instructional practices (Bandura, 1997). Without understanding how future teachers perceive and respond to learner-centred pedagogies during their preparation, efforts to reform teacher education may fail to achieve their intended outcomes.

The flipped classroom has emerged as a promising pedagogical innovation that addresses this fundamental challenge in teacher education. This approach reverses the traditional instructional model by delivering content outside of class time, typically through pre-recorded lectures or readings, and utilising face-to-face class sessions for active learning, discussion, problem-solving, and application activities under the instructor's guidance (Lo & Hew, 2017; Akçayır & Akçayır, 2018). By restructuring the learning environment in this manner, flipped classroom pedagogy enables teacher educators to model learner-centred practices while simultaneously developing pre-service teachers' 21st-century skills through application and facilitation rather than passive content reception. The conceptual appeal of flipped classroom pedagogy lies in its potential to address multiple challenges simultaneously. By moving content transmission outside the classroom, instructors create space for deeper engagement with material through active learning strategies that promote critical thinking, creativity, collaboration, and communication. Students can access content at their own pace, reviewing difficult concepts as needed, while class time becomes dedicated to higher-order cognitive activities that benefit from instructor guidance and peer interaction (Han & Røkenes, 2020).

For teacher education specifically, the flipped model offers the additional advantage of providing pre-service teachers with direct experience of learner-centred instruction, thereby addressing the apprenticeship-of-observation problem by modelling the very practices they are expected to implement in their future classrooms. This experiential dimension distinguishes teacher education applications of flipped learning from implementations in other disciplinary contexts, as pre-service teachers simultaneously benefit as learners and gain professional knowledge of innovative pedagogical approaches.

The purpose of this study was to assess the extent to which pre-service teachers perceive the value of flipped classroom pedagogy in developing their professional pedagogical skills.

Specifically, the research sought to determine whether pre-service teachers view flipped learning as meaningful and relevant for their future teaching practice. By examining pre-service teachers' perceptions of their learning experiences, skill development, and implementation intentions, this study aimed to provide empirical evidence regarding the viability of flipped classroom approaches in Ghanaian teacher education contexts. The findings are intended to inform policy decisions and professional development initiatives aimed at transforming teacher preparation programmes to better align with contemporary educational demands.

Research Questions

The following research questions were formulated to guide the study;

1. What are pre-service teachers' overall perceptions of their learning and satisfaction with flipped classroom pedagogy compared to traditional lecture methods?
2. To what extent do pre-service teachers perceive that flipped classroom pedagogy enhanced their development of 21st-century pedagogical skills?
3. What is the level of intention and self-perceived capability among pre-service teachers to apply flipped classroom strategies in their future teaching practice?

Theoretical Framework

This study draws upon two theories that highlight different aspects of learning within flipped classroom environments. First, Vygotsky's (1978) social constructivism theory provides a foundational understanding of how knowledge is constructed through social interaction and collaborative engagement. According to Vygotsky, learning occurs most effectively within the Zone of Proximal Development (ZPD), the space between what learners can accomplish independently and what they can achieve with guidance from more knowledgeable others. The flipped classroom operationalises this principle by creating structured opportunities for peer collaboration and instructor facilitation during face-to-face sessions, enabling learners to work within their ZPD while developing deeper understanding through social negotiation of meaning. Pre-service teachers' positive perceptions of their learning and skill development in collaborative environments suggest that these activities create productive learning spaces where knowledge is actively constructed through social interaction (Vygotsky, 1978; Adedaja, 2016; Yeboah et al., 2020).

Second, Bandura's (1977, 1997) self-efficacy theory offers critical insights into how learning experiences shape individuals' beliefs about their capabilities to execute specific behaviours. Self-efficacy beliefs are not merely reflections of actual skill levels; they also influence motivation, persistence, and performance by shaping goal-setting, effort expenditure, and responses to challenges. For pre-service teachers, developing strong self-efficacy beliefs regarding innovative pedagogical practices is essential for future implementation. When teacher education programmes provide opportunities for pre-service teachers to successfully experience and practice learner-centred approaches, they contribute to the development of robust self-efficacy beliefs, increasing the likelihood that these practices will be transferred

into future classroom contexts. Research by Tschannen-Moran and Johnson (2011) and Menon and Sadler (2016) has consistently shown that high-quality teacher education courses significantly influence pre-service teachers' self-efficacy beliefs about teaching. The combination of social constructivist principles and self-efficacy theory provides a comprehensive framework for understanding both the immediate learning benefits of flipped classroom pedagogy and its potential long-term impact on pre-service teachers' professional practice.

Methodology

This study adopted a positivist research paradigm and employed a descriptive survey design under the quantitative research approach (Park et al., 2020). The positivist paradigm was deemed appropriate given the study's focus on measuring pre-service teachers' perceptions and quantifying their responses regarding specific aspects of their flipped classroom experience. The descriptive survey design enabled the collection of standardised data from a large sample of participants, facilitating statistical analysis and generalisation of findings within the specified population (Aggarwal et al., 2016).

The study was conducted at the University of Education, Winneba (UEW), Ghana. The flipped classroom approach examined in this study was implemented with Level 100 students enrolled in the EDC111 professional education course. The implementation followed a systematic structure designed to maximise active learning opportunities while ensuring students had adequate access to content knowledge. Lecture content was pre-recorded by the instructor and provided to students one week prior to each scheduled class session, allowing students sufficient time to engage with the material at their own pace and in their preferred learning environments. Following their engagement with pre-recorded content, students were organised into collaborative groups and assigned performative tasks directly related to the week's instructional content. These tasks were designed to require application, analysis, and creativity and innovation of the concepts presented in the pre-recorded lectures, moving beyond mere recall or comprehension.

During face-to-face class sessions, students engaged in their assigned performative tasks, which included formal presentations, dramatic performances, poetry recitations, musical interpretations, structured debates, and other creative applications of course content. These activities served the dual purpose of helping students solidify their understanding of course material while simultaneously providing them with authentic experiences of learner-centred, active pedagogical approaches. The instructor's role during class sessions shifted from content delivery to facilitation, providing guidance, feedback, and scaffolding as students worked through their collaborative tasks and presentations (Atta & Bonyah, 2023).

The target population comprised pre-service teachers enrolled in the EDC111 course who had experienced flipped classroom pedagogy as part of their instructional experience during the 2023/2024 academic year. Using volunteer sampling techniques, participants were recruited for the study. Volunteer sampling was employed due to ethical considerations regarding

participant autonomy and the voluntary nature of research participation (Etikan et al., 2016). All students who had completed the flipped classroom experience in the EDC111 course were invited to participate in the survey, and those who voluntarily agreed to participate and provided informed consent were included in the study. The final sample consisted of 202 participants, who represented a substantial proportion of students who had experienced the flipped classroom intervention. The study sample consisted of 202 Level 100 pre-service teachers enrolled in the EDC111 professional education course at the University of Education, Winneba. All participants had experienced the flipped classroom pedagogical approach throughout the semester and were therefore positioned to provide informed perspectives on their learning experiences, skill development, and implementation intentions. The sample represented diverse academic backgrounds and intended teaching specialisations typical of first-year teacher education students.

Data were collected using a structured questionnaire specifically designed to address the three research questions guiding the study. The questionnaire was developed based on a comprehensive review of literature on flipped classroom pedagogy, pre-service teacher perceptions, and pedagogical self-efficacy. The instrument employed Likert-scale items, allowing participants to indicate their level of agreement with statements related to their learning experiences, skill development, and implementation intentions. Response options included Strongly Agree (SA), Agree (A), Neutral (N), Not Applicable (NA), Disagree (D), and Strongly Disagree (SD), providing participants with a sufficient range to express nuanced perceptions.

The questionnaire consisted of three main sections aligned with the research questions. The first section focused on pre-service teachers' overall perceptions of their learning and satisfaction with the flipped classroom approach compared to traditional lecture methods. Items in this section addressed perceived improvements in learning, overall satisfaction, cost-benefit perceptions, and recommendations for broader adoption. The second section examined pre-service teachers' perceptions of how the flipped approach contributed to their professional growth and the development of 21st-century pedagogical skills, including critical thinking, creativity, collaboration, and communication. The third section assessed pre-service teachers' intentions to apply flipped classroom strategies in their future teaching practice and their self-perceived capability to implement such approaches effectively.

Before formal data collection, the questionnaire was pilot-tested with a small group of pre-service teachers not included in the final study sample to ensure item clarity, appropriate response options, and adequate coverage of relevant constructs. Based on feedback from the pilot study, minor revisions were made to improve item clarity and comprehensibility. Data collection occurred at the conclusion of the EDC111 course, after all students had completed the flipped classroom experience. The overall reliability coefficient was 0.86. Questionnaires were administered digitally using Google Forms. Participants were provided with written information about the study's purpose, procedures, and their rights as research participants before completing the questionnaire. Completed questionnaires were automatically submitted, and the researchers received them in real-time.

Data were analysed using descriptive statistics to characterise the sample and summarise participants' responses to questionnaire items. Frequency distributions and percentages were calculated for each Likert-scale item to determine the proportion of participants endorsing various response options. Data were analysed using the Statistical Package for the Social Sciences (SPSS). For each research question, responses were tabulated and analysed to identify patterns and trends in pre-service teachers' perceptions. The analysis focused on identifying the proportion of participants expressing positive perceptions (combining Strongly Agree and Agree responses), neutral perceptions, and negative perceptions (combining Disagree and Strongly Disagree responses) for each questionnaire item. This approach enabled clear identification of consensus areas and potential concerns regarding the flipped classroom implementation (Field, 2018).

The study adhered to established ethical principles for research involving human participants throughout all phases of the research process. All participation was voluntary, with students clearly informed that their decision to participate or decline would have no impact on their course grades or academic standing. Participants were provided with comprehensive information about the study's purpose, procedures, potential risks and benefits, and their rights as research participants, including the right to withdraw from the study at any time without penalty.

Informed consent was obtained from all participants before data collection. Participants provided written consent after receiving detailed information about the study and having the opportunity to ask questions. Anonymity was maintained throughout data collection and analysis, with no identifying information recorded on questionnaires. Each questionnaire was assigned a unique identification number, known only to the research team, to facilitate data management while protecting participant anonymity. Confidentiality protocols ensured that individual responses could not be traced back to specific participants (Creswell & Creswell, 2018).

Results

Pre-Service Teachers' Overall Perceptions of Flipped Classroom Pedagogy

The findings reveal overwhelmingly positive perceptions of flipped classroom pedagogy among pre-service teachers across all measured dimensions related to the first research question. Table 1 presents the distribution of responses regarding pre-service teachers' overall learning experiences and satisfaction with the flipped classroom approach compared to traditional lecture methods.

Table 1: Pre-service Teachers' Overall Experience with Flipped Classroom

Statement	SA N(%)	A N(%)	N N(%)	NA N(%)	D N(%)	SD N(%)
The flipped approach improved my learning compared with traditional lectures	63(31.2)	126(62.4)	7(3.5)	4(2.0)	5(2.5)	7(3.5)
I was satisfied with my overall learning experience in this course	49(24.3)	119(58.9)	18(8.9)	6(3.0)	7(3.5)	3(1.5)
The benefits of the flipped approach outweighed the challenges	54(26.7)	123(60.9)	8(4.0)	6(3.0)	7(3.5)	4(2.0)
I would recommend the flipped approach for other courses in my programme	60(29.7)	119(58.9)	9(4.5)	4(2.0)	7(3.5)	3(1.5)
I wish that other lecturers use this approach for other courses	63(31.2)	116(57.4)	8(4.0)	5(2.5)	4(2.0)	6(3.0)

When asked whether the flipped approach improved their learning compared to traditional lectures, 63 participants (31.2%) strongly agreed, and 126 participants (62.4%) agreed, yielding a combined positive response rate of 93.6%. These findings align with research by Ruiz-Jiménez et al. (2024) and Monzonís et al. (2021), who documented similarly high satisfaction rates among university students experiencing flipped classroom methodologies. Only a small minority expressed disagreement: 5 participants (2.5%) disagreed, 7 (3.5%) strongly disagreed, 7 (3.5%) remained neutral, and 4 (2.0%) indicated the item was not applicable to their experience.

Satisfaction with the overall learning experience similarly elicited strong positive responses: 49 participants (24.3%) strongly agreed, and 119 (58.9%) agreed that they were satisfied with their learning experience in the course, representing an 83.2% positive response rate. The relatively higher neutral response rate for this item (8.9%) compared with other items suggests that, while most students were satisfied, some may have had mixed experiences or specific concerns that tempered their overall satisfaction, despite recognising learning benefits.

The perception that benefits outweighed challenges showed comparable endorsement, with 54 participants (26.7%) strongly agreeing and 123 participants (60.9%) agreeing, for a combined 87.6% positive response. This finding is particularly significant as it indicates that pre-service teachers recognised the value of the flipped approach even while acknowledging that it may have presented certain challenges, such as increased workload, need for self-discipline in engaging with pre-class materials, or adjustment to unfamiliar pedagogical formats.

When asked whether they would recommend the flipped approach for other courses in their programme, 60 participants (29.7%) strongly agreed, and 119 participants (58.9%) agreed, yielding an 88.6% recommendation rate. This high recommendation rate provides strong evidence that pre-service teachers found genuine value in the approach and believed their peers would benefit similarly from exposure to flipped classroom instruction in other courses.

Finally, 63 participants (31.2%) strongly agreed, and 116 (57.4%) agreed that other lecturers should adopt this approach, representing an 88.6% endorsement rate.

The consistency of positive responses across multiple related items suggests that pre-service teachers found genuine value in this pedagogical approach rather than simply expressing general satisfaction or acquiescence. The relatively low rates of disagreement and neutral responses further reinforce the robustness of these positive perceptions.

Perceptions of Professional Growth and 21st-Century Skill Development

Regarding the second research question about professional growth and 21st-century skill development, pre-service teachers reported substantial benefits from the flipped classroom approach. Table 2 presents the distribution of responses regarding how the flipped pedagogy contributed to participants' professional development.

Table 2: How Flipped Pedagogy Enhanced Professional Growth of Pre-Service Teachers

Statement	SA N(%)	A N(%)	N N(%)	NA N(%)	D N(%)	SD N(%)
The flipped approach enhanced my critical thinking skills	67(33.2)	118(58.4)	9(4.5)	3(1.5)	3(1.5)	2(1.0)
The approach improved my ability to collaborate with peers	71(35.1)	121(59.9)	6(3.0)	2(1.0)	1(0.5)	1(0.5)
I developed better communication skills through the performative tasks	69(34.2)	115(56.9)	11(5.4)	4(2.0)	2(1.0)	1(0.5)
The flipped classroom helped me understand how to facilitate rather than just lecture	65(32.2)	122(60.4)	8(4.0)	3(1.5)	3(1.5)	1(0.5)
I gained practical knowledge of learner-centred teaching methods	72(35.6)	117(57.9)	7(3.5)	3(1.5)	2(1.0)	1(0.5)

The data indicate that participants perceived meaningful enhancement of their pedagogical competencies through their engagement with flipped instruction. When asked whether the flipped approach enhanced their critical thinking skills, 67 participants (33.2%) strongly agreed, and 118 participants (58.4%) agreed, yielding a 91.6% positive response rate. Regarding collaboration with peers, 71 participants (35.1%) strongly agreed and 121 (59.9%) agreed, for a total positive response rate of 95.0%. This exceptionally high endorsement suggests that the group-based performative tasks central to the implementation successfully created opportunities for meaningful collaborative learning.

Development of communication skills through performative tasks was endorsed by 69 participants (34.2%) who strongly agreed and 115 participants (56.9%) who agreed, representing a 91.1% positive response rate. Understanding how to facilitate rather than just lecture was endorsed by 65 participants (32.2%) who strongly agreed and 122 participants (60.4%) who agreed, yielding a 92.6% positive response rate. This finding is particularly significant for teacher education, as it suggests that the flipped classroom experience helped

pre-service teachers conceptualise their future role as facilitators of learning rather than merely transmitters of information.

Finally, gaining practical knowledge of learner-centred teaching methods was endorsed by 72 participants (35.6%) who strongly agreed and 117 participants (57.9%) who agreed, representing a 93.5% positive response rate. The performative tasks and collaborative activities central to the flipped classroom implementation provided opportunities for pre-service teachers to develop skills in communication, creativity, critical thinking, and collaboration, which are recognised as essential 21st-century competencies (Bano et al., 2024). By experiencing these learner-centred approaches as students themselves, participants gained practical understanding of how such pedagogies function and the types of learning outcomes they can facilitate. This finding resonates with research demonstrating that active engagement in pedagogical innovations during teacher preparation contributes to a deeper understanding of instructional methodologies (Atta & Bonyah, 2023; Yeboah et. al., 2020).

Implementation Intentions and Self-Efficacy

The third research question addressed pre-service teachers' intentions to apply flipped classroom strategies in their future teaching and their self-perceived capability to do so. Table 3 presents the distribution of responses regarding participants' implementation intentions and self-efficacy beliefs.

Table 3: Pre-Service Teachers' Intentions to Apply Flipped Classroom Pedagogies in Future Teaching

Statement	SA N(%)	A N(%)	N N(%)	NA N(%)	D N(%)	SD N(%)
I intend to use flipped classroom strategies in my future teaching	68(33.7)	119(58.9)	9(4.5)	3(1.5)	2(1.0)	1(0.5)
I feel confident in my ability to implement flipped classroom approaches	61(30.2)	124(61.4)	11(5.4)	4(2.0)	1(0.5)	1(0.5)
I believe I can adapt flipped strategies to different subject areas	64(31.7)	118(58.4)	13(6.4)	5(2.5)	1(0.5)	1(0.5)
I have the skills needed to create engaging pre-class materials	57(28.2)	117(57.9)	18(8.9)	7(3.5)	2(1.0)	1(0.5)
I am prepared to facilitate active learning during class time	70(34.7)	121(59.9)	7(3.5)	2(1.0)	1(0.5)	1(0.5)

The findings reveal exceptionally high levels of both implementation intention and self-efficacy. When asked about their intention to use flipped classroom strategies in future teaching, 68 participants (33.7%) strongly agreed and 119 (58.9%) agreed, yielding a 92.6% positive response rate. Confidence in their ability to implement flipped classroom approaches was expressed by 61 participants (30.2%) who strongly agreed and 124 (61.4%) who agreed, representing a 91.6% positive response rate.

Belief in their ability to adapt flipped strategies to different subject areas was expressed by 64 participants (31.7%) who strongly agreed and 118 participants (58.4%) who agreed, yielding a 90.1% positive response rate. This finding suggests that pre-service teachers recognised the transferability of flipped classroom principles across disciplinary contexts rather than viewing them as applicable only to the specific course in which they experienced the approach. Perceptions of having the skills needed to create engaging pre-class materials showed slightly lower but still strong endorsement, with 57 participants (28.2%) strongly agreeing and 117 participants (57.9%) agreeing, representing an 86.1% positive response rate. The somewhat higher neutral response rate for this item (8.9%) may reflect some uncertainty about the technical or pedagogical skills required to produce high-quality instructional videos and other pre-class materials.

Finally, preparedness to facilitate active learning during class time was endorsed by 70 participants (34.7%) who strongly agreed and 121 participants (59.9%) who agreed, yielding a 94.6% positive response rate. This exceptionally high endorsement suggests that engaging in facilitated active learning activities during the flipped classroom implementation contributed to pre-service teachers' confidence in their ability to facilitate similar activities when they become practising teachers.

Pre-service teachers expressed strong confidence in their ability to adopt similar approaches upon entering the profession, suggesting that their direct experience with flipped classroom pedagogy contributed to robust self-efficacy beliefs in learner-centred instruction (Campbell et al., 2024). The high levels of implementation intention are particularly significant given research demonstrating that behavioural intentions are strong predictors of actual behaviour, especially when accompanied by adequate self-efficacy beliefs (Asare, 2023). These findings support Bandura's (1997) theoretical framework, which posits that successful performance experiences are the most powerful source of efficacy information, directly influencing individuals' beliefs about their ability to execute specific behaviours in future contexts.

Discussions

The findings of this study align with and extend existing research on flipped classroom pedagogy in higher education while offering novel insights specific to teacher education contexts. The overwhelmingly positive perceptions reported by pre-service teachers resonate with findings from Lo and Hew (2023) and Akçayır and Akçayır (2018), whose meta-analyses of flipped classroom research consistently identified student satisfaction and improved learning outcomes as key benefits of this pedagogical approach. Research by Wanner and Palmer (2015) and Garnjost and Lawter (2019) similarly documented enhanced student perceptions of learning and increased satisfaction when comparing flipped classrooms to traditional lecture-based instruction. However, the present study's focus on teacher education adds a critical dimension not always present in general higher education research, specifically the potential for flipped classroom experiences to model effective pedagogical practices that pre-service teachers can subsequently implement in their own teaching.

The high rates of positive perception across all measured dimensions suggest that the flipped classroom implementation at UEW successfully created a learning environment that pre-service teachers found engaging, valuable, and relevant to their professional development. The finding that 93.6% of participants perceived improved learning compared to traditional lectures is particularly striking, as it indicates near-consensus regarding the pedagogical benefits of the approach. This finding is consistent with the meta-analytic research by Strelan et al. (2020), who demonstrated, through an analysis of multiple studies, that flipped classroom approaches have positive effects on student performance across disciplines and education levels.

Development of 21st Century Skills and Professional Competencies

The finding that pre-service teachers perceived significant development of their 21st century pedagogical skills through flipped classroom participation corroborates recent work by Atta and Bonya (2023) and AbdulRab (2023), who documented enhanced critical thinking, collaboration, and self-directed learning among students engaged in flipped learning environments. For teacher education specifically, these skill development outcomes carry dual significance: they represent both personal learning gains for pre-service teachers and the acquisition of pedagogical competencies they will need to facilitate similar skill development among their future students. This dual benefit distinguishes teacher education applications of flipped classroom pedagogy from implementations in other disciplinary contexts.

The exceptionally high endorsement rates for items related to collaboration (95.0%), gaining practical knowledge of learner-centred methods (93.5%), and understanding facilitation rather than lecturing (92.6%) suggest that the flipped classroom experience successfully exposed pre-service teachers to authentic examples of constructivist, learner-centred pedagogy. By participating in collaborative performative tasks and experiencing facilitated rather than lecture-based instruction, pre-service teachers gained a first-hand understanding of what learner-centred teaching looks and feels like from the student perspective. This embodied knowledge is likely to be more memorable and influential than abstract theoretical discussions of pedagogical principles (Han & Røkenes, 2020).

Addressing the Theory-Practice Gap in Teacher Education

A particularly important contribution of this study is its address of the theory-practice gap that has long plagued teacher education. As Philips and Condry (2023) noted, one of the most persistent challenges in preparing effective teachers is the disconnect between pedagogical theories learned in coursework and the practical realities of classroom instruction. Symons et al. (2020) emphasised that teacher preparation programmes should focus on blending theory and practice within instructional methodology coursework, while Flower et al. (2017) found that embedding preventive classroom management strategies and tying theory to specific classroom situations are vital for fostering effective, rather than reactive, teaching responses.

By experiencing learner-centred approaches firsthand as students, pre-service teachers in this study gained practical, embodied knowledge of how such pedagogies function, what types of learning activities they entail, and how instructors facilitate rather than merely transmit knowledge. This experiential learning grounds abstract pedagogical theories in concrete

practice, making them more comprehensible, relevant, and actionable for future teachers (Han & Røkenes, 2020). The high endorsement rates for items related to understanding facilitation and gaining practical knowledge of learner-centred methods suggest that the flipped classroom successfully bridged theory and practice by providing pre-service teachers with authentic experiences of the pedagogical approaches they are being prepared to implement.

Moreover, the finding that 92.6% of participants intend to use flipped classroom strategies in their future teaching suggests that the experience was sufficiently positive and meaningful to influence their emerging professional identities and pedagogical orientations. This is particularly significant given research demonstrating that pre-service teachers' early experiences with innovative pedagogies during their preparation significantly shape their subsequent willingness to adopt similar approaches in their own classrooms (Korthagen, 2017).

Self-Efficacy Development and Implementation Intentions

The strong implementation intentions and high self-efficacy levels reported by participants are particularly encouraging findings that align with research by Brown (2012) and Li et. al. (2022) on pre-service teachers' pedagogical self-efficacy. These scholars have demonstrated that self-efficacy beliefs developed during teacher preparation programmes significantly influence whether novice teachers attempt to implement innovative practices upon entering the profession. Research by Tschannen-Moran and Johnson (2011) and Menon and Sadler (2016) has consistently shown that high-quality teacher education courses significantly influence pre-service teachers' self-efficacy beliefs about teaching.

Teachers with low self-efficacy regarding learner-centred approaches tend to default to more traditional, teacher-centred methods even when they intellectually endorse constructivist principles (Klassen & Tze, 2014). Conversely, teachers who have experienced success with innovative pedagogies during their preparation and who have developed strong self-efficacy beliefs are more likely to persist with these approaches despite the inevitable challenges and setbacks that accompany any pedagogical innovation (Kim & Seo, 2018). The present study's findings suggest that flipped classroom experiences in teacher education may help develop the robust self-efficacy beliefs necessary to sustain innovative practice beyond initial teacher preparation, particularly when such experiences provide mastery experiences, vicarious learning opportunities, and verbal persuasion, as theorised by Bandura (1997).

The finding that 91.6% of participants expressed confidence in their ability to implement flipped classroom approaches is particularly noteworthy. This high level of self-efficacy likely stems from multiple sources identified in Bandura's framework. First, by successfully engaging in performative tasks and collaborative activities during the flipped classroom implementation, pre-service teachers gained experiences that demonstrated their capability to succeed in learner-centred learning environments. Second, by observing their instructor modelling facilitation rather than lecture-based instruction, pre-service teachers gained experiences that helped them envision themselves in similar facilitator roles. Third, by receiving feedback and encouragement from their instructor and peers during collaborative activities, pre-service teachers received verbal persuasion that reinforced their developing capabilities.

Theoretical Implications

From a theoretical perspective, these findings provide empirical support for both social constructivism and self-efficacy theories in the context of teacher education. The social constructivist emphasis on collaborative learning and the Zone of Proximal Development was clearly operationalised through the group-based performative tasks that characterised the flipped classroom implementation. Pre-service teachers' positive perceptions of their learning and skill development suggest that these collaborative activities created productive learning environments in which knowledge was actively constructed through social interaction (Vygotsky, 1978).

The exceptionally high endorsement of collaboration-related items (95.0% for improved ability to collaborate with peers) provides strong evidence that the flipped classroom structure effectively facilitated social learning processes. By working together on performative tasks, pre-service teachers engaged in the type of dialogic interaction that Vygotsky identified as central to cognitive development. The instructor's role as facilitator during face-to-face sessions exemplified the concept of the more knowledgeable other, providing scaffolding that enabled students to accomplish tasks they could not have completed independently while gradually releasing responsibility as students' competence increased.

Similarly, the high self-efficacy levels and implementation intentions reported by participants support Bandura's (1977) proposition that successful performance experiences contribute to the development of robust efficacy beliefs. Research by Burger (2024) demonstrated that collaborative mentoring approaches aligned with constructivist learning principles provide opportunities for reflection on practice that benefit pre-service teachers' development of self-efficacy. By successfully engaging in flipped classroom activities, pre-service teachers gained mastery experiences that enhanced their confidence in implementing similar approaches in their future teaching, confirming the critical role of performance accomplishments in self-efficacy development (Burger, 2023).

Implications for Teacher Education Reform in Ghana

The findings of this study have significant implications for ongoing teacher education reform efforts in Ghana, particularly in light of the recent implementation of the Standards-Based Curriculum. The SBC emphasises learner-centred, competency-based instruction, yet teacher education institutions have been slow to adopt pedagogical approaches that model these principles (Annan, 2020). The overwhelmingly positive findings of this study suggest that flipped classroom approaches offer a practical and effective means of transforming teacher preparation to better align with the pedagogical demands placed on teachers in Ghanaian schools.

The high rates of satisfaction, perceived improvement in learning, and recommendation for broader adoption indicate that pre-service teachers recognise the value of experiencing learner-centred pedagogy during their preparation. These findings challenge potential assumptions that students prefer traditional lecture-based instruction because it is less demanding or more familiar. Instead, the data suggest that when active learning is well-designed and effectively

implemented, students appreciate its benefits and wish for more opportunities to engage with such approaches across their teacher preparation programme.

The strong implementation intentions expressed by participants are particularly encouraging from a reform perspective. If these intentions translate into practice, exposing pre-service teachers to flipped classrooms and other learner-centred approaches during their preparation may help create a new generation of teachers who are equipped and motivated to implement the pedagogical approaches required by the Standards-Based Curriculum. This could help break the cycle of traditional, lecture-based instruction that has persisted despite decades of reform efforts.

Conclusions

This study demonstrates that the flipped classroom offers a promising and contextually relevant pedagogical model for strengthening teacher education in Ghana. The findings indicate that pre-service teachers not only favour this approach over traditional lecture-based instruction but also report meaningful gains in essential 21st-century pedagogical competencies. With more than 90 per cent of participants identifying improved learning experiences and expressing intentions to integrate similar strategies into their future classrooms, the flipped classroom emerges as a practical pathway for narrowing the persistent theory-practice divide in teacher preparation. Equally notable is the high level of self-efficacy reported by participants, suggesting that exposure to learner-centred pedagogies during training boosts their confidence and readiness to enact active, collaborative instructional practices. Overall, the evidence indicates that integrating flipped classroom pedagogy into teacher education programmes can significantly align instructional preparation with the competency-based, learner-centred imperatives of Ghana's Standards-Based Curriculum, ultimately preparing pre-service teachers to drive pedagogical transformation in basic schools.

Despite the promising findings, three key limitations must be acknowledged. First, the study employed a descriptive survey design that captured perceptions at a single point in time, limiting the ability to determine whether these positive perceptions lead to long-term behavioural change in actual classroom practice. Second, the study relied solely on self-reported data rather than triangulating perceptions with objective measures of learning or demonstrated pedagogical competence. Third, because the study was conducted within a single institution using volunteer participants, the findings may not be fully generalizable to the broader population of pre-service teachers across diverse teacher education settings in Ghana.

To advance the potential of flipped classroom pedagogy in teacher education, future investigations should employ longitudinal designs that track pre-service teachers into their early-career teaching to examine whether intentions to adopt flipped or learner-centred pedagogies translate into sustained classroom practice. Comparative studies across multiple institutions and varied implementation models would further illuminate contextual enablers and constraints, particularly in resource-limited settings. Research exploring complementary learner-centred pedagogies would also provide a more comprehensive understanding of effective pedagogical innovation in teacher preparation.

Education policymakers should integrate clear expectations for learner-centred pedagogies within teacher education accreditation frameworks, accompanied by training, monitoring and adequate funding. Additionally, national guidelines should support institutions in building the technological and instructional design infrastructure required to sustain flipped classroom models.

Teacher education institutions should invest in structured professional development to prepare faculty to design and effectively facilitate flipped learning environments. Institutional support structures, such as technology-enhanced teaching spaces, access to multimedia production resources, and collaborative repositories of instructional materials, are also essential. Embedding flipped classroom experiences across multiple courses within programmes will allow pre-service teachers to consistently encounter, reflect on, and internalise learner-centred instructional approaches, increasing the likelihood of transfer into their own teaching practice.

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