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Aidoo, Benjamin

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Research Article

Perceptions of Ghanaian Student Teachers on Benefits and Challenges of the Flipped Classroom: A Case Study

Benjamin Aidoo [1*]
 0000-0003-0708-7746

Veli-Matti Vesterinen [2,3]
 0000-0002-1255-6845

Marey Allyson Macdonald [1]
 0000-0003-1729-0596

Berglind Gísladóttir [1]
 0000-0002-1787-3006

Svava Pétursdóttir [1]
 0000-0002-1206-8745

[1] School of Education, University of Iceland, Reykjavik, ICELAND
[2] Department of Chemistry, University of Turku, Turku, FINLAND
[3] Faculty of Educational Sciences, University of Helsinki, Helsinki, FINLAND
* Corresponding author: bea30@hi.is

ARTICLE INFO	ABSTRACT
	The views of student teachers on using the flipped classroom approach were investigated in three Ghanaian colleges of education during the 2020/2021 academic year. A questionnaire with open-ended questions was used to collect data from 143 student teachers. Responses were analyzed using qualitative content analysis. In addition, a focus group interview was taken to examine some of the issues in more depth The flipped classroom approach allowed the students to feel that they were in control of their own learning by using self-paced and collaborative learning. The approach also deepened their conceptual understanding as well as their learning skills. The student teachers also experienced three interconnected challenges, including inadequate ICT infrastructures, such as poor internet connectivity, lack of skills to use ICT, and increased workload. The flipped classroom approach can positively impact students' learning, but educators planning to use the approach should consider the adequacy of the ICT infrastructure available. **Keywords:** flipped classroom, ICT infrastructure, students, collaborative learning

INTRODUCTION

Before the pandemic, researchers recommended and emphasized the need for changing instructional practices to involve digital learning concepts (Huang et al., 2019). But some were hesitant to change their pedagogical approaches to suit the situation (Kerres, 2020). As a result, most educators mainly reproduced teaching their practices with digital technology (Kerres & Bucher, 2022). During the COVID-19 outbreak, there were rushed opportunities to use emergency remote teaching to expand open educational resources and practices (Bozkurt & Sharma, 2020; Chukwuemeka et al., 2021). As a result, most educators in higher education already teaching using virtual conferencing and interactions (Divjak et al., 2022). In Ghana, however,

educators found this shift to engage more students in remote teaching a challenge since only few had knowledge, experience and support for online teaching (Gyampoh et al., 2020).

Research studies on the other hand reported less ICT infrastructure and reliable internet (Adarkwah, 2021) and low ICT competence (Aidoo et al., 2022) made online learning challenging for educators. Students, on the other hand, struggled with limited ICT resources, e.g., reliable internet (Agormedah et al., 2020; Ogbonnaya et al., 2020) and lack of digital devices and skills to use them (Koi-Akrofi et al., 2020; Owusu-Fordjour et al., 2020). These challenges revealed the readiness and adoption of students and educators for digital education (Divjak et al., 2022). Educators shared videos, lectures, and other learning materials online without effective teaching and learning procedures (Crawford et al., 2020).

In Ghanaian chemistry teacher education curriculum, units such as organic chemistry are compulsory units taken as part of the bachelor of education program to adequately prepare student teachers. This unit is considered one of the challenging units for students especially with the IUPAC system and the complexities of naming and drawing structures of organic compounds (Oppong et al., 2022). Other difficulties with the COVID-19 disruptions and online learning adoption, educators were overburdened with less teaching time, cuts in teacher-student contact time, changes in teaching methods, student engagement, and assessment. Therefore, using teacher-centered approaches or online learning to makes complex topics more challenging for students to understand (Danker, 2015; Farmer, 2018).

As Greener (2020) argued, taking online courses will not guarantee students can learn the content effectively for academic success. To deal with these learning challenges, chemistry educators sought out best practices. One model that can support student learning is the flipped classroom approach (Bergmann & Sams, 2012). According to Bruggeman et al. (2021), the provision of pre-recorded lectures, extra learning materials, assessment tasks, and active platforms for constant engagement and discussions enhances students learning. The flipped classroom approach is based on blended learning, where students receive instruction and complete tasks through traditional face-to-face and online learning via technology (Tomas et al., 2019). Flipped classroom approach involves students using instructional materials, e.g., videos before class, and applying the experience during in class (Bergmann & Sams, 2012; Bishop & Verleger, 2013).

Some researchers have emphasized that flipped classroom involve student-centered learning activities that allow students to take an active role in the learning process (Cevikbas & Argun, 2017). In the flipped classroom learning environment, videos are a flexible instructional tool that allow students to learn the material anytime, anywhere, at their own pace (FLN, 2014). Educators select content and create a flexible, enabling learning environment for students (FLN, 2014). Since students come to class prepared with content knowledge, class time is intended for collaborative learning activities. This means students come to class with prior knowledge and familiarity with course content and prepare for active learning such as discussions or problem-solving activities.

Students accessing instructional materials allows them to take responsibility and play an active role in controlling their learning (Merisi et al., 2022). This helps students become more involved in generating ideas and constructing knowledge instead of waiting to receive information from educators. In such cases, students are more engaged in knowledge construction learning activities which enhances a deeper understanding of the learning material (Kaya & Yildirim, 2022).

Researchers have indicated that to maximize learning students must complete pre-class activities and participate in in-class activities (Lee & Choi, 2019). Students watch video lectures and take short quizzes to prepare for active learning and discussion activities. Pre-class instruction reduces students' learning difficulties and help increase their understanding of tasks (Nowels & Hewit, 2018). However, students hesitant to watch videos or read materials results in inadequate preparation for flipped learning (He et al., 2016). According to Koh (2019), students perceived classroom presents extra workload as more time is spent on pre-class activities and in-class activities.

In flipped learning, there are changes in educators and students' roles, how to keep 'true' to the curriculum, and how instructional demands change. Further, discussions with some educators and policymakers encouraged the researchers to continue the trial of flipped classroom model to go ahead in colleges of education, despite the pandemic. As a result, our purpose was to implement a flipped classroom model to

deliver chemistry instructions to students to enhance their learning. This study was built on the idea of flipped learning and aspects that would bring a change in the teaching and learning of chemistry.

LITERATURE REVIEW

The flipped classroom has gained much positive recognition in education because it enhances students' engagement in the learning process. Moving content instructions to homework allow class time to focus on students' active engagement in collaborative group work and fosters knowledge acquisition and development of learning skills (Bergmann & Sams, 2012). Off-loading some of the in-class activities to pre-class creates free space to prepare students adequately to engage in more challenging concepts that demand active learning skills. Students devote more time to classroom learning activities that help them understand the learning material and achieve higher learning outcomes (van Alten et al., 2019).

Several studies reported that reserving class time for meaningful discussions and activities improves students' learning (Zainuddin & Attaran, 2016). Since students learn on their own much class time is utilized for active learning activities, including peer discussion and problem-solving (Chen et al., 2017; Cilliers & Pylman, 2020; McLean et al., 2016). These benefits of a blended flipped classroom approach suggest that students engage in collaborative work, and reflection of tasks improves their ability to construct knowledge and develop thinking skills (Aldaka, 2020; Boateng et al., 2022).

One essential characteristic of the flipped classroom is the educator's role. In the flipped classroom instructors serves as a facilitator to guide, motivate, and provide feedback to students to enhance knowledge construction (Cevikbas & Kaiser, 2020). During the in-class time, teacher-student interaction allows the educator to give feedback and support opportunities for students for knowledge application tasks. As explained, the instructor guides students to engage in active collaborative activities that foster knowledge comprehension, deeper thinking, and problem-solving activities during the in-class activities. Studies have shown that teachers motivate students through classroom interactions which help to build their conceptual knowledge (Stratton et al., 2020).

In the literature of flipped classroom implementation in teacher education context, interesting results are reported. Since students learning experiences important indicators for measuring successful learning outcome, most researchers have focused on students' views and perceptions. Related studies found in the literature shows students have positive perceptions and satisfaction about the flipped the classroom. These studies report students perceived flipped instruction is more flexible with opportunity to control and learn at their convenience (Garcia-Ponce & Mora-Pablo, 2020; Merisi et al., 2022; Sointu et al., 202; Ulas, 2021), enhance students' understanding of science and achievement (Kaya & Yildirim, 2022), instructional videos effective enhancing students learning (Cukurbasi, 2022; Ubah et al., 2020), practical in-class activities increased students' self-autonomy for learning (Schwichow et al., 2022).

In Ghana, Oppong et al. (2022) engaged 45 pre-service teachers in a single pre-test-posttest design study in a flipped classroom setting. The results showed an improvement in pre-service teachers' performance in naming and drawing organic compounds. Also, the pre-service teachers could learn independently and collaborate with peers interactively, resulting in their understanding of the concepts.

Aidoo et al. (2022) examined 44 pre-service teachers' views on their experiences and learning outcomes in the flipped classroom. The results showed that most pre-service teachers had positive perceptions of the flipped classroom and believed the approach was effective for delivery chemistry lessons.

As seen in the literature, flipped classroom approach have implemented in teacher education across the globe. In Ghana however, the studies are limited in teacher education, thus the study aim to examined student teachers' views on the potential benefits and challenges of the flipped classroom approach. Focusing on this aim this study investigated how students' teachers perceived learning experiences in the flipped classroom approach. The approach was used to gain more practical and insightful evidence on the impact of the flipped classroom approach on students learning and the challenges they face with the approach.

To achieve the purpose of the study, the researchers sought to examine the following research questions:

1. What do students perceive as benefits of the flipped classroom approach?
2. What do students perceive as challenges of the flipped classroom approach?

METHODOLOGY

In this study, researchers examined students' opinions based on their experience in the chemistry course they enrolled in through face-to-face teaching and online over eight weeks. For this reason, the study used a descriptive qualitative case design (Merriam, 2009). A case study design is appropriate for generating an in-depth understanding of an issue in a real-life context, such as learning processes involved in flipped learning. The descriptive case study was appropriate to develop a deep understanding of students' experiences in the flipped classroom approach.

Participants

Three chemistry educators were purposely identified to participate in the study. Since the classes were already in place, the educators used their chemistry students for the study. Altogether 143 student educators enrolled in the general chemistry courses ran by the three educators participating in the research project for eight weeks.

Course Description and Implementation

The course was part of the bachelor of education program in the 2020/2021 academic year. The course is a mandatory taken by all students who are majoring in primary education, home economics, early childhood education, and science programs. The organic chemistry component of the course is considered one of the most challenging content for students, yet it is a requirement to be fulfilled as part of the program. The course serves as a preparation for teaching science at the elementary schools after completing the program. From that perspective, researchers chose to use this approach to test how the approach can be used as an alternative pedagogical approach to increase students' motivation for the course.

The educators and researcher (first author) prepared the course materials, including videos, PowerPoint slides, course reading materials, tasks for assessment. Educators outlined the goals, instructions, tasks, and activities at the beginning of each week to know what was expected. All the materials were stored on Google Classroom and shared with course participants via WhatsApp.

The teaching sequence of the course content was delivered in three different sessions and tasks. The first task involves students engaging in pre-class materials from home with 10-minute videos, reading supporting materials to understand the concept, and doing preparatory quizzes on the videos. In the second part, educator introduced the key ideas of the topic through a face-to-face question and answer method during the in-class session. The educator then initiates a discussion to build up the basic concepts relating to the content. After completing the class activities, final interactive group and whole class discussion is introduced for further engagement on learning tasks on Zoom. Finally, whole class discussion and group presentations are done for students to reflect on their learning and assess their understanding of the concept face-to-face. During the last sessions, assignments, homework, and exercises were given to course participants either in groups or individually.

Data Collection and Data Analysis

At the end of the course, a questionnaire with open-ended questions was distributed to all the participants. The questions were based on general perceptions of the flipped classroom approach. Out of the 143 questionnaires distributed, 125 responses representing 87% were returned. Further, six participants were invited to participate in a focus group. During the focus group, students were asked specific questions regarding their experiences in learning in a flipped classroom environment. The views from the questionnaire and focus group were analyzed using qualitative content analysis (Mayring, 2000). Participant's responses were transcribed verbatim and then abstracted, defined, and formulated into categories and subcategories. After the first round of analysis, the categorization was revised to remove overlaps.

FINDINGS

The findings from the analysis of the qualitative data obtained from the study are presented, as follows.

Students' Overall Perception of Their Learning Experience in the Flipped Classroom

Students were asked to describe their general learning experience in the flipped classroom approach in the survey. Over 44 % of those surveyed positively related their experience, using words like good, excellent, engaging, and effective. About 33% responded that taking the chemistry course in a flipped classroom environment was bad, stressful, not helpful, and challenging. Some (37%) of the students described their learning experience as useful as it enhanced conceptual understanding. About 21% of the students responded the flipped classroom approach was engaging and enhanced active learning.

Perceived Benefits of the Flipped Classroom Approach

Students mentioned several ways by which they benefited from flipped instructions. Several themes emerged from the analysis of the survey and focus group. After the analysis, identified themes were flexible for self-paced learning, taking responsibility, enhanced collaborative learning, more opportunities for interaction with educators, improved conceptual understanding, and development of learning skills. These themes and supporting comments from the data are summarized as follows:

Flexible for self-paced learning

Some of the students surveyed and interviewed felt the flipped classroom was more flexible. Since the flipped classroom was new to most of the students being able to learn at their convenience was more beneficial to them. According to them, they were able to obtain information from pre-class activities that helped them to construct new knowledge. Students felt being able to learn the pre-class instructions at their convenience in terms of time and pace positively impacted their learning. One student stated in the survey that:

> "The flexible classroom allows learning at their own pace and time" (Student 58, survey, S58s).

During the focus group, one student felt the flexible nature of flipped classroom enhanced their learning and stated that:

> "The flipped classroom makes learning more flexible because we can learn at our own convenient time and pace" (Student 1, interview, S1i).

In addition to the survey, 8% of the students interviewed also responded that the flexibility of the flipped classroom approach enabled them to learn at their convenience.

Students taking responsibility for their learning

Students mentioned they were allowed to contribute to the teaching and learning process. They believed taking an active role in the learning process made it easier to learn independently. They felt the flipped classroom approach enabled them to become active learners. Two participants from the survey noted that:

> "The learning process in the flipped classroom allows to take responsibility for their learning rather than receiving information from educators" (S81s).

> "The approach helps students to take responsibility for their learning" (S43s).

One participant during the focus group added that:

> "Learning in the flipped classroom allows students to take an active role in learning" (S3i).

In addition, 15% of the students indicated in the focus group and survey the flipped classroom approach enabled them to take control and be responsible for their learning.

Improves students understanding of conceptual knowledge

Students mentioned the approach helped in increasing their understanding and learning of the concepts. Two survey participants expressed views, as follows:

> "The flipped approach fosters a deeper conceptual understanding than memorizing and recalling facts in the lecture approach" (S95s).

> "The learning approach helps to deepen concept knowledge construction and more understanding of the concept" (S74s).

Another student reiterated the flipped learning activities involved hands-on activities that enhanced their conceptual understanding of the content, as follows:

> "Learning was more practical for better understanding concepts than memorizing and recalling facts" (S4i).

In addition, the survey and focus group responses revealed that 11% believed the learning activities contributed to their understanding of the concepts.

Development of learning skills

Some of the students felt the collaborating with peers enhanced the development of learning skills. One student indicated in the survey that:

> "The flipped classroom learning activities improve learning skills that help students to critically think and solve practical problems" (S1s).

In addition, two students stated in the focus group that working with peers enhanced their skills development to connect classroom learning to solve problems, as follows:

> "The flipped learning activities involve critical thinking, which helps students connect what is learned from the concepts to solve daily life problems" (S5i).

> "The flipped classroom helps students to connect what is learned from the concepts better as we gather facts by exploring the materials, asking questions, and sharing ideas" (S2i).

In support of the other student's assertions that flipped learning activities help problem-solving skills, another 10% of the respondents from the survey and focus group shared similar beliefs.

Promoting collaborative learning

Students also believed that collaborating with peers in group work activities facilitated their understanding of conceptual knowledge. They agreed working in peer-group work helped them build confidence to interact. A student wrote in the survey, as follows:

> "Working with other students helped me to learn and understand the concepts" (S19s).

Two students during the focus group believed and supported students' collaboration enhanced their learning, as follows:

> "Flipped classroom created opportunities for students to discuss concepts through group work" (S3i).

> "We understand the concept better working with peers than with an educator teaching us since we can share ideas" (S5i).

Supporting this assertion, 14% of the students felt working with peers enhanced their understanding of the concept and increased their motivation to learn and develop learning skills.

More opportunities for interaction with educators

Some of the students believed they can interact with teachers more often than in the face-to-face. Students felt the regular classroom interaction and small group discussion with the educators helped them gain a better understanding and retention of what was learned. One student indicated in the survey that:

"I have face to face interaction with tutors and colleagues, which helps me remember things that are learned" (S19s).

During the focus group, some students explained that the flipped classroom approach created an opportunity for more interactions with the teacher. They believed such interactions enabled educators to provide feedback on students' questions and misconceptions. Three students stated, as follows:

"The approach allowed students to interact with the tutors to find solutions to challenging questions" (S5i).

"The flipped classroom allows students to have one-to-one interaction with educators" (S3i).

"Flipped classroom created an opportunity for students to ask questions and get feedback from educators" (S1i).

Supporting this assertion, 12% of the students felt interacting with their educators created an opportunity to receive feedback that enhanced their understanding of the concept.

Perceived Barriers and Challenges to Flipped Learning

Even though the students generally had positive views about the flipped classroom approach, they also indicated some challenges and barriers to flipped learning. About 21% of the students surveyed responded that taking the course in the flipped environment was more challenging than face-to-face.

Three themes emerged from the analysis of the survey and focus group. The themes identified were internet and network connectivity, lack of ICT equipment, and increased workload. These themes and supporting findings are described below.

Lack of ICT infrastructure, e.g., the Internet access and digital tools

Many students noted learning in the flipped environment was challenging and difficult. This difficulty lies in the access to internet and poor network connectivity. Three students stated this in the survey, as follows:

"The major challenge has to do with instability and poor internet connection" (S4s).

"Students often experience network problems" (S106s).

"The internet connectivity was poor, which made it impossible to learn" (S2s).

Most of the students interviewed noted watching videos, participating in online class, discussions and other incidental tasks discussions was very challenging. Three students noted, as follows:

"The unavailability of a network in some areas made it very difficult for most students to watch videos, participate in the online lessons and group discussions" (S5i).

"The network was often unstable, students always missed the most critical activities in the class discussions that could help us understand the concepts" (S2i).

"Sometimes because of the poor network, there was disengagement in the out-of-class learning that would prepare us for the discussion in class" (S3i).

In support of this finding, about 10% of the students surveyed expressed frustration over not getting access to the videos and online learning activities due to the poor network connectivity and the Internet access.

Another concern expressed by students was the high cost of internet data bundles. They mentioned that connecting to the online sessions takes time and demands more data bundles because of the unstable network. One participant commented, as follows:

> "The flipped classroom approach is cost-intensive and considering the amount of data bundles needed for one class session, it made us prefer the face-to-face" (S2i).

In addition, the students also claimed they had no access to ICT equipment such as android mobile phones, computers, and laptops. This made it difficult to join the online sessions or watch the video lectures and materials because they could not afford these modern digital tools. One student stated in the survey, as follows:

> "The lack of ICT equipment made it difficult to watch the videos and participate in the online lessons" (S22s).

In addition, two students further agreed the absence of the digital tools affected their learning, as follows:

> "I did not enjoy the course well because I did not have the electronic device to participate in most lessons, especially those that demand technology" (S4i).

> "Most of our phones do not support the software platforms, e.g., Google Classroom or WhatsApp, so we cannot watch the videos or join online discussions" (S1i).

Further, 13% of the students believed they could find the approach challenging because of the issues with ICT infrastructure.

Lack of skills to use ICT equipment

Students find it challenging learning in the flipped classroom when participating in online class or discussions. Since the learning platforms were new to some of the students, navigating through it was quite difficult.

Students reported a lack of the skills to use ICT and learning platforms. Most students were unfamiliar with the new ICT tools and software, e.g., Google Classroom and Zoom, making them difficult to use. Two participants elaborated on these comments during the focus group, as follows:

> "Because the learning platforms are new to some of us, sometimes students lack the skills and find it difficult to use" (S5i).

> "There were some technical issues with the learning platform, e.g., mute/unmute, share and we had no idea how to navigate through and use the learning platform" (S6i).

Increased workload for learners

Some students interviewed shared their views of the working activities involved in flipped classroom approach. In the student's view, watching videos, making presentations, submitting assignments online, and engaging in online discussions are additional workloads for them. Three students explained how the changes in their roles and medium of assessments impacted their workload, as follows:

> "The flipped classroom is new to students, so watching videos at home, making presentations, participating in online discussions with peers, and submitting assignments online is cumbersome and challenging" (S4i).

> "Flipped lessons increase our workload because there is more time for planning, preparation, and responsiveness from the student" (S2i).

> "You must learn so many things to better prepare for the in-class session" (S5i).

DISCUSSION

Numerous studies on students' views on the flipped classroom on learning (Akayoglu, 2021; Stratton et al., 2020; van Wyk, 2018). Little is known about the perceptions of flipped classroom approaches on students

in developing countries. The present study examined student educators' opinions of a combined face-to-face and online course in a flipped classroom.

The study showed that students generally had positive views about the flipped classroom approach. Students were provided with tasks to revise and practice at their own convenient time and pace. Such flexibility to review and replay video lectures enhance their understanding of conceptual knowledge. This finding is in line with previous studies flexible nature of flipped classroom approach allows to learn anywhere and anytime and at their own pace (Doo, 2021; Drozdikova-Zaripova & Sabirova, 2020; Ekmekci, 2017).

The study findings also revealed that students perceived taking an active role in the learning process allowed them to take responsibility for their learning. This helped them become more involved in generating ideas and constructing knowledge instead of waiting to receive information from educators. While accessing instructional materials, students actively control their learning as they engage with the materials. This finding of the study is in line with the literature (Cevikbas & Argun, 2017; Karagol & Esen, 2019). The results show that students activate their self-independence by engaging with course materials, resulting in a meaningful learning outcome and satisfaction. In such cases, the active learning activities in flipped classroom approach foster individualized learning among students and improve their learning outcomes (McLean et al., 2016). Also, they felt the flipped classroom approach enhanced their ability to become self-directed, independent, and interact with the learning materials. This finding implies that in the flipped classroom, students have better control over how they learn and when they learn. Additionally, our results showed that engaging students in active learning activities led them to believe they could enhance their conceptual understanding. These findings confirm Cukurbasi (2022) study that the flipped classroom approach is effective for enhancing students conceptual understanding and learning. Students mentioned they could control their learning and perform the tasks at their own pace. This contributed to understanding the concepts, applying in-class discussion knowledge and develop critical thinking and problem-solving skills. This study's results agree with other studies on students engaging in active learning activities, individualized learning, and student-student interactions enable them to develop higher-order thinking skills (Umutlu & Akpinar, 2020).

Our study findings indicate that students perceived that the flipped approach encourages collaborative learning. Students agreed that the flipped classroom approach incorporates collaborative learning as educators use small group activities to work together. The students believed participating in these small learning activities for group discussions, problem-solving tasks, and pair-and-share activities increased students' interest and confidence and enhanced learning outcomes. These findings agree with previous studies that have reported that engaging students in collaborative learning through face-to-face and online interactions improves their understanding of concepts, confidence, thinking skills, and problem-solving skills development (Boateng et al., 2022; Cilliers & Pylman, 2020). Since students engage in deep learning activities, the flipped classroom approach creates a student-centered learning culture through the peer interaction. As students are involved in peer interaction in group space, they receive support from peers which can enhance their learning as found in literature (Chen et al., 2017; Ilter & Yesilyurt, 2021). Many students believed working in peer group activities facilitated their understanding of the content. This is because the flipped classroom stimulated their interaction with peers and enabled student's activeness in carrying out group tasks.

Another finding revealed the effective use of in-class time for teacher-student interactions. Because of the extra time space available from removing content delivery to out of class, teachers make maximum use of the time to connect with students. These connections enabled educators to identify student's problems or weakness and provide the needed assistance. This study results showed that the approach gives space for the instructor to motivate and provides students with feedback to enhance their learning. As in related literature, educators addressed students' questions to support students understanding of concepts through rich and effective application of their prior knowledge (Cevikbas & Kaiser, 2020). In addition, this study found students could communicate with the educator to answer questions and receive prompt feedback and remedial help. As emphasized in previous studies, educator-led discussions with students individually or small groups help to give just-in-time instruction and support for students as instructors have better familiarity with students at that point (Bergmann & Sams, 2012). This implies that educators should devote more classroom time to learning activities that focus on applying instructional materials, creating room for interaction, and providing students with feedback.

Despite the positive findings, students indicated they faced challenges learning in the flipped classroom. The challenges were mainly systematic and technical, associated with ICT infrastructure and technical issues rather than the approach. Most students mentioned that lack of access to the internet, network connections, and ICT equipment impacted their learning. These challenges resulted in inadequate preparation for out-of-class activities such as watching videos and joining online discussion sessions with the teacher and peers. This aligns with the previous studies that not all students have internet access to view video lectures at home to prepare for class activities (Van Niekerk & Delport, 2022). Also, some studies have argued that students could not afford the internet data bundles and claimed it was expensive to prepare for the in-class activities as in the literature (Adedoja, 2016). This study's findings suggest that educators could open ICT labs for students to do pre-class activities. Also, the study findings showed students lacked technical and technological skills to use ICT equipment and the learning platforms, which negatively affected their learning experiences. Previous studies reported that inadequate ICT skills and competence would cause students to experience technical difficulties when navigating online learning platforms (Yilmaz & Malone, 2020). This could explain students' disengagement in individualized learning at home, affecting their preparation and participation in the flipped lessons. This implies that student educators need the training to use technology to teach.

In addition, the study findings revealed students felt the learning activities in the flipped classroom approach increased their workload. This finding is consistent with the literature where students claimed pre-class activities are time-consuming and increase their workload (Cakiroglu et al., 2020; Lo, 2019). Students generally see reviewing lecture materials as time-consuming and an extra workload. This might result from their low self-regulation, resulting in negative familiarity with the approach. This result is found in literature wit students developing negative views due to their low regulatory activities (Chen et al., 2014). It could also imply students' low ICT competence led to their inability to learn in the flipped learning environment.

Further, it is worth mentioning that this study has limitations. First, the study was limited to only three public colleges of education. The students recruited for this study were second-year who had little experience with the flipped classroom approach. Due to lack of experience and challenges arising from students' pre-class preparation due to inadequate resources, e.g., lack of ICT tools and poor internet connectivity, might have affected their attitudes towards the approach. In addition, collecting data entirely online was challenging, which may have affected the quality of responses from students during the focus group.

Several suggestions for future research based on the findings of this study are recommended. Future research is required to study students' performance using a flipped-classroom approach with quantitative and qualitative data to support the existing findings as empirical evidence. In conducting future research, researchers should consider taking face-to-face focus groups or interviews to limit the challenges of internet cuts and audible voice notes.

CONCLUSION

This study identified potential benefits and challenges to consider when implementing flipped classroom approach in developing countries. It revealed that the flipped classroom approach resulted in some positive learning outcomes. Students reported that the flipped classroom approach enhanced their understanding, concept learning, and skills development. Poor internet connection and internet access were significant challenges that impacted the implementation of flipped classroom approach. Institutions, policymakers, and governments should pay attention to providing ICT infrastructure to schools and universities to implement e-lessons. Also, competence in using ICT for learning was identified as a challenge. Therefore, educators and policymakers might need to make provisions for ICT equipment in computer labs to help develop students' ICT skills competency.

On the other hand, this research highlighted some key issues to be considered when implementing the flipped classroom approach in developing countries. As the study is a case study limited to only three public colleges of education in Ghana, more research is needed to consider the diversity of situations in Ghana and other developing countries. To further evaluate the effectiveness of the flipped classroom approach, quantitative studies focusing on the issue in various settings are also needed. One should also consider that ICT infrastructures and technologies are developing quickly. It is probable that in the future, more and more will have quick access to the internet and the skills to utilize ICT in their learning.

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