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Entry

Navigating the Flipped Learning Approach: Opportunities, Challenges, and Implications in Teacher Education

Benjamin Aidoo [1,*], Alexander Obiri Gyampoh [2] and Andrew Chebure [3]

[1] Independent Researcher, Freyjugata 9, 550 Saudarkrokur, Iceland
[2] Department of Science, Kibi Presbyterian College of Education, P.O. Box PMB, Kibi EE-0051-9474, Ghana; ao.gyampoh@kpce.edu.gh
[3] Department of Science and Technology Education, University of KwaZulu-Natal, Durban 4041, South Africa; andychebure@gmail.com
* Correspondence: bea30@hi.is

Definition

Over the past decade, educators have utilized flipped learning to augment students' learning outside of the classroom. The COVID-19 pandemic disruptions in regular classroom teaching and learning activities intensified the use of the approach. This entry examines teacher educators' and pre-service teachers' perspectives of flipped learning, highlighting the opportunities and challenges during and after the pandemic. This entry also examines how flipped learning impacted educators' work and pre-service teachers' learning, which necessitated its continuous development and use in teacher education. A critical analysis of the literature and illustrations from other perspectives highlights the implication of adopting flipped learning and how educators, pre-service teachers, and universities can support the integration of the approach in the curriculum. While the approach provides substantial benefits to both educators and pre-service teachers, integrating digital technologies to adopt the approach presents challenges to practitioners, which need to be addressed with more support for professional development training. This entry contributes to the existing valuable information for policymaking for technological integration in the transformation of teacher education.

Keywords: ICT-based education; higher education; flipped learning; digital competences

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1. Introduction

The proliferation of digital technologies has enable the continuity of teaching and learning in the digital age [1], making digital technology an agent for change. The inclusion of technology has improved educators' competence for teaching [2]. Kormakova et al. [3] stressed the importance of teacher educators' proficiency in using technology to transform classroom practices to benefit student learning. Educators invest considerable time and resources to mentor students to facilitate the attainment of valuable experiences and the development of technological learning competences [4]. Likewise, educator's technological skills enable their students, particularly pre-service teachers (i.e., students undergoing training to become educators), to develop interests and actively participate in technology-mediated learning activities required in their future classroom [3]. This indicates that educators' technological skills in mastering and using technology to teach and engage students are critical. Notwithstanding, some educators have positive aspirations for technology integration [5,6] but still lack the required knowledge and skills to put this into practice, indicating gaps in educators' actual technological aspirations, competences, and

classroom practices [6]. This discrepancy led to the reassessment of how technology has been integrated into the curricula, particularly considering the changes necessitated by the COVID-19 pandemic [7]. Interestingly, the pandemic opened opportunities for the adoption of technology-driven teaching and learning pedagogies to support students' continuous online learning activities. Notably, one of the most adopted approaches globally during the pandemic was flipped learning. Flipped learning (FL) served as a measure to continuously engage students in independent learning and collaborative learning experiences [8,9], which somehow brought some form of relief to educators and students.

This entry aims to highlight the perspectives of educators and pre-service teachers (i.e., students undergoing training to become educators) on FL, focusing on the opportunities and challenges that encompassed the approach during and after the pandemic and the need for the continuous exploration of the approach. This entry adds to the existing knowledge covering critical research carried out during and after the pandemic to understand the extent to which the FL approach is utilized in higher education.

2. Literature Review

The Concept of Flipped Learning

Flipped learning involves shifting direct instruction outside the classroom so that class time can be used for interactive, collaborative, and student-centered learning activities [10,11]. According to the Flipped Learning Network [12], FL is a "pedagogical approach where direct instruction are moved from a group learning space to the individualized learning space, and the educator uses the resulting class time for collaborative interactive learning environment for students to apply conceptual knowledge learned". FL creates an avenue for students to access and engage with learning materials prior to class time (usually with or without technology), so that the classroom time can be dedicated to interactive and collaborative learning activities [13]. The idea of FL is designed to move the acquisition of basic knowledge out of the class and then use class time to deepen and apply the knowledge [14,15]. A critical aspect of FL is that the students work at their own pace at home and take control of the learning to suit their progress [10,14]. By taking ownership of their learning, students can perform independent learning actions outside of traditional classroom settings, which is essential for their understanding as they engage deeply with the learning material [16]. The approach is found to create time for the execution of varied instructional strategies comprising active learning, teacher–student interactions, and higher order thinking activities [17]. In addition, students engage in group work to brainstorm and interact with peers, which enhances their social skills development [18–20]. Accordingly, students create new knowledge when they are guided by peers or experts such as instructors. In that sense, Vygotsky argues that individual's prior and sociocultural experiences shape what they learn and how to use these experiences when discussing with peers in an interactive learning environment [21].

To widen the efficiency of the FL format, researchers have posited the inclusion of specified strategies, such as inquiry learning, to increase students' motivation and participation [21–23]. Integrating inquiry learning activities in FL allows learners to seek knowledge and new understandings in a practice-based format [22]. For instance, flipped inquiry learning activities increase educators' time with students and provide time for active learning activities and deeper engagement [24]. This enable educators to determine the students' ability level when planning problem-based learning activities in their classroom [25]. Several studies show inquiry learning activities in FL promote students' learning collaboration and interpersonal communication, enhance their deep learning of concepts, and promote their higher-order thinking [22,26]. Other researchers have found that integrating inquiry learning into FL facilitates students' interactions in a user-friendly online

learning environment and improves their technological skills to learn [27–29]. FL follows the foundations of constructivist teaching and learning, aligning as student-centered, thus making the educator take the role of a facilitator [30]. However, educators' competences in understanding the principles of FL are critical to ensure its adoption to provide students with high-quality learning experiences [3]. This entry will provide answers to the following research question: What are the opportunities and challenges of adopting flipped learning in teacher education?

3. Digital Competences in the Use of Flipped Learning

In FL, instructors prepare learning materials, such as voice-over PowerPoints and interactive lecture videos with embedded quizzes, for students' review and lead other learning activities in class [13,20]. Educators combine inverted teaching methods with adaptive learning activities, which deepen their understanding of how students could progress and help to identify and address specific areas where students may be struggling [30].

In designing FL activities, it is essential for educators to have pedagogical and professional digital competences in designing their classroom activities [31]. According to the Domingo-Coscollola et al. [32] digital competence involves a set of critical knowledge, skills and confidence to use Information and Communication Technologies (ICT) to support students learn, participate, engage, and work. Educators' digital competence refers to educators' proficient ICT use for professional activities, such as pedagogical didactic activities, and knowledge of learning strategies to help students build their digital literacy [33]. In that regard, educators' deeper understanding of the use of digital technologies beyond the technical proficiency for teaching and learning is critical for their PDC [34]. Additionally, it has been established that educators' technological competence results in preparing pre-service teachers to demonstrate a more excellent digital competence and aptitude to learn [7,35]. These digital competences include the knowledge, skills, and attitudes to use digital interactive tools to learn and communicate with peers [36,37], which are usually developed and nurtured through teachers' capacity building. Starkey [38] argues that capacity building on ICT integration for technology-oriented education demands sufficient skills and digital competence. Such demand motivates educators to understand how to design a digital learning environment for students to learn in [39]. This indicates the need for both educators and their students to nurture and improve their professional digital competence in FL [40,41].

The rapid transition from face-to-face teaching to online learning forced both educators and students to adapt flipped learning [42,43], which called for more technological professional development. It is believed that adopting FL redirects the focus of stakeholders towards developing systems, fostering innovation in teachers' professional learning, thereby widening the scope of online learning developments and opportunities for students [44,45]. According to Dailey and Robinson [46], providing extensive professional development and support guides educators to work in their capacities and also in professional learning communities. Some educators believe that integrating and adopting FL aligns with ICT initiatives aimed at equipping students with the necessary skills and interest in the science and technology job market [47]. Thus, encouraging ICT integration to adopt FL with specific technological skills can expand students' and educators' suitability to solve problems using technology. These attributes in educators' work and students' learning demonstrate the efficacy of the FL approach.

4. Flipped Learning in Teacher Education

The research interest in FL has risen recently across the globe in teacher education. It is expected that prior to the pandemic, institutions would have made significant progress

in adopting FL to strengthen the goals of ICT in the curriculum. Consequently, the interest in FL becoming a new standard of teaching and learning led to an increase in research on the approach during and after the COVID-19 pandemic. Such interest necessitated the need to examine the effectiveness of integrating FL in teacher education and develop an appropriate measure to intensify the call for the approach.

Benefits of Flipped Learning During and After the Pandemic in Teacher Education

Educators in several higher educational institutions have adopted FL as a pedagogical approach to reduce the current pressures in their expanded programs. FL has gained much recognition due to its potential benefits to both educators and pre-service teachers. To educators, the implementation of FL is used as a framework for professional development (PD) learning that helps them optimize their use of time more effectively to manage their workloads [10,22]. FL as a PD practice has positive impacts on practitioners. For instance, the approach enhances educators' knowledge and experiences to manage their time designing learning materials, e.g., videos lectures [48], to integrate active learning strategies in their classroom [49]. Educators who have utilized FL are able to provide deeper multifaceted student engagement activities, including brainstorming and problem-solving activities [50,51]. FL enables instructors to teach large classes and to cover vast amounts of material in a limited time [52]. Through FL, instructors spend more time assisting and engaging struggling students, while providing increased assistance to well-performing students as well more free time to work [53,54]. In addition, FL enhances educators' efficacy to use technology [48] to engage students in active learning and to foster an increased understanding of the content [10] and improves their active learning [24,53]. Similarly, educators interaction with students during the learning process enabled them to understand their students better and provide more effective assistance and support through teacher–learner interactions through virtual interfaces [54]. By using FL, educators can determine the students' ability level when planning problem-based activities in the classroom [33]. Giving students access to the learning materials and tasks beforehand makes better use of their time, changes the nature of educators' work, and improves the quality of their work for classroom transformation [40,55].

On the other hand, FL provides students with the leverage to take responsibility and ownership to control their time and the pace of their flexible self-learning [23,56,57] and facilitates students' positive learning experiences, engagement [58,59], and knowledge application [15,60,61]. FL increases the in-class learning efficacy by enhancing students' access to information and knowledge outside of the classroom [62]. In addition, students have positive attitudes towards learning materials, e.g., video lectures, enhancing their class preparation for active participation [23], and, because they can rewind and pause and review lessons [22], they can gain a deeper understanding of the conceptual knowledge [12,21,30]. In addition, students engage in active learning activities, such as group work, to interact with other students, which enhances their social skill development as they collaborate with peers [18,19,21,25]. As noted by Crews and Butterfield [63], pre-class, in-class, and post-class stages in FL are essential, as each stage prepares students to either learn individually or collaborate with peers. Reviewing these activities enables students to scaffold their learning and better prepares them for the active learning stages (in-class and post-class), which involves reflections and discussions among peers and instructors to solidify their understanding [40]. Furthermore, pre-service teachers feel that FL is useful and willing to take courses designed with flipped learning principles [64] and would implement some techniques in their future classes [65,66]. In addition, engaging pre-service teachers in a FL course improves their academic performance [29,67] and development of critical thinking skills [68].

5. Challenges and Limitations of Adopting Flipped Learning

Despite the positive attributes, educators and students have encountered certain challenges and barriers adopting FL. Teacher educators think that FL is cumbersome and are reluctant to use it due to their low professional technological competences [10,49,51]. Educators' weaker competences in technology integration result in a weaker ICT preparation and experiences for professional work [69]. Although, educators have the acquired knowledge but are reluctant to use such knowledge due to their pedagogical beliefs [2,7]. They are willing to integrate ICT to change classroom practices but, because of how their timetables are structured, they fear they would be unable to do so effectively [70]. Due to the heavy workload and working conditions within the universities, some educators feel their ability to integrate FL requires a significant amount of time [71]. Educators have more courses and other administrative duties and require time to adequately prepare their teaching tasks. Abonyi et al. [72] have indicated that educators' inadequate time and hefty workloads threaten their adoption of new learning pedagogical practices. Kafyulilo et al. [73] also added that even though educators are interested in learning new things to bring innovation into their classroom practices, their working environment, such as their lack of time and workloads, limits the use of such new skills.

Moreover, it has also been established that educators' ICT competence results in helping students demonstrate a more excellent ICT skill and aptitude for learning [22,25]. The success of FL implementation depends on the educator's ability to work alongside students and provide immediate feedback through tutorials. But such a role poses a challenge to some educators, as they cannot facilitate, guide, and monitor large groups of students simultaneously [74,75]. Most pre-service teachers are not effectively regulating their learning activities because they lack technological skills, leading to missing essential discussions and inefficient interactions. The lack of pre-service teacher competences in managing their learning activities online sometimes leads to inadequate interactions between them and their educators. These deficiencies suggest that educators and pre-service teachers finds FL overly complex and usually unfriendly [67,68] due to their low technological competences. For this reason, technological competences can hinder practitioners' ability to use FL effectively, leading to a disengagement from crucial discussions and interactions.

Further, the effective implementation of FL depends on the availability and access to ICT infrastructure, including digital learning technology and internet services [19,68]. In addition, some educational institutions also lack the sufficient ICT facilities for the effective implementation of technological innovations [1,32]. This lack of infrastructure arises from unequal distribution, resulting in a digital divide between the location and topography of universities. It is also essential to acknowledge that students, particularly those from low-income households, might lack access to ICT resources at home [76,77]. That possibility highlights that home conditions, such as family income, play a significant role in students' ability to access ICT infrastructure to learn.

One major limitation of educators' and pre-service teachers technological deficiencies' in working in digital learning environments is attributed to inadequate training in the appropriate use of ICT [46,78]. Educators believe that adequate PD training in online education would enable them to develop competences and improve their online teaching practices. Most educators lack the requisite training and have to resort to friends and colleagues for help in setting up online learning platforms. In addition, educators have attributed the lack of adequate training to school leaders uncooperating due to their low knowledge of technological innovation [79]. Educators believe school leaders' commitment to innovations play a vital role when it comes to decision making for effecting change. Some educators have also reported that they receive one-time PD training, which does not adequately give them the all the requisite skills to improve their classroom practices [80].

Most often these short term PD programs and resources are meant to save costs due to insufficient funds allocated to innovations [80]. Therefore, it is encouraged that school heads and management should take key steps to abreast themselves of critical innovations in technology for their educators' continuous use of technology.

6. Opportunities of Adopting Flipped Learning

As pointed out in other research, opportunities for PD in FL have helped educators and pre-service teachers to develop some ICT skills and to adopt online learning practices [48,54].

It is believed that this training could help educators to train students to acquire the technological skills to learn and apply them in their lives and become competent in ICT-related careers [47,81]. The effective integration of ICT can highlight the benefits of pursuing STEM programs in universities, thereby encouraging students to consider future careers in ICT-related fields. Some educators thought that PD could direct stakeholders' attention towards innovation and result in more comprehensive engagement and government backing for ongoing PD. Such support is crucial for educators to implement ICT initiatives effectively [72]. In that regard, PD can help educators to deepen their understanding of the use of digital technologies beyond the technical proficiency for teaching and learning [34]. Such training provides opportunities for educators to appreciate and use emerging digital tools to optimize their students' personalized learning, social skills, and employable technological competences.

7. Concluding Thoughts and Implications for Future Classroom Practice

This entry highlights the complexities of educators' and pre-service teachers' digital competences, working conditions, ICT infrastructure, associated costs of digital tools, and resources in shaping their experiences with FL. Educators and pre-service teachers have diverse views about FL. Those perspectives significantly shape their overall perception of FL's effectiveness and satisfaction. Educators' and pre-service teachers' technological competence is still being developed, despite the positive signs and a general belief in the value and opportunities provided for technological integration for FL adoption. This shows that a successful adoption of FL requires both teacher and learner competences in using ICT and educators who can integrate subject-based teaching with the affordances of ICT. Therefore, providing the necessary professional development training support for educators and pre-service teachers to develop and master their technological competences would improve their confidence in integrating FL. Such training could result in the advancement of technological competences for educators' and pre-service teachers' PD to practice the technological knowledge gained. This suggests that educators' ICT competences and working conditions are improved through the support from policymakers, and technological skills could result in the effective implementation of a technology-enhanced learning system. Moreover, ICT integration generally seemed to be interconnected with the prevailing home and school learning conditions, including access to technological tools and insufficient internet access. These factors affect pre-service teachers' access to learning materials, participation in classroom discussions, communication with educators, and navigation through the learning forums.

At this point, the advancement of FL in teacher education reflects the elevation of efforts by educators and researchers, highlighting the prospects of the approach. Over time FL has become a pedagogical approach that has provided new opportunities for educators to support students' learning engagement beyond the regular traditional classroom instructions. These opportunities show the growing body of knowledge in the research in various fields, demonstrating the applications and potential of FL in education. Even with some weaknesses and threats of ICT infrastructure, associated costs of digital tools, technologi-

cal skills persisting among students and educators highlight the need for educators and policymakers to address these challenges effectively. Findings from this entry suggest that the adoption of FL can leverage ICT education for the future use of pre-service teachers. A retrospective approach of analyzing and evaluating FL could address a significant gap that could solidify the essence of the continuous utilization of the approach in higher education. This entry does not only provide a critical aspect of education that can significantly impact students' learning outcomes but provides information that students can derive significant learning when resources and knowledge are disseminated by their educators and institutions. Such critical information could reveal a deeper acceptance of the approach whenever an emphasis on ICT integration is brought forth. This entry emphasizes the need for more studies on the implementation of the flipped approach to showcase its benefits to both educators and pre-service teachers to adopt it in their future classroom. Based on our analysis, it is clear that FL is becoming a widely adopted pedagogical approach in teacher education from the aforementioned opportunities that educators and pre-service teachers report.

In summary, the potential and challenges of FL do not deter researchers and educators from continuously working on the approach. Addressing the challenges is not just for mentioning but is a necessity to advocate for strategies to overcome them to encourage the further use of FL.

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