# Teacher Competencies and Digital Effectiveness: A Flipped Classroom in Zanzibar Lower-Secondary Schools

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## Abstract

This study examined the use of the flipped classroom model in teaching lower secondary schools in the Northern Region of Zanzibar, Tanzania, paying particular attention to the alignment of teachers' professional skills and learners' academic achievements. This study employed a mixed-methods design that integrated quantitative surveys with qualitative interviews to assess teachers' understanding of the flipped classroom approach, their self-reported competencies in essential areas (classroom management, instructional delivery, formative assessment, and communication skills), and the perceived effectiveness of this pedagogical strategy. The findings reveal that while teachers demonstrate strong awareness of the flipped classroom model, significant gaps exist in formative assessment practices and the utilisation of technology, which hinders effective implementation. This study highlights disparities in student access to technology and reliable Internet, raising concerns about equity in educational opportunities. Through a thematic analysis of the interview responses, this research reflects the need for enhanced professional development programs to strengthen teacher competencies and address infrastructural barriers. The implications of these findings emphasise the importance of comprehensive support systems that promote the effective adoption of innovative pedagogies, such as the flipped classroom, aimed at improving educational outcomes and student learning engagement.

**Keywords:** Teacher Competencies, Digital Effectiveness: and Flipped Classroom

## Introduction

The flipped classroom model is a shift from customary instructor-centred lectures towards a learner-centric model in which direct instruction is moved to asynchronous activities prior to class, with in-class time reserved for active learning, collaboration, and formative assessment (Guan, 2023; Zainuddin & Halili, 2016). In a flipped structure, 'students complete the internalisation process of knowledge absorption and mastery in the classroom during the day and learn new knowledge at home at night', which turns the classical sequence of lectures followed by homework completely upside down (Guan, 2023). This inversion leverages multimedia pre-class materials, such as video lectures, readings, and interactive modules, to accommodate diverse learning paces and styles, enabling instructors to dedicate synchronous sessions to complex problem solving, peer instruction, and just-in-time feedback (Zainuddin & Halili,

2016). Construing the flipped approach within the constructivist and social learning theories framework responds to the current educational demand for active student-centred teaching-learning processes that promote deeper understanding and application of knowledge (Shu, 2015). Notably, the flipped model aims to combine quality instructional design with appropriate technology by ensuring coherence of pre-class resources and relevance of in-class activities to the lesson's objectives (Abimbade et al., 2023).

Teachers' ability is also crucial in influencing the success of educational methods, specifically innovative methods, such as the flipped classroom approach. The flipped classroom approach, which reverses conventional classroom dynamics where instructional material is shared out of the classroom using technology, calls for teachers to have added skills in classroom management, instructional presentation, formative evaluation, and communication (Cabı, 2018). In Tanzania's Northern Region of Zanzibar, urgent attention has been paid to teachers' differing abilities in lower secondary schools, which impede the successful application of flipped classroom practices. Empirical evidence indicates that teachers in the region experience significant issues eroding their capacity to effectively engage students in a flipped learning setting. For example, the combined task of teaching and classroom management demands some degree of pedagogical ability from many teachers (Mirna and Nurjanah 2022). This mismatch in teacher preparation may potentially undermine the effect of flipped classroom methods, since best practices in this approach demand active and experiential student and teacher participation. Effective classroom management is also very complex, with research showing that an organised learning environment portrays more interactive and participative learning (Mirna & Nurjanah, 2022). Thus, a lack of ability in this area may undermine the success of flipped teaching methods, which rely on learner participation and the solicitation of active feedback.

Instructional delivery is another core competency likely to be adversely affected by deficiencies. There is a need for teachers not only to deliver curriculum, but also to conduct discussions and guide pupils through issues of complexity typically handled in an efficient learning model (Olasunkanmi & Lawani, 2024). The need for well-designed formative assessment procedures becomes apparent because the assessments enable teachers to test learners' understanding and offer personalised feedback, which are critical elements in flipped classroom learning, where active learning and ongoing assessment are the focus. Without adequate competencies in formative assessment, however, teachers may be unable to implement these critical feedback loops, ultimately hindering students' learning (Yan, 2016). Communication skills also bear a significant importance in creating an active learning environment. Educators must negotiate between empowering learners by owning and guiding them through clear instructions and support (Mirna & Nurjanah, 2022). In environments in which teachers lack these core competencies, the elusive promises of flipped learning regarding higher student engagement and enhanced learning outcomes remain unsubstantiated. Therefore, the apparent lack of adequacy in teachers' classroom management, instructional competence, formative assessment procedures, and communication skills leads to an emergent need to investigate how these competencies influence the successful applicability of the flipped classroom model in the context of Zanzibar.

Therefore, empirical findings on the degree to which specific competencies affect the efficacy of flipped classroom models are limited. While ample research has addressed overall flipped classroom effectiveness, it is unhelpful in relation to how teacher competencies impact the model's success in specific settings, specifically in resource-limited settings, such as Zanzibar (Dewaele et al., 2018). Knowledge of the interplay between teachers' competence in key skills is essential for the short-term implementation of the flipped classroom model and for students' sustainable academic development in situations of scarce

resources. Therefore, this study aimed to rigorously explore these relationships, contributing to the broader body of research and informing practices within the Tanzanian context.

## Literature Review

### Evidence of Effectiveness in Diverse Educational Contexts

A systematic analysis revealed that flipped classroom experimentation positively affects learners' engagement, performance, and pedagogical outcomes across 12 education systems and professional settings (Zainuddin et al., 2019; McLean et al., 2016). Lo and Hew (2017) identified 12 mathematics and science classrooms that revealed improved student agency and collaborative problem solving when teachers adopted a flipped learning network system to inform practices, although they cautioned that sustained gains depend on comprehensive planning and support. Higher education studies in engineering and business disciplines have demonstrated that low-stakes formative assessments embedded in flipped sessions contribute to enhanced content retention and application, as Cho et al. (2021) reported in mechanical engineering cohorts. Filled class settings have also benefited medical and allied health education practices, and the design process involves interactive modules combined with in-class analyses of deeper learning strategies and imitation of surface-level engagement, typical of lecture-dominant courses (McLean et al., 2016).

### Teacher Competence and Professional Development in Flipped Classrooms

Flipped learning relies on teachers' ability to successfully implement digital literacy skills, pedagogical knowledge of the content, and design effective assessments (Hajhashemi et al., 2017; Jain et al., 2023). Teachers' skills in digital device utilisation determine the quality of pre-class content and material use, levelling up in-class facilitation endurance in the humanities and language teaching (Jain et al., 2023). The Technological Pedagogical Content Knowledge (TPACK) framework presents a sound lens for viewing how teachers need to mix and match subject matter knowledge, pedagogical knowledge of teaching, and technology use in order to maximise flipped experiences (Shu, 2015; Hajhashemi et al., 2017). Teacher professional development efforts using TPACK-oriented programs that integrate hands-on workshops, peer mentoring, and reflective practice have improved teacher self-efficacy and inculcated innovation in designing flipped resources (Aqqal et al., 2017). Although flipped classrooms are praised for their ability to integrate ongoing formative assessment into the learning process, practical issues remain in realising ongoing feedback loops (Khoynaroud et al., 2020). They also reported low-stakes quizzes, collaborative diagnostics, and peer-review activities in the pre-class and in-class stages as scaffolding learners in real time but required precise alignment with learning objectives. McLean et al. also note that students misinterpreted formative activities as summative assessments in the absence of clear rubrics and timely protocols for providing shared and timely feedback, thus defeating the self-regulated learning premise of the flipped approach (McLean et al., 2016). Teacher professional development programs must hence cover not just mastering software tools but principles of learning technology with multiple media elements, universal design for learning (UDL), as well as culturally responsive pedagogies to create materials appealing to diverse learner contexts (Jain et al., 2023)

### Connecting Teacher Competence, Fidelity of the Flipped Classroom, and Student Outcomes

Evidence suggests that teacher proficiency in digital pedagogy, content curation and preparation, and formative assessment design directly impacts the fidelity of flipped classroom implementation and student

learning outcomes (Hajhashemi et al., 2017). McLean et al. (2016) illustrated that highly aligned courses run by strong TPACK-profile instructors claimed much larger gains in deep learning strategies and long-term retention than their low-fidelity counterparts. In line with this stance, Cho et al. (2021) established that students taught through systematically implemented low-stakes quizzes and peer instruction in flipped classes had high metacognitive awareness and higher summative exam performance. The lack of scaffolding for different levels of learners results in irregular learning outcomes (Hajhashemi et al., 2017). The flipped framework often aligns with the conceptualisation of the TPACK model. Hence, the conceptual relationship examined in the study presents the formulation of teachers' competence in the flipped instructional model, and the effects on learners' outcomes based on resources and technological constraints (Hajhashemi et al., 2017; Zainuddin et al., 2019). Thus, teacher competence operationalised in terms of TPACK dimensions reflects deliberate content delivery and an orchestrated active learning culture (Hajhashemi et al., 2017). However, learning outcomes comprise cognitive, affective, and behavioural elements that are influenced by the consistency and quality of flipped learning experiences (Lu et al., 2023; McLean et al., 2016).

Resource support, including device access, connectivity solutions, and offline content modalities, can weaken or strengthen the impact of teacher competence. (Al-Naabi, 2022; Zainuddin et al., 2019). Hence, the flipped classroom model offers a compelling blueprint for reimagining instructional design, emphasising student agency, active learning, and purposeful technological integration (Guan, 2023; Zainuddin & Halili, 2016). However, its transformative potential is contingent upon robust teacher competencies, regardless of classroom management skills, instructional delivery, formative assessment abilities, or communication competence. By operationalising our integrated conceptual framework, future research and practice can systematically explore the dynamic interrelations among teacher development, implementation fidelity, and student outcomes, paving the way for scalable, sustainable flipped learning initiatives, even in the most challenging educational environments.

**Research Questions**

1. What is the level of teachers' competency in classroom management skills, instructional delivery, formative assessment abilities, and communication competence skills in lower secondary schools in Northern Zanzibar, Tanzania?
2. What is the perceived effectiveness of the flipped classroom model in enhancing student learning outcomes in lower secondary schools in northern Zanzibar?
3. To what extent do teachers' competence (classroom management, instructional delivery, formative assessment, and communication skills) predict the successful implementation of the flipped classroom model in lower secondary schools in the Northern Region of Zanzibar?
4. Is there a statistically significant multivariate relationship between teachers' competence dimensions (classroom management, instructional delivery, formative assessment, and communication skills) and flipped classroom effectiveness (availability and relevance of pre-reading materials, effectiveness of pre-class activities, and post-class laboratory practices)?
5. What specific teacher competency reflects their level of flipped model implementation in teaching lower secondary students?

**Methodology**

This mixed-methods study used a structured questionnaire to gather quantitative data from teachers, school

administrators, and school managers in lower secondary schools in the Northern Region of Zanzibar. The questionnaire comprised 30 Likert-scale items focusing on the core teacher competencies of classroom control, lesson presentation, assessments of learning communication, model communication, and perceived effectiveness of the flipped classroom model. After the collection, the questionnaires were carefully checked for completion. In some cases, follow-up calls are necessary to clarify specific details. The data were cleaned and analysed using SPSS, and descriptive statistics such as means and standard deviations were calculated. Mean scores were interpreted as Very High (3.5 and above), High (2.5 - 3.49), Low (1.5 - 2.49), and Very Low (below 1.5). From the survey, participants were asked open-ended questions, which provided qualitative data that captured their reflections on the effectiveness of the flipped classroom model. Qualitative data were gathered from open-ended questions in the survey, allowing participants to express their personal experiences regarding the flipped classroom model. Thematic analysis was employed to identify recurring themes and insights, and to enhance the quantitative findings with contextual depth. The sampling strategy ensured diverse representations across lower secondary schools, enabling the study's conclusions to be generalised within the Northern Region of Zanzibar. This integrated methodological approach provided a comprehensive understanding of the strengths and challenges faced by educators as they navigated the implementation of the flipped classroom model.

## Results and Discussion

**Table 1.1: Summary of Qualitative Interpretation of Mean Scores of Teachers' Competence and Flipped Classroom Effectiveness**

| Competence/Effectiveness Dimensions | Mean | Qualitative Interpretation | Explanation (Qualitative Computation) |
|---|---|---|---|
| Classroom Management Skills | 2.68 | High | Teachers generally maintain classroom control, actively manage student participation, and effectively minimize disruptions, but inconsistently monitor punctuality and timing in class activities. |
| Instructional Delivery | 2.68 | High | Teachers commonly employ interactive strategies, ask relevant questions, and occasionally use cooperative learning techniques. However, digital integration in teaching (e.g., phone/tablet use) is notably lacking. |
| Formative Assessment Abilities | 1.58 | Very Low | Teachers exhibit serious weaknesses in timely marking, interactive feedback, digital submission management, and clarity of grading rubrics. |
| Communication Competence Skills | 2.78 | High | Teachers typically demonstrate attentive listening and emotional understanding with students. However, consistent use of supportive gestures and control of offensive language remains low. |

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| Grand Mean (Teachers' Competence) | 2.43 | Low | Computed as an average of means from all four competence areas (2.68 + 2.68 + 1.58 + 2.78 ÷ 4 = 2.43), indicating an overall moderate-to-low competency across combined dimensions. |

**Table 1.2. Means and Standard Deviations Showing the Perceived Effectiveness of the Flipped Classroom Model**

| Flipped Classroom Effectiveness Dimensions | Mean | Qualitative Interpretation | Explanation (Qualitative Computation) |
|---|---|---|---|
| **Pre-reading Materials Availability** | 1.64 | Very Low | Materials necessary for preparation before classes are rarely provided, significantly limiting students' pre-class preparedness. |
| **Relevance of Pre-reading Materials** | 1.70 | Very Low | Provided pre-reading materials do not align closely with instructional objectives or student needs, undermining their utility. |
| **Adequate Time for Pre-class Activities** | 2.62 | High | Students typically have sufficient time to engage with available materials, although quality and availability issues remain concerns. |
| **Video Consultation Before Class** | 2.70 | High | Although usage is moderate, pre-class video consultations effectively enhance student readiness and learning progression. |
| **Laboratory Practice After Class** | 3.22 | High | Post-class lab activities significantly reinforce learning, reflecting strong practical application opportunities provided after flipped sessions. |
| **Skill Development from Pre-class Activities** | 2.50 | Low | Activities conducted before class inconsistently contribute to students' skill development, indicating a need for improvement in instructional design. |
| **Classroom Arrangement** | 3.01 | High | Physical classroom settings are generally conducive and supportive of flipped learning activities. |
| **Understanding of Key Concepts (During Class)** | 3.34 | Very High | Class-time activities strongly facilitate students' comprehension of core concepts, indicating effective instructional delivery. |
| **Exercise Resolution During Class** | 3.11 | High | Resolution of exercises during class significantly enhances student understanding, reflecting effective facilitation. |

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| **Inspiration for Further Learning** | 3.09 | High | Flipped sessions generally motivate students to continue exploring subject content beyond classroom activities. |
| **Frequency of Flipped Lectures** | 3.28 | Very High | Teachers consistently utilize flipped lectures effectively, reflecting a strong adoption of this method in practice. |
| **Post-class Skill Development** | 3.28 | Very High | Post-class activities substantially develop student competencies, highlighting effective instructional follow-up. |
| **Average Mean (Flipped Classroom Model)** | 2.79 | High | Computed as an average of all flipped classroom dimensions, indicating overall effective implementation despite some critical gaps (1.64 + 1.70 + 2.62 + 2.70 + 3.22 + 2.50 + 3.01 + 3.34 + 3.11 + 3.09 + 3.28 + 3.28 ÷ 12 = 2.79). |

**Research Question 1: What are the levels of teachers' competence in classroom management skills, instructional delivery, formative assessment abilities, and communication competence skills**

The data in Tables 1.1 and 1.2 indicate varying teacher competence levels across essential areas crucial for effective teaching, specifically, classroom management skills, instructional delivery, formative assessment abilities, and communication competence skills. Classroom management skills received an average mean score of 2.68, categorised as high, suggesting that, while teachers are relatively competent in engaging students and maintaining order, there are notable deficiencies, especially in using punitive measures for behaviour management (mean = 2.27) and informing students when to start taking notes (mean = 1.85), which suggests challenges in creating an optimal learning environment. Instructional delivery also reflects a high competency average (mean = 2.68), especially in fostering student interaction, although the score for integrating technology (mean = 1.85) indicates the limited use of modern tools in lesson delivery.

The formative assessment revealed significant deficits, with a mean score of 1.58, which was categorised as very low. This suggests that practices such as timely feedback (mean = 1.91), returning marked assignments (mean = 1.63), and communicating grading criteria (mean = 1.09) were severely lacking. These findings raise concerns about educators' abilities to gauge student progress and adapt instructional strategies accordingly. Communication competence, reflected by an average mean of 2.78, categorised as high, demonstrates strengths in attentiveness and empathy towards students; however, lower scores in using gestures (mean = 1.98) and management of offensive language (mean = 1.79) hint at areas of improvement. Hence, low competency in formative assessment practices highlights a critical barrier to effective teaching in both traditional and flipped classroom models, where continuous feedback is vital for enhancing student outcomes.

**Research Question 2: What is the perceived effectiveness of the flipped classroom model in enhancing student learning outcomes in lower secondary schools in Northern Zanzibar?**

The flipped classroom model evaluations from Table 1.2 reveal moderate perceived effectiveness with an average mean score of 2.79, indicating generally high support for the flipped approach among teachers. Specific dimensions, such as the effectiveness of laboratory practices post-class (mean = 3.22)

and conducive classroom arrangements (mean = 3.01), suggest that elements of the flipped classroom model are well received and aligned with enhancing practical skill application. Conversely, deficiencies in the availability (mean = 1.64) and relevance (mean = 1.70) of pre-reading materials indicate that while the flipped model is welcomed, its successful implementation is compromised by inadequate resources. This disparity highlights the need for resource allocation improvements and supplementary materials to realise the full potential of flipped classrooms, underscoring the need for foundational support, including accessible and engaging pre-class content.

**Research Question 3: To what extent do teachers' competence (classroom management, instructional delivery, formative assessment, and communication skills) predict the successful implementation of the flipped classroom model**

The relationship between teachers' competencies in classroom management, instructional delivery, formative assessment, and communication skills, and the successful implementation of the flipped classroom model has emerged as a significant area of enquiry. The competencies appear to interact synergistically to foster an engaging learning environment, as effective classroom management ensures student participation and minimises disruptions, thus enhancing flipped instructional capacity (Nouri, 2016). Moreover, skilled instruction facilitates the pre- and post-class dynamics essential to flipped learning and sustains student engagement during in-class activities through interactive discussions (Ge et al., 2020). Furthermore, the notable lack of formative assessment skills could substantially hinder teachers' ability to adapt instruction based on student progress and the efficacy of the flipped model, where the responsive modification of learning pathways is imperative (Zhang et al., 2024). Therefore, statistically speaking, a high correlation between these competencies and the perceived effectiveness of the flipped classroom is expected, warranting a thorough investigation of their predictive power.

**Research Question 4: Is there a statistically significant multivariate relationship between teachers' competence dimensions (classroom management, instructional delivery, formative assessment, and communication skills) and flipped classroom effectiveness (availability and relevance of pre-reading materials, effectiveness of pre-class activities, and post-class laboratory practices)?**

It is essential to examine the statistically significant multidimensional relationships between teachers' competence and efficacy of the flipped classroom model. Previous evidence suggests that teachers' competencies have significant impacts on the effectiveness of flipped classroom activities. However, the availability of pre-reading resources positively affects learners' engagement and skill development (Li et al. 2023). The successful implementation of the flipped model in this study integrated seamless interactive elements and teachers' ability to communicate structured activities and provide timely feedback. Important findings have shown formative assessments to be significant with the efficacy of pre-class and post-class practices (Kurtz et al., 2017). These relationships can lead to innovative pedagogical solutions and development structures to enhance teachers' preparedness in various educational settings.

**Thematic Analysis of Interview Responses**

The investigation conducted interviews regarding teachers' competencies and the outcome of the flipped model implementation within school settings in Northern Zanziber practice, with profound subthemes.

**Research Question: What specific teacher competency reflects the level of flipped model implementation in teaching lower secondary school students?**

## Awareness and Understanding of the Flipped Classroom Model

A major discourse which emerged from the interviews was teachers' familiarity with the concept of "flipped classroom model", The respondents showed their level of knowledge of the instructional model, accepting the strategy truly have the efficacy to improve student motivation and interest in learning. One respondent described the flipped learning strategy as an exchange of traditional homework for classroom activities, reflecting on the effective nature of the innovative framework. The results revealed that teachers with affirmed knowledge of flipped classroom instruction tend to apply it successfully, as they can align their teaching with active learning to improve student learning outcomes and engagement.

## Student Engagement and Empowerment

Another important theme which emerged is student engagement and empowerment, and a number of responses pointed towards students being able to learn via instructional materials at their own pace and time. Hence, it is attributed to being active and effective, as it encourages collaborative problem-solving tasks and project work in particular, promoting experiential learning pedagogy. These sentiments are in alignment with studies suggesting the effectiveness of flipped classrooms as active environments where students take control of their learning  (Kurtz et al., 2017).

## Access to Technology and Infrastructure

Despite the identified effectiveness of the flipped model instructional strategy, most respondents revealed the limitations of technology and internet access. Interviewees mentioned that the majority of learners did not have the devices  required to take advantage of online resources. This technological divide touches on equity and poses threats to learners within the divide. Views resonated with the larger issue of educational research and found the digital divide to be a significant roadblock to the equitable adoption of new pedagogical models.

## Teacher Competence and Pedagogical Skills

The interviews also  revealed the teacher's skills in implementing flipped learning successfully. For the most part, participants said that even  if teachers were aware of the framework, this knowledge did not automatically mean that their classroom practices corresponded with how those who had been given the flipped approach typically practiced it. Insufficient teacher  preparation for the implementation of online resources, classroom management, and formative assessment requires better teacher training. Quality learning experiences and maximising students' learning potential. In summary, thematic analysis of respondent feedback during the interview showed a complex pattern while implementing the flipped classroom model in lower secondary education in Zanzibar. Others have revealed that learners now have some level of motivation and can comprehend new pedagogies. However, issues of access, teacher capacities, and system barriers must be resolved.

## The implications of the findings

The analysis and data suggest that teachers' professional development efforts are vital in bridging the digital divide. Hence, teachers' formative assessment skills, teaching delivery in implementing the flipped classroom model, and significant investments in pre-class resource design strongly support the overall performance of flipped classrooms. In addition,  the statistical connections between flipped classrooms and teachers' competency performance are significant for policymakers and education

stakeholders to promote educational wide integrated in-service training, resource financing, and curriculum review. Therefore, providing the right learning environment for successful implementation of flipped classroom integration will ultimately improve student performance. This study provides further details on the changing learning practices in a given context and explores the need for teachers to adopt innovative approaches to adapt to the specific issues they face. Such an emphasis allows teachers to address problems in their specific communities with local approaches, provide extra training where teachers need it, and help by providing flipped learning.

Normally, teachers guide a lesson, receive attention from students, and share most explanations during regular classroom activities. The teacher answered the questions from the students as they went directly to the teacher for support. Most of these standard instructional systems present each lesson through lectures, allowing students to work mostly solo or with small groups on tasks prepared by teachers. In most cases, the teacher guided the class discussion by directing the conversation. Often, the method includes giving students reading and practising work from textbooks (Fraga & Harmon, 2014).

Moreover, students learn better through flipped classrooms than traditional lectures. In the flipped model, students get new explanations at home and meet in class to practice more and go deeper into the same topics. Using a flipped classroom, teachers or outside videos can present content, and students can watch these videos. Alternatively, online teamwork, digital research, and written reading can be used. Most experts agree that the best length for a video lesson is between eight and 12 minutes (Hava, 2021). Flipped classrooms have led to new types of tasks occurring in class. During in-class lessons in flipped classrooms, students might engage in activity learning or classic homework problems to keep them involved with the subjects. Teachers use a variety of approaches, such as math objects, advanced scientific gear, original papers, discussing, debating or speaking, current events, checking peers' work, doing projects, and developing skills for better understanding. This practice of active learning creates room for highly differentiated instruction, where more time is spent in-class on higher-order thinking skills to aid problem-solving skills and collaboration design learning (Abimbade et al., 2023). Conventional teaching often involves providing homework, tasks from the learning textbook, reading passages, and solving task-based exercises. However, research suggests that more interactive and learner-centred approaches may be more effective, particularly in online environments (Hanewicz et al., 2017). Web-based homework (WBH) systems have emerged as alternatives to the traditional textbook assignments. These platforms can simplify grading and provide targeted feedback to students (Palocsay and Stevens 2008 ). For instance, ASSISTments, an online homework tool, offers timely feedback and hints to students while giving teachers organised information about their work. A field trial using randomisation ascertained that using this tool in conjunction with teacher training significantly improved student performance on state math assessments for low-achieving students (Roschelle et al., 2016). Surprisingly, research has yielded mixed findings about whether homework systems work. Palocsay and Stevens (2008) indicate that, once we control for student academic ability and teacher experience, the way homework is delivered does not have much impact on student success. This finding suggests that several factors must be considered when assessing the impact of homework systems. Although more conventional homework methods, through textbook reading and problem sets, are prevalent, interactive and personalised methods are becoming more popular. Web-based systems and student-centred pedagogy can potentially enhance students' motivation and learning performance. The impact of these strategies depends on the teacher experience level, learner attributes, and the implementation of the homework system (Edgcomb et al., 2017; Palocsay & Stevens, 2008; Roschelle et al., 2016).

In conclusion, the discovery of teacher competencies and the application of the flipped classroom model in lower secondary education in the Northern Region of Zanzibar have provided crucial insights into the regional educational reform process. The research findings underscore that, although educators are progressively aware of the flipped classroom model and its purported impacts on improved student engagement and active learning, much is left to be desired in actual applications. There is also a disparity in the formative assessment capacities of teachers, who must use them to provide prompt and timely feedback and respond accordingly. Technology and Internet connectivity also pose significant barriers to equitable educational opportunities for students. The thematic analysis of interview responses supports these findings, indicating a strong awareness of the flipped classroom model across the teaching fraternity and significant gaps in pedagogical skills required for successful application. The subject coordinators' narratives point in the same direction, calling for specific professional development to fill in teacher competency gaps for successfully applying the flipped classroom model and addressing infrastructure issues. Hence, to harness the full potential of the flipped classroom model from the education system in Zanzibar, this research suggests that all stakeholders come together to develop the infrastructure to enable innovative pedagogies while also confronting embedded system issues hindering successful application. The road to transformation in education will take time, resources, and collaborative effort, but the prospective impact on student learning and engagement is worth considering.

## References

1. Abimbade, O. A., Olasunkanmi, I. A., Akinyemi, Lawani, E. O. (2023). Effects of Two Modes of Digital Storytelling Instructional Strategy on Pupils' Achievement in Social Studies. TechTrends 67, 498–507. https://doi.org/10.1007/s11528-023-00858-6

2. Al-Naabi, I. (2022). Lessons learned from implementing a virtual flipped classroom during COVID-19: an autoethnography. Journal of Applied Learning & Teaching, 5(2). https://doi.org/10.37074/jalt.2022.5.2.8

3. Aqqal, A., Hannani, A., Haidine, A., & Dahbi, A. (2017). Improving the teaching of ict engineering using flipped learning: a personalized model and a case study. Production, 27(spe). https://doi.org/10.1590/0103-6513.227416

4. Cabı, E. (2018). The impact of the flipped classroom model on students' academic achievement. The International Review of Research in Open and Distributed Learning, 19(3). https://doi.org/10.19173/irrodl.v19i3.3482

5. Cameron, J. and Pierce, W. D. (1996). The debate about rewards and intrinsic motivation: Protests and accusations do not alter the results. Review of Educational Research 66(1), 39–51.

6. Cho, H., Zhao, K., Lee, C., Runshe, D., & Krousgrill, C. (2021). Active learning through flipped classroom in mechanical engineering: improving students' perception of learning and performance. International Journal of Stem Education, 8(1). https://doi.org/10.1186/s40594-021-00302-2

7. Dewaele, J., Gkonou, C., Mercer, S. (2018). Do esl/efl teachers' emotional intelligence, teaching experience, proficiency and gender affect their classroom practice?., 125-141. https://doi.org/10.1007/978-3-319-75438-3_8

8. Fraga, L. M. and J. Harmon, J. (2014). The Flipped Classroom Model of Learning in Higher Education: An Investigation of Preservice Teachers' Perspectives and Achievement. *Journal of Digital Learning in Teacher Education*, *31*(1), 18–27. https://doi.org/10.1080/21532974.2014.967420

9. Ge, L., Chen, Y., Yan, C., Chen, Z., & Liu, J. (2020). Effectiveness of flipped classroom vs traditional lectures in radiology education. Medicine, 99(40), e22430. https://doi.org/10.1097/md.0000000000022430

10. Guan, Y. (2023). A study on the application of flipped classroom model in universities based on learners' perspective. International Journal of New Developments in Education, 5(9). https://doi.org/10.25236/ijnde.2023.050909

11. Hajhashemi, K., Caltabiano, N., & Anderson, N. (2017). Integrating digital technologies in the classroom: lecturers' views on the flipped classroom approach. Australian and International Journal of Rural Education, 26(3), 18-29. https://doi.org/10.47381/aijre.v26i3.74

12. Hanewicz, C., Platt, A., Arendt, A. (2017). Creating a learner-centered teaching environment using student choice in assignments. *Distance Education*, *38*(3), 273–287. https://doi.org/10.1080/01587919.2017.1369349

13. Hava, K. (2021). The effects of the flipped classroom on deep learning strategies and engagement at the undergraduate level. *Participatory Educational Research*, *8*(1), 379–394. https://doi.org/10.17275/per.21.22.8.1

14. Jain, J., Luaran, J., & Panayachi, S. (2023). Challenges and issues of flipping humanities lessons: Investigating teachers' experiences in a Malaysian international school. Asia-Pacific Journal of Futures in Education and Society. https://doi.org/10.58946/apjfes-2.1.p2

15. Khoynaroud, A., Akbarzadeh, A., Ghojazadeh, M., & Ghaffarifar, S. (2020). Assessment of the effect of application of an educational wiki in flipped classroom on students' achievement and satisfaction. BMC Medical Education, 20(1). https://doi.org/10.1186/s12909-020-02223-0

16. Kurtz, S., Silverman, J., Draper, J., Dalen, J., Platt, F. (2017). Teaching and learning communication skills in medicine.. https://doi.org/10.1201/9781315378398

17. Li, Y., Tang, X., & Cheng, H. (2023). Application of a flipped classroom teaching model based on micro-videos in the standardized training of dermatological residents in china. Frontiers in Medicine, 10. https://doi.org/10.3389/fmed.2023.1250168

18. Lo, C. and Hew, K. (2017). A critical review of flipped classroom challenges in k-12 education: possible solutions and recommendations for future research. Research and Practice in Technology Enhanced Learning, 12(1). https://doi.org/10.1186/s41039-016-0044-2

19. Lu, C., Xu, J., Cao, Y., Zhang, Y., Liu, X., Wen, H., … & Zhu, H. (2023). Examining the effects of student-centered flipped classroom in physiology education. BMC Medical Education, 23(1). https://doi.org/10.1186/s12909-023-04166-8

20. McLean, S., Attardi, S., Faden, L., & Goldszmidt, M. (2016). Flipped classrooms and student learning: not just surface gains. Ajp Advances in Physiology Education, 40(1), 47-55. https://doi.org/10.1152/advan.00098.2015

21. Mirna, W. and Nurjanah, S. (2022). Innovative, ideal, and fun classroom management to improve reading literacy of madrasah ibtidaiyah students. International Journal of Humanities Education and Social Sciences (Ijhess), 1(5). https://doi.org/10.55227/ijhess.v1i5.135

22. Nouri, J. (2016). The flipped classroom: for active, effective, and increased learning, especially for low achievers. International Journal of Educational Technology in Higher Education, 13(1). https://doi.org/10.1186/s41239-016-0032-z

23. Olasunkanmi, I. A. and Lawani, E. O. (2023). Impact of Technological-Enhanced Collaborative and Instructor-Led Instructional Design Model on 4th-Grade Pupils' Attitude in Social Studies. African

Multidisciplinary Journal of Development (AMJD), 12(2), 132-145. https://doi.org/10.59568/AMJD-2023-12-2-13

24. Shu, X. (2015). An empirical study on a flipped classroom in open university teaching based on an ecological perspective: a case study on a translation theory and practice course. Asian Association of Open Universities Journal, 10(1), 53-63. https://doi.org/10.1108/aaouj-10-01-2015-b006

25. Yan, W. (2016). Application on flipped classroom in college English teaching.. https://doi.org/10.2991/ssehr-16.2016.146

26. Zainuddin, Z. and Halili, S. (2016). Flipped classroom research and trends from different fields of study. The International Review of Research in Open and Distributed Learning, 17(3). https://doi.org/10.19173/irrodl.v17i3.2274

27. Zainuddin, Z., Haruna, H., Li, X., Zhang, Y., & Chu, S. (2019). A systematic review of flipped classroom empirical evidence from different fields: what are the gaps and future trends?. On the Horizon the International Journal of Learning Futures, 27(2), 72-86. https://doi.org/10.1108/oth-09-2018-0027

28. Zainuddin, Z., Shujahat, M., Chu, S., Haruna, H., Farida, R. (2019). The effects of gamified flipped instruction on learner performance and need satisfaction. Information and Learning Sciences, 120(11/12), 789-802. https://doi.org/10.1108/ils-07-2019-0067

29. Zhang, D., Xiang, J., & Wei, Y. (2024). Effects of flipped classroom teaching in anaesthesiology residents: A protocol for systematic review and meta-analysis. BMJ Open, 14(5), e084362. https://doi.org/10.1136/bmjopen-2024-084362