

# Enhancing In-Class Independence: A Qualitative Exploration of Collaborative Constructivism among Medical English Students with a Flipped Classroom Approach

Jinxuan Wang<sup>1</sup>, Norharyanti Mohsin<sup>1\*</sup>, Xing Wang<sup>2</sup>, Kaiyue Guo<sup>3</sup>, Ruihua Jin<sup>4</sup>, Yiling Bai<sup>5</sup>

<sup>1</sup>Curriculum & Instructional Technology Department, Faculty of Education, University Malaya, 50603 Kuala Lumpur, Malaysia

<sup>2</sup>School of Stomatology, Shanxi Medical University, Taiyuan City, Shanxi Province Taiyuan City, Shanxi Province China

<sup>3</sup>Shanxi Medical University School and Hospital of Stomatology, Taiyuan, China

<sup>4</sup>Shanxi Technology and Business University No. 99 Wucheng South Road, Xiaodian District, Taiyuan City, Shanxi Province, Taiyuan City, Shanxi Province, China

<sup>5</sup>Shanxi Medical University School and Hospital of Stomatology, Taiyuan, China

Received: 2025 July 18

Revised: 2025 October 02

Accepted: 2025 November 04

Published online: 2025 November 04

## \*Corresponding author:

Curriculum & Instructional Technology Department, Faculty of Education, University Malaya, 50603 Kuala Lumpur, Malaysia  
Email: yantimohsin@um.edu.my

## Citation:

Wang J, Mohsin N, Wang X, Guo K, Jin R, Bai Y. Enhancing In-Class Independence: A Qualitative Exploration of Collaborative Constructivism Among Medical English Students with a Flipped Classroom Approach. Strides Dev Med Educ. 2025 November; 23(1):e1622.  
doi:10.22062/sdme.2025.201491.1622

## Abstract

**Background:** The Flipped Classroom Approach (FCA) is rapidly being used in Medical English Education to encourage autonomy and active learning; although the qualitative data on in-class independence through collaborative constructivism, fostered by FCA and its underlying factors, remain underexplored.

**Objectives:** To explore how FCA facilitates in-class autonomy among medical English students through collaborative constructivist processes.

**Methods:** A total of 20 medical students enrolled in an FCA-based medical English course were purposively sampled to conduct a qualitative case study. The data was collected by forming three focus groups, semi-structured interviews, classroom observations, LMS logs, and reflective journals. The data collection spanned over 10 weeks, and the data were thematically analysed using Braun and Clarke's six-phase framework, followed by checks for intercoder reliability and triangulation to ensure trustworthiness.

**Results:** There was initial resistance to self-directed pre-class work among students, primarily because of cultural and technological barriers. However, students gradually turned confident, self-regulated, and developed ownership. Most students reported improved vocabulary retention and higher engagement. While structured pre-class materials, scaffolding, and role assignments mitigated imbalances in participation, peer discussions and instructor facilitation were pivotal in co-constructing knowledge, enhancing vocabulary retention, communicative skills, and engagement.

**Conclusion:** FCA enhances in-class independence and language competence among medical English learners when implemented with collaborative constructivist design and scaffolded supports. Institutions must invest in teacher training, digital literacy support, and structured pre-class scaffolds to maximize benefits.

**Keywords:** Collaborative Constructivism; Flipped Classroom; In-Class Independence; Medical English Education; Peer Learning;

## Background

English efficiency is a necessary competence in medical education, enabling efficient interaction among healthcare specialists and enhancing patient well-being (1). As healthcare services have become globalized, proficiency in English is essential for medical and academic interactions. Nevertheless, the conventional lecture-based teaching in medical English courses is often criticized for its passive educational context, which

restricts learner involvement and fails to nurture critical thinking. In contrast to the flipped classroom model, conventional lecture-based teaching leads to lower levels of student engagement, higher dissatisfaction, and restricted logical reasoning skills. This primarily owes to the absence of pre-recorded micro lectures, small group tasks, and the lack of structured pre-class quizzes which directly limit the critical thinking skills of students and their engagement with the course materials (2).

Furthermore, the studies show that due to a greater focus on content delivery than learner participation, the didactic lectures often remain restricted to surface-level education in which pupils end up only memorizing theories instead of attempting deeper comprehension. (3). This is particularly challenging in English for Medical Purposes (EMP), where competencies such as cooperative problem-solving, communication abilities, and critical thinking are just as crucial as vocabulary.

### **The Need for Student-Centered Learning Approaches**

To address these limitations, a paradigm shift has taken place towards learner-focused and constructivist pedagogies in medical learning, comprising the flipped classroom approach (FCA), dynamic education tactics, and problem-based education (4). The FCA converses conventional lecture-based mentoring by requiring pupils to study pedagogical ingredients before class, targeting concentrated in-class sessions focused on practical usages, peer cooperation, and interactive discussions (5).

*Qualitative Research in Medical Education:* The majority of research on FCA in clinical English education has traditionally focused on quantitative methodologies, highlighting exam performance and learner grades (6). Nonetheless, qualitative studies are crucial as they offer profound insights into the advancement of in-class independence, learner education know-how, and involvement patterns (7). Complementarily, qualitative research can capture the nuances of social and cognitive processes, making it an apt methodology for peer communication, reflections, and assisting educators in decoding learner insights in understanding the way FCA nurtures independent education and cooperative construction of knowledge. Existing research (8) provides strong support for the use of complementary qualitative methodologies to gain deep, nuanced insights into the FCA. Qualitative research and individualized interviews have been identified as key to capturing student feedback on emotional responses, the effect of social interactions on understanding, and cognitive sense-making during class and pre-class activities concerning nursing education.

Several authors have demonstrated how qualitative research methodology forms, specifically reflective interviews and observations, can capture the nuances of procedural change involved in socially situated learning and cognitive processing (9). Evidences emphasize the importance of observations in classrooms and semi-structured interviews in the interpretation of peer prompting and group roles (10). They also highlight the role of cognitive processes, such as monitoring and

planning, in social contexts among Vietnamese students in EFL flipped classrooms. The demonstrated ability of qualitative research to interpret these complex, multifaceted learning variables aligns well with the analytical approach adopted in this study. Hence, this research adopts a qualitative approach to analyze how the FCA enhances in-class autonomy among medical English learners through cooperative constructivism. The research aims to bridge a knowledge gap in the existing literature by exploring the social and cognitive procedures that enable learners to become self-regulated students in a flipped classroom environment.

### *The Flipped Classroom Approach (FCA) in Medical English*

In medical education, the flipped classroom approach (FCA) has taken over as a transformative instructional model, shifting the conventional lectured-centered paradigm toward one that cultivates dynamic learning and learner involvement. Within the context of clinical English, FCA rearranges pedagogical content delivery to pre-class activities, such as video lectures and readings, thereby preserving precious in-class time for application-centered, collaborative exercises. This methodology aligns with constructivist theories, which emphasize that students generate knowledge through active participation and cooperation (11).

Recent studies have reaffirmed the effectiveness of FCA in enhancing learner involvement in educational outcomes in clinical education. For example, a study implemented the FCA in a neuroscience module, providing learners with pre-class readings and video lectures, followed by in-class undertakings like quizzes and discussions. that the findings were overwhelmingly positive: 84% of pupils responded positively to the FCA, highlighting its stimulating and collaborative nature; 75% of learners completed their pre-season preparations, reporting that their misunderstandings and questions were better addressed during direct sessions in comparison to conventional environments (12). However, despite these benefits, there are still challenges associated with pre-class preparation and support. Relying on participant responses in the survey, which focused on attitudes rather than objective logs, leads to incomplete data on pre-class work completion (13). Furthermore, the “willingness to use” measure does not explicitly reveal how students interact with the content of pre-class sessions (13). The increased risk of unclear instructions and perceived cognitive overload also exacerbates the challenges associated with pre-class engagement (14). However, some support mechanisms

could be implemented to ensure effective student engagement with flipped classroom materials. Some authors state that guided worksheets, shorter segmented videos, and pre-class formative quizzes can be used to increase engagement and pre-class readiness (15). This type of scaffolding can mitigate the limitations of pre-work, especially for medical cohorts. Additionally, prompts for providing guidance could be directly embedded within the videos to make them more concise and explicit, thereby enhancing the accountability of the chosen media in the classroom (9). Therefore, pre-class preparation could be significantly improved by introducing practical design features that reduce cognitive overload.

In an adult health nursing course, quasi-experimental research analyzed the educational outcomes of a flipped classroom system. The study involved 485 nursing students, with the experimental category undergoing the FCA. The outcomes exhibited significant improvement in metacognitive abilities, self-assessed primary skills, and readiness for self-directed learning among students in the FCA category. Moreover, these students reported high levels of course satisfaction, suggesting that the FCA positively influenced educational inspiration and results (16).

Despite these effects, there is a lack of qualitative research scrutinizing how the FCA impacts self-directed learning and learner independence in medical English contexts. Understanding the student insights with the FCA can offer profound perceptions of its influence on their educational procedures and autonomy. Addressing this gap is critical for enhancing the execution of the FCA's implementation and improving learning strategies in medical English education.

#### *Collaborative Constructivism and In-Class Independence*

Vygotsky (17) and Piaget (18) are constructivist learning theorists who suggest that learning is a lively, cognitive, and social process in which students attain knowledge through collaboration with their peers. Collaborative constructivism builds on this by highlighting the role of societal cooperation, meaningful educational discourse, and scaffolding.

The Flipped Classroom Approach (FCA) promotes autonomy by allowing students to engage with lecture materials before a class, thus freeing up class time for peer cooperation, problem-solving, and active discussions (19). The FCA fosters a learner-centered educational environment, reducing reliance on teachers while improving independent learning. As (20) notes, the FCA enhances self-directed learning and

motivation, as students own their studies through in-class discussions and pre-class preparations.

#### **The Role of Peer Interaction in Constructing Knowledge**

Peer collaboration is key to collaborative constructivism. Vygotsky's Zone of Proximal Development (ZPD) proposes that students learn best during their involvement with peers with higher skill levels, which enables scaffolded education (17). Studies suggest that FCA improves ZPD by allowing students pre-class exposure to content, permitting them to go into the classroom with foundational knowledge. This knowledge is then refined through collaborative educational deeds and social cooperation (21). Furthermore, the dialogic nature of classroom discourse in the FCA fosters profound learning. According to (22), knowledge is a co-constructed exploratory discussion where students justify, refine, and challenge their understanding. Recent research by (23) found that structured peer discussions in the FCA-centered courses significantly increased the conceptual understanding and critical thinking of the students in medical English contexts. These discussions also promoted Metacognitive consciousness, allowing students to manage their learning strategies and thought processes more efficiently (24).

Within this context, imbalances in peer participation and conflicts can be managed by increasing the scope for active learning embedded in flipped classrooms. To manage these imbalances, instructors must introduce explicit interaction protocols such as structured peer feedback, regular turn-taking, and role assignments enabling rotation of responsibilities (25). This can be combined with in-class scaffolding to redistribute participation and encourage quieter learners to contribute. Thus, a collaborative approach is fostered to resolve conflict and persistent imbalances to promote sustainable peer learning and problem-solving. Moreover, flipped classrooms promote peer modelling techniques, whereby quieter students seek the help of more extroverted classmates or peer groups to contribute to classroom assignments, by practicing before classes to familiarize themselves with vocabulary and grammar (25).

#### **FCA as a Shift from Passive Reception to Active Engagement**

Conventional, lecture-centered teaching often inspires passive learning where students obtain information without engaging in higher-order cognitive procedures (11). The FCA reverses this dynamic, requiring students to communicate and process content before classes, thereby freeing up valuable classroom

time for applied discussions, cooperation, and case studies (26).

Harden's research on flipped learning in medical education found that FCA significantly enhanced student autonomy. This occurred as students engaged in self-directed inquiry, formulated their own educational objectives, and cooperated with peers to solve medical case studies. This aligns with Piaget's cognitive constructivism (1985), which theorizes that students actively construct meaning instead of passively absorbing information.

Emphasize that the FCA improves self-regulation abilities, encouraging students to handle their own learning schedules, clarify difficult concepts, and use theoretical knowledge during live classroom sessions (21). This enhances a sense of responsibility for education in students, strengthening their problem-solving ability and introducing greater independence.

#### **Barriers and Challenges to Collaborative Constructivism in FCA**

Collaborative constructivism presents several problems within FCA despite its benefits. Student resistance to active learning remains a significant factor, especially in cultures accustomed to teacher-centric education (26). Recent research by (24) found that while students initially struggled with the shift to FCA-centered education, the persistent students demonstrated better communication skills and academic self-confidence. Furthermore, instructor adaptability plays a critical role. Not every mentor is trained to enable learner-centered educational environments, and some may find it challenging to balance between student autonomy and guidance (19). Professional development programs for teachers should focus on collaborative classroom management, learning tactics, and assisted discussions to take full advantage of the FCA's effectiveness (27).

Digital literacy is another notable barrier. FCA depends hugely on digital resources, pre-class video lectures, and virtual discussion forums. A lack of technical skills among students can hamper engagement with pre-class resources, thus reducing the effectiveness of in-class discussions (28). Institutions should, therefore, integrate digital skills training to guarantee the smooth incorporation of FCA with interactive constructivist practices. However, evidence suggests variations in digital literacy. Suggest that digital literacy varies based on students' individual capabilities to innovate and depend on prior training and discipline (20). Furthermore, increased engagement with teachers regarding structured digital literacy might cause

students to feel paralyzed to screen misinformation (29). Since students come from diverse backgrounds with varying levels of digital literacy, they might face difficulties in accessing clinical databases, learning management systems (LMS), and online medical journals. Nevertheless, this challenge can be addressed by designing specific mitigation strategies. According to (29), practical measures such as onboarding tutorials, baseline diagnostics, and utilization of multimodal resources could enhance self-efficacy when engaging with online platforms. This helps in the efficient usage of a medical dictionary application and major medical references that are published in English. Engaging with various media also helps in advanced perceptive capacity, which is in the comprehension and retention of clinical language. Additionally, guiding the onboarding in a stepwise manner and offering alternative formats may help bridge the gap in digital skills, particularly by providing a framework that links learning outcomes with digital literacy (29).

#### *Research Question*

How does the flipped classroom approach facilitate in-class independence among medical English students through collaborative constructivism?

#### **Literature Review**

##### *Constructivist Theories in Language Education:*

Constructivist learning theories have long impacted pedagogical systems have been impacted by constructivist learning theories for a long time, particularly in language learning, by focusing on the social, dynamic, and cognitive processes involved in education. The contributions of Vygotsky (17), Piaget (18), and Bruner are central to this framework. Their theories focus on the significance of students constructing their own understanding of the world through collaboration with their environment and peers.

The Sociocultural Theory of Vygotsky underscores the social nature of learning by stating that collaborations inside an ethnic environment co-construct knowledge. Through supervision and interaction with other skilled teachers and peers (17), the Zone of Proximal Development (ZPD) of Vygotsky emphasizes that students can accomplish higher levels of understanding. In language education, this indicates that learners can improve their linguistic skills through problem-solving activities and interactive conversations that occur within the ZPD. Contemporary studies in language learning highlight the applicability of Vygotsky's theory in recommending peer-mediated education, which allows students to strengthen their

mutual understanding, focusing on clinical English settings and ESP or English for Specific Purposes (30).

Piaget's cognitive constructivism is highly significant to language learning because he emphasized the active creation of knowledge. He suggested that information is not passively received by the students. Instead, they dynamically shape their mental frameworks by interacting with the environment (18). In the context of clinical English, this theory proposes that students actively construct meaning as they engage more with the subject matter, including fresh awareness of prior know-how. This approach is central to the flipped classroom, where students are expected to be aware of the content before the particular class. It enables easier processing of materials and applies fresh information in a collaborative environment. Studies by (26) show that the flipped classroom improves learner involvement and mental advancement, encouraging them to be extremely individualized and dynamic. Besides, it also facilitates interactive learning experiences.

The Scaffolding Approach of Bruner matches the ideology of Vygotsky and Piaget, with the former highlighting the mentor's role in offering students. Indicates that scaffolding helps pupils to perform tasks that they cannot manage on their own (31). This support, in the shape of observation, outline, or prompts, gradually decreases since the skills required to perform independent tasks are slowly developed among the pupils. Scaffolding enables the continuous acquisition of complex concepts and skills in learning language, especially in clinical English. This system works best in a flipped classroom context, in which students frequently engage with interactive activities that encourage them to cooperate with peers and teachers so that their learning can be scaffolded. Incorporating this system into flipped classrooms will foster self-sufficiency and freedom in students. Eventually, they will be able to take ownership of their learning (22).

The importance of social cooperation, guided learning, and lively involvement in attaining linguistic skills is highlighted by these foundational constructivist concepts. From the standpoint of clinical English learning, they support the inclusion of flipped classroom practices, which promote student-centered learning and the interactive assimilation of knowledge. This theoretical framework is highly suitable for examining the way interactive constructivism, as facilitated by the flipped classroom system, can foster better in-class autonomy amongst clinical English learners.

## Recent Contributions to Constructivism in Language Education

Contemporary research continues to support the importance of constructivist theories in language learning. Demonstrated that interactive education in a virtual setting facilitates the co-production of knowledge and simultaneously aids students' autonomy (23). Their research, focusing on virtual interactive language education, found that when students engaged in reflective practices and peer discussions, their linguistic ability and content appreciation significantly improved. Flipped classrooms promote dynamic education and better learner autonomy by shifting the mentor's role from a lecturer to a facilitator (28). This concept echoes Bruner's scaffolding idea. Furthermore, research by (21) indicated that the flipped classroom system is crucial in improving self-regulation in language students by actively encouraging them to take ownership of their learning. By engaging with content before a class, students are better prepared to participate in questions, discussions, and peer interactions during class. This autonomy is essential for fostering deeper educational understanding, as it allows students to be involved with higher-order thinking and problem-solving activities during class time; instead of just absorbing information passively.

Within this context, several examples illustrate how learner autonomy in the flipped classroom setting is manifested by scaffolding and peer communication. For example, students shift from passive reflexive note-taking to self-monitoring via guided worksheets and structured group roles (32). This delegates responsibility to the students, as they autonomously manage tasks and scaffold group roles before and after readiness checks. In another study, similar results were echoed, where scaffolded prompts and coded short vignettes were used for strategizing behaviour and influencing metacognitive dialogue (10). This demonstrates how autonomy is developed in students in a stepwise manner. Another exemplar study by (33) points out that structured peer feedback and peer-explained protocols foster self-assessment among students and enhance their self-assessment ability. These strategies serve as key indicators of student autonomy, with communication among peer groups acting as a secondary resource for supported learning.

*Flipped Classroom in Medical and Language Education:* In the higher education sector, FCA, or the flipped classroom approach, has gained widespread recognition as it has the capacity to develop and retain dynamic education and long-standing learner

association (13). The FCA reverses the conventional, lecture-centric structure by fostering an academic environment that encourages students to engage with academic resources before a class and spend classroom time on supportive, collaborative activities.

### Effectiveness of FCA in Medical Education

The utility of the FCA in clinical education has been widely scrutinized, demonstrating its ability to boost clinical reasoning, problem-solving skills, and knowledge acquisition (34). Conventional didactic lectures often fail to engage students actively in learning complex clinical ideas, leading to the passive reception of knowledge (6). In contrast, the FCA offers a student-centered framework, facilitating students to learn at their own pace and become more independent (35). A meta-analysis of flipped classroom studies concerning medical learning found that students in FCA-centered courses demonstrated better knowledge retention and problem-solving skills compared to students based on lecture-centered traditional teaching (26).

Despite these advantages, qualitative research highlighting students lived experiences with the FCA in medical environments remains limited. The majority of current research relies on quantitative performance metrics rather than understanding the way FCA impacts student encouragement, interactive learning, and self-regulation (35-36). This gap underscores the necessity of meticulous qualitative studies that analyze involvement patterns, insights, and learner collaborations.

### Flipped Classroom in Language Education: A Shift toward Active Learning

In language education, the FCA endorses cooperation, active communication, and group effort. Studies propose that students display better speaking efficiency, self-assurance, and self-directed learning behaviours in flipped language courses compared to those in conventional environments (3). The FCA shifts grammar and vocabulary instruction to pre-class activities and dedicates classroom time to highlight problem-solving exercises, peer discussions, and practical communicative tasks (37). Additionally, there is a growing body of evidence on how the flipped classroom approach fosters autonomous learning and metacognitive skills among medical English learners. A study correlated flipped classroom designs in nursing courses with enhanced scores for note-taking, self-testing, and pausing videos, all critical aspects of metacognition and self-regulated learning (38). This amounts to a significant increase in self-paced learning and improved student attention as they develop the right

to manage their favoured tasks. Approximately 75% of medical students enrolled in flipped classrooms devote more time to self-study, which indicates a shift towards a student-centred approach and enhanced scope for cognitive engagement (39). Moreover, flipped classrooms help in the construction of answers to questions during the class and inspire discussions and recapitulation following the examinations, which supports active learning through better knowledge retention (40). Since vocabulary retention is crucial for remembering the patient safety terminology and effectively applying it in specific scenarios, such as documenting patient history, issuing patient discharge summaries, etc. Furthermore, research has shown that the FCA in English for Specific Purposes (ESP), including Medical English, can lead to significant improvements in students' abilities to use technical terms in professional environments (4). Medical pupils enrolled in an FCA-centered English course performed considerably better in medical communication tasks compared to traditional classes (41). The research highlighted the significance of interactive constructivism, where knowledge is dynamically co-constructed through case-centered education, role-playing, and peer discussion.

### Challenges in Implementing FCA in Medical and Language Education

FCA offers several instructive benefits, but its execution is fraught with difficulties. Research indicates that learner resistance to mentor adaptiveness, self-directed education, and technological obstructions can influence the efficacy of FCA (21). With increased pre-class workload, several learners find it challenging to balance comprehension with in-class undertakings (35). Besides, teachers may need extensive training to transition from a lecture-centered role to that of a facilitator, which is critical for sustaining a supportive and collaborative environment (36).

Despite these difficulties, the FCA has been acknowledged as an efficient instructive gadget in medical and language learning, fostering interaction amongst students and enabling dynamic education. Prospective studies should highlight qualitative scrutiny into student experiences, especially in ESP courses like medical English, to fully comprehend how the FCA adds to in-class autonomy, professional abilities, and linguistic advancement.

*Collaborative Constructivism and Active Learning:* In the context of language learning, collaborative constructivism is based on the notion that students co-construct knowledge through dynamic engagement

with peers, negotiation of meaning, and social communication (27). This system aligns with the sociocultural theory of (17), which emphasizes the significance of societal communication in cognitive advancement. In the medical English classroom setting, collaborative education improves vocabulary acquisition and refines the communicative skills of students in professional medical environments (42).

### The Role of Peer Interaction in Medical English Learning

Medical English courses, interactive activities, and peer discussions offer students the option to practice professional communications and medical terminology in realistic settings. Research proposes that dynamic involvement with peers assists students in processing and retaining domain-specific expressions more efficiently than conventional methods of rote memorization (23). Learners clarify ideas, strengthen their understanding of complicated medical terms, and foster collaborative education (22). Meanwhile, resistance to peer interaction among students can be addressed by maintaining clarity of roles, rotation of responsibilities, and identifying explicit rubrics, leading to early success, guided by confident peers (33). This considerably reduces anxiety and improves willingness to participate in peer interactions. Students involved in interactive education demonstrated better levels of language retention, inspiration, and involvement compared to those in teacher-centric contexts. In flipped classroom environments, with pupils reviewing course material before a class, interactive constructivism plays a crucial role in deepening in-class discussions and strengthening knowledge through peer scaffolding (28).

### Cognitive and Social Benefits of Collaborative Learning

From a cognitive perspective, peer communication fosters the deep processing of information, as students actively reorganize their knowledge and incorporate fresh ideas into their existing psychological frameworks (31). Medical English students involved in group discussions often correct each other's misunderstandings, leading to more precise application of language and enhanced self-confidence in professional interactions (26).

Socially, cooperative constructivism improves problem-solving abilities, critical thinking, and enhances collaboration (43). Learners working in small clusters improve interactive communication skills essential for interdisciplinary cooperation and patient care (24).

### Challenges in Implementing Collaborative Learning

Despite its advantages, implementing cooperative constructivism in medical English courses presents challenges. Some students may refuse peer communication due to the possibility of teacher-centered teaching or the fear of making errors (4). Furthermore, gaps in digital literacy can impede collaboration in technology-intensive learning environments in flipped classrooms (28). Tutors have huge responsibilities as supervisors, facilitators of discussions, and shapers of a cooperative classroom environments that encourage interactive and active engagement (30). Future studies should examine the long-term impacts of collaborative constructivism on clinical English aptitudes and explore methods to overcome obstacles that appear in peer instruction across different educational contexts.

### Objectives

To explore how FCA facilitates in-class autonomy among medical English students through collaborative constructivist processes.

### Methods

**Research Design:** To analyze student experiences in a flipped classroom approach (FCA)-focused clinical English course, a qualitative case study was designed. This choice was guided by the need for a detailed comprehension of collaborative communication, student engagement, and educational independence (21, 44). Qualitative case studies facilitate the meticulous exploration of pragmatic educational contexts, making them suitable for analyzing how students navigate an FCA context in clinical English learning (45). The credibility of the data was maintained not only through intercoder reliability but also by structured member checking, which involved validating participants by supplying them with brief analytic summaries (46). Furthermore, data sources, such as observation notes, were triangulated across different data sources, followed by audit trails on the raw data for theme development. The transferability and peer communication were assessed by a concrete description, whereby all the data was confirmed beyond ray coder kappa scores (46).

**Participant Selection:** Purposive sampling was employed to select 20 medical pupils enrolled in an FCA-based medical English course. The choice ensured that respondents had diverse backgrounds with regard to prior exposure to FCA, language skills, and age (47). Inclusion criteria required students to have attended a minimum of 80% of classes and actively participated in classroom undertakings. Previous studies emphasize

that purposive sampling is particularly effective in educational case studies where diverse viewpoints are critical for thematic exploration (48).

**Data Collection Methods:** To ensure methodological consistency and triangulation of data, a number of qualitative data assortment systems were applied (49).

- **Classroom Observations:** Structured and unstructured observations were conducted over 10 weeks, highlighting the communication of the students, their levels of involvement, and patterns undertaken (50). Because the server bias was minimized in the classroom by maintaining a standard protocol for coding behaviour to ensure consistency. Additionally, minimizing interaction and adopting a non-participant positioning helped facilitate the use of repeated coding and triangulation of observations with the LMS logs and student self-reports. Moreover, adherence to ethical guidelines, camera placements, and recording the number of visits served helps mitigate the Hawthorne effect. This ensured the credibility of the findings (51).
- **Semi-Structured Interviews:** With the help of semi-structured interviews, the diverse viewpoints of the students and teachers were assimilated, facilitating smooth feedback while keeping the focus on the main research questions (52).
- **Focus Group Discussions (FGDs):** To analyze cooperative educational knowledge, understanding of the FCA in clinical English learning, and peer dynamics, three focus groups were utilized (5-7 pupils each) (53).
- **Student Reflections and Learning Journals:** Students maintained reflective journals to document their difficulties, educational tactics, and self-perceived progress (54). These reflections offered rich insights into the advancement of the development of student autonomy.

**Data Analysis Approach:** Thematic exploration was used to identify patterns pointing to learning independence, cooperation, and in-class autonomy. Categorization and coding were conducted by the NVivo 12 software, confirming organized qualitative data modeling (55). Triangulation was applied to improve fidelity by cross-referencing learner reflections, observation notes, and interview transcripts (56). The six-phase framework of Braun (57) was applied for thematic adaptation:

1. Familiarization with data
2. Initial coding
3. Searching for themes

4. Reviewing themes
5. Defining and naming themes
6. Report writing

Intercoder dependability was ensured by cross-validating findings from two independent scholars (24). Reflexive thematic exploration confirmed a deep understanding of the student experiences, particularly in self-regulated education and collaborative studies (58). Ethical approval was obtained from UMREC (Research Ethics Committee), approval number UM.TNC(P&I)/UMREC/3/5670, ensuring informed consent, confidentiality, voluntary participation, and adherence to institutional ethical guidelines throughout the study and external oversight.

## Results

### Student Adaptation to the Flipped Classroom Approach

**Initial Resistance and Challenges:** The transition to the FCA posed initial challenges for medical English students. Accustomed to the lecture-based traditional methods, many students expressed uneasiness with the increased responsibility of self-directed learning. This sentiment aligns with (12) findings, who noticed that learners often struggle to switch from passive to active educational modalities in flipped classrooms.

Technological barriers contributed to the initial resistance as well. Inadequate availability of digital materials and unfamiliarity with virtual education media slowed down the ability of some students to engage efficiently with pre-class resources. These barriers highlight the need for appropriate technological support when implementing the FCA in medical education.

**Decreasing Resistance and Recognizing Benefits:** Despite initial challenges, resistance to self-paced learning decreased as students started to recognize the advantages of the FCA. Engaging with pre-class resources enabled students to approach in-class activities with foundational comprehension, fostering a more communicative and stimulating educational environment. They found that medical learners preparing before class achieved higher performance scores and needed fewer interventions during peer-supported educational sessions.

**Role of Peer Discussions in Reinforcing Understanding:** Peer discussions appeared as a crucial component in strengthening the understanding of medical English amongst students. Collaborative educational contexts allowed students to clarify concepts, share diverse viewpoints, and employ theoretical knowledge in practical situations. This

cooperative system enhanced understanding and introduced self-confidence in applying medical terms correctly. Have documented the efficacy of peer-supported learning in medical competence acquisition, focusing on its role in enhancing the practical use and retention of knowledge (59).

In summary, the transition to the Flipped Classroom Approach initially presented opposition among medical English learners, but the continuous engagement with self-paced education and active participation in peer discussions facilitated adaptation. These findings demonstrate the value of providing educational support during the FCA transition and promoting collaborative learning outcomes to enhance student outcomes in clinical English learning.

*Development of In-Class Independence:* Learners illustrated growing self-regulation and self-assurance. Learner reflections on FCA adaptation are displayed in Table 1.

**Table 1.** Student perceptions of FCA (Thematic Summary)

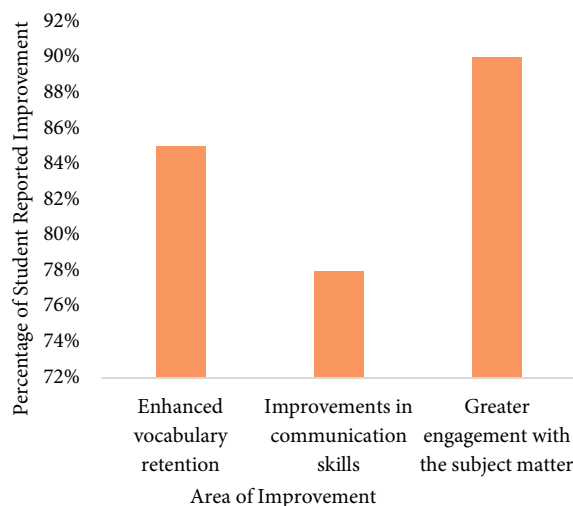
Theme	Key Student Responses
Initial Resistance	"I was unsure about learning on my own at first."
Increased Autonomy	"Preparing before class helped me understand topics better."
Peer Learning	"Discussing with classmates made concepts clearer."

Table 1 presents a thematic summary of student perceptions of the adaptation of the Flipped Classroom Approach (FCA). Initially, students were reluctant to self-paced learning, as indicated by statements such as, "I was unsure about learning on my own at first." However, familiarity grew, and they reported increased autonomy, recognizing that pre-class preparation facilitated better appreciation of course materials. Additionally, peer discussions played a crucial role in reinforcing the understanding, with students highlighting the benefits of collaborative learning, stating, "Discussing with classmates made concepts clearer." These findings align with previous research indicating that FCA enhances student independence and engagement by fostering self-regulated learning and interactive discussions (60).

*Impact of Collaborative Constructivism on Learning Outcomes:* Peer discussions played a crucial role in medical English terminology. Learner-reported advancements are exhibited in Figure 1.

Figure 1 illustrates improvements in medical English proficiency as perceived by students. Based on student self-reports from reflective journals, interviews, or focus

groups, the chart shows that 85% of students reported enhanced vocabulary retention, 78% demonstrated improvements in communication skills, and 90% experienced greater engagement with the subject matter. These findings suggest that the Flipped Classroom Approach (FCA) effectively supports language acquisition and active learning in medical English education.



**Figure 1.** Student-Perceived improvements in medical English proficiency.

*Instructor's Role and Classroom Dynamics:* Teachers facilitated discussions instead of direct teaching. Observed teacher roles are summarized in Table 2.

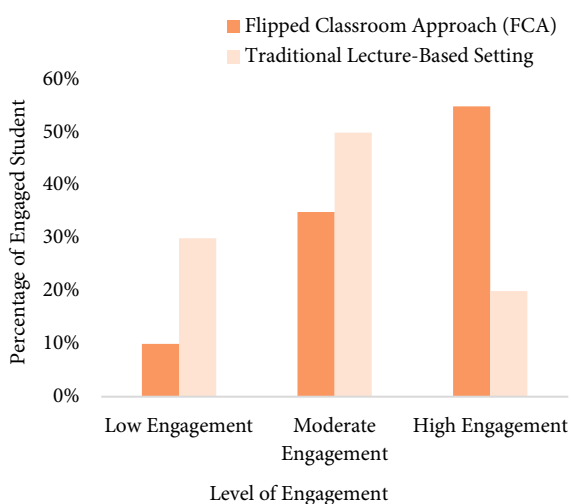
**Table 2.** Instructor Roles in FCA Classrooms

Role	Description
Facilitator	Guides discussions, prompts critical thinking
Moderator	Encourages peer collaboration
Mentor	Provides individualized feedback

Table 2 outlines the various roles instructors adopt in Flipped Classroom Approach (FCA) environments. Specifically, instructors serve as facilitators, leading discussions and encouraging critical thinking among students. They also act as moderators, fostering peer collaboration to enhance interactive learning experiences. Additionally, instructors assume the role of mentors, providing individualized feedback to support students' academic development and personalized learning goals. These dynamic roles reflect a shift from traditional student-facing lecturing to more student-centered, interactive teaching strategies, which are essential to FCA settings.

Figure 2 compares student engagement levels in the Flipped Classroom Approach (FCA) versus traditional

lecture-based settings. The chart illustrates that a higher percentage of students exhibit high engagement in FCA (55%) compared to traditional classrooms (20%), while traditional methods show a larger proportion of students with low engagement (30%) compared to FCA (10%). This aligns with research findings indicating that FCA fosters active participation and collaborative learning.



**Figure 2.** Student engagement levels in FCA vs. traditional classrooms

## Discussion

### *Interpretation of Findings in Relation to Research*

**Question:** This study shows that the Flipped Classroom Approach (FCA) has a crucial, constructive influence on fostering in-class autonomy among medical English learners. Through organized pre-class activities, students get the option of self-directed involvement in content creation, facilitating deeper understanding and analytical comprehension before entering the classroom. Therefore, class time can be channeled to collaborative education, where students can co-construct knowledge through discussion and peer cooperation (11).

One of the major findings of this research was the growing level of self-regulation and student engagement. Students are more likely to come prepared by having access to resources before class, which enhances their ability to dynamically participate in discussions and cooperate efficiently with their peers (23). This autonomy is further supported by collaborative constructivism, which highlights the social nature of education and the significance of peer-to-peer communication (17). Students clarify uncertainties, build upon each other's knowledge, and discuss meaning, which adds to the co-construction of medical English efficiency (22).

This collaborative process, which was key to the FCA, also emphasized the significance of peer accountability. Rather than depending solely on the teacher, students became more accountable to their peers, recognizing that they would be required to group tasks and share insights from their pre-class work. This transition from a teacher-centered model to a student-centered one in the educational context supports growing autonomy, which is crucial for the advancement of medical communication competence (28). Besides, the results suggest that this transition made students more relaxed by allowing them to take ownership of their learning. In other words, the FCA increased the level of autonomy in students.

The research also found that mentor facilitation was extremely valuable in boosting the flipped classroom's efficacy. The classroom environment became more dynamic once the role of the mentor switched from a conventional lecturer to a facilitator. The learners got the opportunity to be actively involved in organizing activities (43). The instructor's capacity to scaffold learning knowledge base, encourage reflection, and lead peer discussions was required for collaborative constructivism to flourish (31).

### *Key Factors Contributing to Student Independence:*

Several factors were identified as contributing to the growing in-class autonomy of the learners within the flipped classroom model. The structured pre-class preparation, comprising communicative resources, readings, and videos, facilitated student involvement in the independent development of content. This independence in learning is necessary for students to feel valued and self-confident in the classroom (21). Also, the incorporation of active learning activities in class, for example, peer instruction and problem-solving tasks, enabled students to openly use their knowledge immediately, nurturing self-efficacy and autonomy in clinical English (28).

Additionally, the findings highlight the significance of social education in establishing autonomy. By engaging in discussions and peer communications, students could develop a sense of togetherness, where learning became a shared experience rather than a personal activity (27). Supported by the FCA model, this peer communication generated a sense of belonging, which subsequently inspired greater self-regulation and involvement (22).

Despite these successes, the execution of the flipped classroom was not free of challenges, though. Especially at the outset, some students expressed their reservation to the model, largely due to their lack of exposure to

self-learning and dependence on teacher-led teaching (30). Demonstrated that the gaps in student digital literacy and a lack of acquaintance with the virtual learning environment can present crucial challenges to the success of the FCA (26). These challenges were particularly apparent among students who were ill at ease with technology or who did not see the instant worth of involving themselves with the pre-class content.

**Challenges and Areas for Improvement:** While the Flipped Classroom Approach (FCA) demonstrates strong potential for enhancing student autonomy, significant challenges remain with digital literacy and student opposition. Teachers must offer transparent guidance on how to approach pre-class resources and set expectation boundaries for active in-class engagement (11). Besides, providing training sessions on virtual platforms and digital gadgets before the course begins can be effective in lowering technological barriers and ensuring that all students are equipped for the FCA setting (30). To address initial student resistance to flipped classroom models and support digital literacy skill development, targeted tutorials can explain the scope for optional onboarding at the start of the course using digital submission tools and collaborative platforms, such as medical databases (61). Additionally, complex digital assignments could be simplified by providing stepwise guidance, subtitles for text readings, and instruction videos (61). Additionally, communicating the pedagogical rationale for students using handouts in actual languages to promote high-value activities helps bridge digital literacy. Furthermore, to foster collaborative approaches, pairing less tech-savvy students with technologically advanced peers can help with digital literacy in students. The success can be evaluated through repeated short trials, identifying students who improved more. Additionally, the existing technological knowledge of students can be evaluated at the start of the program. For students deemed less equipped with the necessary credentials, short lessons and videos on how to navigate through the interface can go a long way in instilling confidence among these students (61). Eventually, they could be brought up to the expected level, ensuring success in the FCA classrooms.

According to the research, peer cooperation was helpful, but there were occasional clashes among learners regarding different levels of preparation and involvement. Effective classroom management strategies that endorse equitable participation and promptly resolve conflicts are crucial for the FCA's success in clinical English education

(21). Teachers need to ensure that all learners are actively involved in discussions and that peer instruction roles are evenly shared among all participants.

**Implications for Medical English Education:** The research focuses on the prospect of the Flipped Classroom Approach (FCA) and collaborative constructivism in renovating medical English education. By incorporating dynamic educational tactics and shifting to a more student-centered teaching model, teachers can inspire growing autonomy among pupils while at the same time fostering collaborative education that improves medical interaction abilities (43). The findings suggest that the FCA provides students with the instruments essential to self-regulate and take ownership of their learning, which is a crucial component of success in the medical education sector.

Furthermore, this research adds to the broader literature on constructivist learning theories by demonstrating how collaborative education and peer communication can be applied to foster independent learning and efficiency in a specified zone, like medical English (17). If thoughtfully and adequately exercised, the findings also support the notion that incorporating technology into education has the ability to generate more engaging, meaningful learning experiences that equip students with practical, hands-on challenges.

### Implications and Contributions

**Theoretical Contributions:** This research highlights the potential of the flipped classroom approach (FCA) in medical English education. By incorporating a qualitative structure, this study offers a pathway on how FCA can be employed to endorse in-class autonomy and collaborative constructivism. The findings suggest that collaborative learning and social adaptation supersede individual learning in the context of FCA, aligning this conclusion with the sociocultural theory of Vygotsky (17). This theory proposes that learning is intrinsically a social action, where learners can co-construct knowledge through collaboration, particularly in challenging sectors like medical English (22). Furthermore, the theory of cognitive constructivism by Piaget (1985) suggests that students are active and not passive learners, a conclusion that matches this research, where FCA ensures that students excel in their learning (18).

Furthermore, Bruner's scaffolding theory is reinforced by the findings, where students could slowly take on added learning responsibility through peer assistance and collaboration (31). This study enhances the qualitative literature on FCA by offering a strategic analysis of the way peer learning can foster self-

regulation, independence, and a deep understanding of medical English.

This research, thus, offers a subtle qualitative perspective on FCA, filling a literature gap by illustrating the constructive role of social communication and collaborative constructivism in advancing in-class autonomy among medical English learners.

*Pedagogical and Practical Implications:* From the pedagogical perspective, this research suggests that FCA can reform clinical English education by advancing a dynamic, pupil-focused system of learning. The findings suggest that the combination of peer-to-peer tutoring, cooperative in-class activities, and pre-class preparation enhances student involvement and educational effects (28). Student-driven learning and peer communication are promoted by the FCA model, which generates a perfect milieu for clinical interaction as medical English pupils are required to process complex clinical expressions and interact in English within clinical set-ups (43).

In practical settings, teachers must assume the role of facilitators, not lecturers. The scaffolding inherent in the FCA allows tutors to plan communicative activities that encourage cooperative problem-solving, where pupils can participate in key interventions and develop their knowledge of clinical English with assistance from peer support (26). This can be achieved by role-playing, case-based discussions, and clinical simulations, which provide students with the environment to exercise real-life clinical interactions. Furthermore, mentors should be trained in the efficient use of technology to support pre-class engagement, for example, discussion boards, communicative video lectures, and quizzes, which are vital to the operational success of FCA (11). Furthermore, there should be clinical English books and curricula incorporating reflective practices and cooperative activities. Peer cooperation is crucial to enhancing autonomy. Hence, educators should include further cooperative ventures that will encourage students to practice and hone their competence with the support of feedback loops and group activities (23).

*Policy and Institutional Considerations:* From a policy and institutional perspective, this research supports the broader adoption of the flipped classroom approach in medical English programs. The FCA has the potential to align with global communication standards in clinical education, where the ability to interact efficiently in English is crucial. By emphasizing autonomous education and peer cooperation, the FCA model echoes the growing demand for enduring learning and constant professional improvement in the

clinical sector (43). However, this adoption cannot be facilitated without educational institutions investing in training programs for instructors, offering them the instruments and materials to efficiently accomplish the remits of the FCA. Infrastructural assistance is also necessary to ensure that students have access to essential technologies, such as communicative media, video recording gadgets, and learning management approaches (28). Besides, policymakers should inspire institutional flexibility to facilitate the redesign of traditional curricula to integrate more active learning tactics, comprising peer-led education and cooperative ventures (11). These policies must be implemented because they assist the constant professional development of mentors when they switch from lecture-oriented teaching to learner communication-focused pedagogical systems (26). This would ensure that the FCA is profitably implemented and maintained step by step.

However, some challenges are imposed by policies and institutional infrastructure. For instance: instructors require more time to design course materials and resources, possibly due to infrastructural issues, such as a lack of internet bandwidth (62). The administration could solve these problems by incentivizing faculty through practice assessment methods in flipped classrooms. Additionally, changes in incentivization policies could be adopted, along with conducting pilot evaluations with measurable indicators for performance and cost-benefit analysis across various phases (63). Therefore, policy levers could be developed to address faculty overload, and infrastructural changes should be set up in the form of centralized e-learning support.

Professional development in flipped classrooms is necessary to assign facilitators' roles to the instructors, as they take part in feedback cycles, role rehearsal, and co-planning (62). Consequently, the mode of action changes from the traditional lecturing model and transforms into a format for co-designing, microteaching, and reflexive practices. Hence, professional development (PD) acts as a way to enhance teacher adaptability to foster better outcomes for students. PDs also help in aligning assessments and emphasize the incentivization of redesigning, supported by dedicated institutional time (64). This enables teachers to adopt high-fidelity practices following teacher training. Overall, the focus of PD, clinical versus educational, directly supports teacher adaptability and delivers an approach to improve student outcomes.

Contextually, the following recommendations for training programs could be proposed to prepare

instructors for the facilitative role required in effective FCA implementation. As evidenced by (65), instructors must be supported in designing multimedia and get training on successfully using online platforms so that they can prepare the students before the class. For this, technological adaptation, such as on-demand access, narratives for lectures, and creation of short videos are used in training programs to enable instructors to assume a facilitative role in flipped classrooms (66). Additionally, the instructors need to be trained in following collaborative guidelines and must learn to process formative assessment and active learning designs, which will enable them to adapt to the diverse backgrounds of the students. Instructors must also adhere to time management strategies, community building skills, and navigation skills for reflexive observations, guided by peer review (67). Implementing such iterative professional development approaches can refine the adoption of higher-order learning goals among instructors, allowing them to function as facilitators of student engagement.

### Conclusion

The Flipped Classroom Approach (FCA) efficiently fosters in-class autonomy among clinical medical English students, and this research emphasizes that. The FCA shifts the traditional teaching model, enabling students to assume greater responsibility for their learning. It also helps them to engage with content before the class and apply their knowledge communicatively and cooperatively during the class. This transformation boosts students' autonomy and promotes deeper comprehension and retention of complicated clinical expressions and interactive skills. As suggested by findings, the FCA stimulates the immediate application of knowledge, active learning, and peer collaboration as crucial components for understanding clinical English in a medical milieu. Since students are involved with case-based actions, critical discussions, and role-playing, they enhance problem-solving and critical thinking skills that go beyond rote memorization, making the educational process more lively and professionally contextual. This research adds to the growing body of literature on the instructional benefits of the FCA, particularly in specific sectors such as clinical education, where interaction efficiency is vital.

Future studies should emphasize the longitudinal impact of FCA on clinical English efficiency, exploring whether the developments seen in the short term are sustained over time. Long-term research could offer

valuable insight into the lasting advantages of FCA, advising how language abilities and the system impacts the professional interaction of students are maintained once they enter the clinical sector. Moreover, comparative research between the FCA and traditional pedagogical techniques would provide a clearer understanding of the benefits of the FCA in clinical language education. Such research could analyze the way FCA revolutionizes traditional systems in fostering linguistic skills, self-assurance, and medical decision-making abilities, all through cooperative effort. Additionally, studies should explore the difficulties and challenges to the extensive adoption of the FCA, involving learner approaches, teacher readiness, and limitations in the adoption of technology. Future research can address these issues and help educational institutions in shaping more efficient, wide-ranging, and sustainable medical English curricula that better equip students for the requirements of contemporary healthcare.

**Acknowledgements:** Not Applicable.

**Conflict of interest:** There is no conflict of interest.

**Ethical approval:** Since this was a low-risk study, it did not need any approval from the ethical board.

**Funding/Support:** Key Project of the 2023 Medical Education Research Grant by the Chinese Society of Medical Education and the National Center for Health Professions Education Development: Reform and Exploration of Digital Transformation Empowering the Connotative Development of Stomatological Education (2023A26), Principal Investigator; Shanxi Provincial Postgraduate Education Innovation Program - Model Curriculum for Ideological and Political Education in Courses: Recent Advances in Oral and Maxillofacial Surgery (2024SZ-14), Lead Instructor.

### References

- Hyland K, Shaw P, editors. The Routledge handbook of English for academic purposes. London: Routledge; 2016.
- Mengsha AK, Ayele HS, Misker MF, Beyna AT. Assessing the effectiveness of flipped classroom teaching-learning method among undergraduate medical students at gondar university, college of medicine and health sciences: an interventional study. BMC Medical Education. 2024;24(1):1108. doi: [10.1186/s12909-024-06105-7](https://doi.org/10.1186/s12909-024-06105-7).
- Sun X, Yuan X, Zhang L, Zhang Y, Xiao X, Liu H, et al. Effectiveness of flipped classrooms in Chinese students of clinical medicine major undergoing clinical practice: A meta-analysis. BMC Med Educ. 2025;25(1):205. doi: [10.1186/s12909-025-06737-3](https://doi.org/10.1186/s12909-025-06737-3). PMID: [39920678](https://pubmed.ncbi.nlm.nih.gov/39920678/) PMCID: [PMC11806571](https://pubmed.ncbi.nlm.nih.gov/PMC11806571/)

4. Bergmann J, Sams A. Flipped learning: Gateway to student engagement. Eugene, OR: International Society for Technology in Education; 2014.
5. Bethavas V, Bridgman H, Kornhaber R, Cross M. The evidence for the flipped classroom in health professional education: A systematic review. *Nurse Educ Today*. 2016;38:15-21. doi: [10.1016/j.nedt.2015.12.010](https://doi.org/10.1016/j.nedt.2015.12.010). PMID: [26804940](https://pubmed.ncbi.nlm.nih.gov/26804940/)
6. Hew KF, Lo CK. Flipped classroom improves student learning in health professions education: A meta-analysis. *BMC Med Educ*. 2018;18(1):38. doi: [10.1186/s12909-018-1144-z](https://doi.org/10.1186/s12909-018-1144-z). PMID: [29544495](https://pubmed.ncbi.nlm.nih.gov/29544495/) PMCID: [PMC5855972](https://pubmed.ncbi.nlm.nih.gov/PMC5855972/)
7. Lo CK, Hew KF. A critical review of flipped classroom challenges in K-12 education: Possible solutions and recommendations for future research. *Res Pract Technol Enhanc Learn*. 2017;12(1):4. doi: [10.1186/s41039-016-0044-2](https://doi.org/10.1186/s41039-016-0044-2). PMID: [30613253](https://pubmed.ncbi.nlm.nih.gov/30613253/) PMCID: [PMC6302872](https://pubmed.ncbi.nlm.nih.gov/PMC6302872/)
8. Wang Y, Wang GJ, Yan LJ, Gao J, Fu C, Ren HM. Qualitative research on the flipped classroom cognition of undergraduate nursing students. *BMC Med Educ*. 2024;24(1):1460. doi: [10.1186/s12909-024-06426-7](https://doi.org/10.1186/s12909-024-06426-7). PMID: [39696153](https://pubmed.ncbi.nlm.nih.gov/39696153/) PMCID: [PMC11653839](https://pubmed.ncbi.nlm.nih.gov/PMC11653839/)
9. Phillips J, Wiesbauer F. The flipped classroom in medical education: A new standard in teaching. *Trends Anaesth Crit Care*. 2022;42:4-8. doi: [10.1016/j.tacc.2022.01.001](https://doi.org/10.1016/j.tacc.2022.01.001). PMID: [38620968](https://pubmed.ncbi.nlm.nih.gov/38620968/) PMCID: [PMC9764229](https://pubmed.ncbi.nlm.nih.gov/PMC9764229/)
10. Bui TH, Johnson NF. Self-regulation and metacognition in a flipped classroom: EFL students' perspectives at a Vietnamese university. *Issues in Educational Research*. 2024;34(1):19-36.
11. Bergmann J, Sams A. Flip your classroom: Reach every student in every class every day. *Electronic Journal of Social and Strategic Studies*. 2012; 3(2): 258-64. doi:[10.47362/EJSS.2022.3208](https://doi.org/10.47362/EJSS.2022.3208)
12. Fatima SS, Arain FM, Enam SA. Flipped classroom instructional approach in undergraduate medical education. *Pak J Med Sci*. 2017;33(6):1424-1428. doi: [10.12669/pjms.336.13699](https://doi.org/10.12669/pjms.336.13699). PMID: [29492071](https://pubmed.ncbi.nlm.nih.gov/29492071/) PMCID: [PMC5768837](https://pubmed.ncbi.nlm.nih.gov/PMC5768837/)
13. Alyoussef IY. Acceptance of a flipped classroom to improve university students' learning: An empirical study on the TAM model and the unified theory of acceptance and use of technology (UTAUT). *Heliyon*. 2022; 8(12): e12529. doi: [10.1016/j.heliyon.2022.e12529](https://doi.org/10.1016/j.heliyon.2022.e12529). PMID: [36619432](https://pubmed.ncbi.nlm.nih.gov/36619432/) PMCID: [PMC9816777](https://pubmed.ncbi.nlm.nih.gov/PMC9816777/)
14. Khosa A, Burch S. Flipped Classroom: Students' Cognitive Needs of Relatedness, Competence, and Autonomy in a Fully-Flipped Program. *Journal of University Teaching and Learning Practice*. 2023;20(5): 1-27. doi: [10.53761/1.20.5.04](https://doi.org/10.53761/1.20.5.04)
15. Mengesha A, Burch S. Flipped Classroom: Students' Cognitive Needs of Relatedness, Competence, and Autonomy in a Fully-Flipped Program. *Journal of University Teaching and Learning Practice*. 2023;20(5): 1-27. doi: [10.53761/1.20.5.04](https://doi.org/10.53761/1.20.5.04)
16. Fan JY, Tseng YJ, Chao LF, Lin HY, Jane SW. Learning outcomes of a flipped classroom teaching approach in an adult-health nursing course: A quasi-experimental study. *BMC Med Educ*. 2020;20(1):317. doi: [10.1186/s12909-020-02240-z](https://doi.org/10.1186/s12909-020-02240-z). PMID: [32948178](https://pubmed.ncbi.nlm.nih.gov/32948178/) PMCID: [PMC7501708](https://pubmed.ncbi.nlm.nih.gov/PMC7501708/)
17. Vygotsky LS. *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press; 1978.
18. Piaget J. *The equilibration of cognitive structures: The central problem of intellectual development*. Chicago: University of Chicago Press; 1985
19. Bishop JL, Verleger MA. The flipped classroom: A survey of the research. *Proceedings of the ASEE Annual Conference & Exposition*; 2013 Jun 23-26; Atlanta, Georgia. 2013: 1-18. doi:[10.18260/1-2-22585](https://doi.org/10.18260/1-2-22585).
20. Zhou X, Sun K, Zhu K, Feng L, Sun Q, Zhong D. The impact of digital literacy on university students' innovation capability: evidence from Ningbo, China. *Front Psychol*. 2025; 16:1548817. doi: [10.3389/fpsyg.2025.1548817](https://doi.org/10.3389/fpsyg.2025.1548817). PMID: [40697730](https://pubmed.ncbi.nlm.nih.gov/40697730/) PMCID: [PMC12282524](https://pubmed.ncbi.nlm.nih.gov/PMC12282524/)
21. Sun JCY, Wu YT, Lee WI. The effect of the flipped classroom approach to Open Courseware instruction on students' self-regulation. *British Journal of Educational Technology*. 2017;48(3):713-29. doi:[10.1111/bjet.12444](https://doi.org/10.1111/bjet.12444)
22. Mercer N. *Exploring talk in school: Inspired by the work of Douglas Barnes*. London: Sage; 2008
23. Zhou J, Ye J. Investigating cognitive engagement patterns in online collaborative learning: a temporal learning analytic study. *Interactive Learning Environments*. 2024;32(10):6997-7013. doi:[10.1080/10494820.2023.2299976](https://doi.org/10.1080/10494820.2023.2299976).
24. Nowell LS, Norris JM, White DE, Moules NJ. Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*. 2017; 16(1): 1-13. doi: [10.1177/1609406917733847](https://doi.org/10.1177/1609406917733847)
25. Zarrinabadi N, Ebrahimi A. Increasing peer collaborative dialogue using a flipped classroom strategy. *Innovation in Language Learning and Teaching*. 2019;13(3):267-76. doi: [10.1080/17501229.2018.1455688](https://doi.org/10.1080/17501229.2018.1455688).
26. Chen F, Lui AM, Martinelli SM. A systematic review of the effectiveness of flipped classrooms in medical education. *Med Educ*. 2017;51(6):585-97. doi: [10.1111/medu.13272](https://doi.org/10.1111/medu.13272). PMID: [28488303](https://pubmed.ncbi.nlm.nih.gov/28488303/)
27. Lantolf JP, Thorne SL. *Sociocultural theory and the genesis of second language development*. Oxford: Oxford University Press; 2006.
28. Akçayır G, Akçayır M. The flipped classroom: A review of its advantages and challenges. *Computers & Education*. 2018;126:334-345. doi:[10.1016/j.compedu.2018.07.021](https://doi.org/10.1016/j.compedu.2018.07.021)
29. Yuan N, Yu Q, Liu W. The impact of digital literacy on learning outcomes among college students: The mediating effect of digital atmosphere, self-efficacy for digital technology and digital learning. *Frontiers in Education*. 2025; 10: 1641687. doi: [10.3389/educ.2025.1641687](https://doi.org/10.3389/educ.2025.1641687).
30. Gass SM, Mackey A. *Second language research: Methodology and design*. 3rd ed. London: Routledge; 2021.
31. Bruner JS. *The culture of education*. In: Wearmouth J, Glynn T. *Inclusion and Behaviour Management in Schools*. London: David Fulton Publishers; 2004. doi:[10.4324/9780203064115](https://doi.org/10.4324/9780203064115).
32. Tromp C. Scaffolding the Flipped Classroom to Enhance Students' Learning Process. *Teaching & Learning Inquiry*. 2025; 13:1-18. doi:[10.20343/teachlearninqu.13.26](https://doi.org/10.20343/teachlearninqu.13.26).
33. Naing C, Whittaker MA, Aung HH, Chellappan DK, Riegelman A. The effects of flipped classrooms to improve learning outcomes in undergraduate health professional education: A systematic review. *Campbell Syst Rev*. 2023; 19(3): e1339. doi: [10.1002/cl2.1339](https://doi.org/10.1002/cl2.1339). PMID: [37425620](https://pubmed.ncbi.nlm.nih.gov/37425620/) PMCID: [PMC10326838](https://pubmed.ncbi.nlm.nih.gov/PMC10326838/)
34. Li S, Liao X, Tong K. The effectiveness of flipped classroom in health professions education in China: A systematic review. *J Med Educ Curric Dev*. 2020; 7: 2382120520962838. doi: [10.1177/2382120520962838](https://doi.org/10.1177/2382120520962838). PMID: [33110941](https://pubmed.ncbi.nlm.nih.gov/33110941/) PMCID: [PMC7556183](https://pubmed.ncbi.nlm.nih.gov/PMC7556183/)
35. Tang F, Chen C, Zhu Y, Zuo C, Zhong Y, Wang N, et al. Comparison between flipped classroom and traditional lecture-based classroom in medical education: A meta-analysis. *Med Educ Online*. 2017; 22(1): 1395679. doi: [10.1080/10872981.2017.1395679](https://doi.org/10.1080/10872981.2017.1395679). PMID: [29096591](https://pubmed.ncbi.nlm.nih.gov/29096591/) PMCID: [PMC5678346](https://pubmed.ncbi.nlm.nih.gov/PMC5678346/)

36. Shi XY, Yin Q, Wang QW, Lu BR, Li GX, Huang SH, et al. Is the flipped classroom more effective than the traditional classroom in clinical medical education: A systematic review and meta-analysis. *Frontiers in Education*. 2025;9: 1485540. doi:10.3389/educ.2024.1485540.
37. Karabulut-Ilgu A, Jaramillo Cherrez N, Jahren CT. A systematic review of research on the flipped learning method in engineering education. *British Journal of Educational Technology*. 2017;49(3):398-411. doi:10.1111/bjet.12548
38. Khodaei S, Hasanvand S, Gholami M, Mokhayeri Y, Amini M. The effect of the online flipped classroom on self-directed learning readiness and metacognitive awareness in nursing students during the COVID-19 pandemic. *BMC Nurs*. 2022;21(1):22. doi:10.1186/s12912-022-00804-6. PMID: 35042484 PMCID: PMC8766221
39. Seidi M, Ramezani-Aliakbari F, Doosti-Irani A. Effectiveness of the flipped classroom method using clinical scenarios and Educational Technology versus Subject-Based Lectures in a gastrointestinal physiology course for medical students. *BMC Med Educ*. 2024;24(1):858. doi: 10.1186/s12909-024-05863-8. PMID: 39123163 PMCID: PMC11312676
40. Van Vliet EA, Winnips JAkçayırC, Brouwer N. Flipped-class pedagogy enhances student metacognition and collaborative-learning strategies in higher education but effect does not persist. *CBE Life Sci Educ*. 2015;14(3):ar26. doi: 10.1187/cbe.14-09-0141. PMID: 26113628 PMCID: PMC4710384
41. Mustari SH, Arnika M. The effectiveness of English for specific purposes (ESP) in medical and health students at Tri Tunas Nasional Institute. *Jurnal Penelitian dan Pengabdian Kepada Masyarakat*. 2025;1(1):17-24
42. Gass SM, Mackey A. *Second language research: Methodology and design*. 3rd ed. London: Routledge; 2021.
43. Harden RM. Ten key features of the future medical school—not an impossible dream. *Med Teach*. 2018;40(10):1010-1015. doi: 10.1080/0142159X.2018.1498613. PMID: 30326759
44. Creswell JW, Poth CN. *Qualitative inquiry and research design: Choosing among five approaches*. 4th ed. Thousand Oaks, CA: Sage; 2018.
45. Yin RK. *Case study research and applications: Design and methods*. 6th ed. Thousand Oaks, CA: Sage; 2018.
46. McKim C. Meaningful member-checking: A structured approach to member-checking. *American Journal of Qualitative Research*. 2023;7(2):41-52.
47. Etikan I, Musa SA, Alkassim RS. Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*. 2016;5(1):1-4. doi:10.11648/j.ajtas.20160501.11.
48. Palinkas LA, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Adm Policy Ment Health*. 2015;42(5):533-44. doi: 10.1007/s10488-013-0528-y. PMID: 24193818 PMCID: PMC4012002
49. Denzin NK. *The research act: A theoretical introduction to sociological methods*. 4th ed. London: Routledge, 2017.
50. Merriam SB, Tisdell EJ. *Qualitative research: A guide to design and implementation*. 4th ed. San Francisco: Jossey-Bass; 2016.
51. World Bank. *Teach Primary*. [cited 2022 Aug 30]. Available from: <https://www.worldbank.org/>
52. Kallio H, Pietilä AM, Johnson M, Kangasniemi M. Systematic methodological review: Developing a framework for a qualitative semi-structured interview guide. *J Adv Nurs*. 2016;72(12):2954-65. doi: 10.1111/jan.13031. PMID: 27221824
53. Morgan DL. *Basic and advanced focus groups*. London: Sage; 2019. doi:10.4135/9781071814307
54. Ryan M, Ryan M. A Model for Reflection in the Pedagogic Field of Higher Education. In: Ryan, M. (eds) *Teaching Reflective Learning in Higher Education*. Cham: Springer; 2015. doi:10.1007/978-3-319-09271-3\_2.
55. Castleberry A, Nolen A. Thematic analysis of qualitative research data: Is it as easy as it sounds? *Curr Pharm Teach Learn*. 2018; 10(6): 807-815. doi: 10.1016/j.cptl.2018.03.019. PMID: 30025784
56. Patton MQ. *Qualitative research and evaluation methods*. 4th ed. Thousand Oaks, CA: Sage; 2015
57. Braun V, Clarke V. Conceptual and design thinking for thematic analysis. *Qualitative psychology*. 2022;9(1):3.
58. Terry G, Hayfield N, Clarke V, Braun V. Thematic analysis. In: Willig C, Rogers WS, editors. *The SAGE handbook of qualitative research in psychology*. London: SAGE Publications Ltd; 2017:17-36. doi:10.4135/9781526405555.n2.
59. Chan E, Botelho MG, Wong GTC. A flipped classroom, same-level peer-assisted learning approach to clinical skill teaching for medical students. *PLoS One*. 2021;16(10):e0258926. doi: 10.1371/journal.pone.0258926. PMID: 34679098 PMCID: PMC8535182
60. Steen-Utheim AT, Foldnes N. A qualitative investigation of student engagement in a flipped classroom. *Teaching in Higher Education*. 2018; 23(3): 307-24. doi: 10.1080/13562517.2017.1379481
61. Getenet S, Cantle R, Redmond P, Albion P. Students' digital technology attitude, literacy and self-efficacy and their effect on online learning engagement. *International Journal of Educational Technology in Higher Education*. 2024;21(1):3. doi:10.1186/s41239-023-00437-y.
62. Nichat A, Gajbe U, Bankar NJ, Singh BR, Badge AK, Badge A. Flipped classrooms in medical education: improving learning outcomes and engaging students in critical thinking skills. *Cureus*. 2023;15(11):e48199. doi: 10.7759/cureus.48199. PMID: 38054140 PMCID: PMC10694389
63. Mizza D, Reese M, Malouche D. Flipped classroom evaluation and blended learning potential: a case study of engagement and inclusion in quantitative education. *Smart Learning Environments*. 2025;12(1):56. doi:10.1186/s40561-025-00412-2.
64. Baig MI, Yadegaridehkordi E. Flipped classroom in higher education: a systematic literature review and research challenges. *International Journal of Educational Technology in Higher Education*. 2023;20(1):61. doi:10.1186/s41239-023-00430-5.
65. Brewer R, Movahedazarhouli S. Flipped learning in flipped classrooms: A new pathway to prepare future special educators. *Journal of Digital Learning in Teacher Education*. 2019;35(3): 128-43. doi:10.1080/21532974.2019.1619110.
66. Gopalan C, Bracey G, Klann M, Schmidt C. Embracing the flipped classroom: the planning and execution of a faculty workshop. *Adv Physiol Educ*. 2018;42(4):648-54. doi: 10.1152/advan.00012.2018. PMID: 30387698
67. Dalbani H, Eissa S, Syed-Ahmad SF, Almusharraf N. Transitioning to flipped classrooms: Instructors' perspectives. *Sustainability*. 2022;14(20):1-26. doi:10.3390/su142013426.