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Abstract*: In higher education, it is anticipated that English students should possess both proficiency in language and the capacity for critical thinking. Nonetheless, the dynamics of English as foreign language (EFL) classrooms often reveal a tendency for teachers to exert significant control over the class. Thus, this study aims to discover the scaffolding strategies applied by the teacher in an online EFL class in terms of classroom interactional competence (CIC). The participants were twelve English preparatory class students studying at A2 level of a state university in Türkiye. The majority of the students were Turkish and one of them was Somalian. They were enrolled in the same class. In the application process, the Microsoft Teams educational platform was used, and the lesson was conducted synchronously through this platform. The lesson lasted ninety minutes. By adopting a conversational analysis (CA) approach, a ninety-minute online English class was critically examined within the scope of Walsh's (2006) self-evaluation of teacher talk (SETT) framework and concept of CIC. The interaction was analyzed by specifically focusing on scaffolding strategies. According to the findings, the teacher was found to apply restating, reformulation, inviting participation from students, providing explanation, modelling, extension, further explaining students' understanding and checking scaffolding strategies.*

Keywords: *Classroom interactional competence, Conversational analysis, English language teaching, Higher education.*

INTRODUCTION

In recent decades, the field of teacher development and classroom discourse research have increasingly emphasized the exploration of classroom interaction dynamics. This shift aims to reveal how teachers and second language (L2) learners communicate during teaching and learning activities. The overarching goal is to gain deeper insights into the process of second language acquisition (SLA). A substantial body of literature has emerged, underscoring the pivotal role of teachers in facilitating learners' engagement and fostering effective learning through classroom interactions (Walsh, 2013).

Classroom interaction (CI) is at the heart of the learning process and is considered as the most important factor in the curriculum since learning occurs in the interaction process rather than through the interaction (Walsh, 2011). Therefore, it can be argued that interaction is an indispensable part of the learning process as classroom interaction is directly related to the material, syllabus, communication, motivation, identity, theory, and practice (Soraya, 2017). According to Walsh (2011), classroom interaction competence has three key features. The first one is called as the use of pedagogically convergent language, which is appropriate for learners. The second one

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includes creating interactional space such as extensive use of pause, a lack of repair, signposting in instructions, extended learner turns and echo. The last one is about shaping learner contribution such as seeking clarification, scaffolding, modelling or repairing learner input. In addition, he identifies four modes that are used in second language classes, which were previously called micro-contexts by Seedhouse (1996). The first one is the managerial mode, which emphasizes the transmission of information and classroom management. The second mode, known as the material mode, centers around the educational materials used for learning. The third mode, termed the skills and system mode, places its focus on teaching language skills like reading, writing, speaking, and listening, as well as language components such as grammar, vocabulary, and pronunciation (phonology). The final mode, referred to as the classroom context mode, offers students increased opportunities to express themselves using the language they are learning. Each mode is associated with distinct educational objectives that are directly tied to the learning task at hand. Walsh further describes each mode in detail by presenting pedagogic goals and instructional features related to each mode (See Appendix A). Each mode comes with distinct educational objectives closely tied to the learning activity at hand. For instance, when it comes to classroom management, instructors must communicate information, introduce new activities, and so on. In the classroom context mode, where students' English proficiency is showcased, educators must foster oral fluency among the students. Each educational objective finds expression in specific interactional elements (Walsh, 2011).

One of the interactional features of the material mode, skills and systems mode and classroom context mode is using scaffolding. In the context of education, the concept of scaffolding relates to Vygotsky's Sociocultural Theory, which encompasses the fundamental aspects of supporting English language learners. Scaffolding, in essence, involves providing additional support when a learner encounters challenges and withdrawing that support as the learner makes progress. Several principles guide this concept: (1) individual learning is fostered through social interaction; (2) language serves as a tool for developing cognitive abilities; (3) assisting learners in completing tasks with more knowledgeable individuals; (4) learning from those with greater expertise; and (5) learners benefit from growing independently (Ardiningtyas et al., 2023). In conclusion, scaffolding is a concept that has its roots in the field of education but draws inspiration from the construction industry's support structures. It serves as a metaphor for the support provided to learners, whether they are children, students, or inexperienced individuals, to help them solve problems or complete tasks they would otherwise struggle with independently. This support is crucial in assisting learners in reaching their educational goals. Ultimately, scaffolding is a valuable teaching and learning strategy that promotes collaboration, autonomy, and the acquisition of essential life skills such as collaborative learning. It serves as a bridge between the learner's current level of competence and their potential development, allowing them to work at a higher level of activity and achievement. Accordingly, this study aims to analyze scaffolding strategies employed by the teacher as a component of CIC from a conversation-analytic perspective.

Literature Review

Classroom Interactional Competence (CIC)

 In EFL context, classroom interaction encompasses all forms of communication. It encompasses not only genuine and authentic exchanges but also includes formal drilling activities (Ellis, 1990, p. 12). As Brown (2000) suggests, "interaction is the collaborative exchange of thoughts, feelings, or ideas between two or more people, resulting in a reciprocal effect on each other" (p. 165). This interaction involves not only one-sided communication but also requires at least two individuals exchanging messages to facilitate effective communication, a concept in alignment with Wagner's (1994) assertion that "interaction is reciprocal events that require at least two objects and two actions" (p. 8). The use of effective strategies for classroom interaction can potentially improve students' communicative skills, leading to enhanced performance (Suryati, 2015). Young (2008) states that interactive competence encompasses identity resources, linguistic resources and interactional resources. Identity resources

include the participation framework, which is about the identities of all participants in an interaction. Linguistic resources encompass the features of pronunciation, vocabulary, and grammar that typify a practice. In addition, they include how participants construct interpersonal, experiential, and textual meanings in a practice. Finally, linguistic resources are about the selection of acts in a practice and their sequential organization; how to select the next speaker, how to know when to end one turn and when to begin the next; how to respond to interactional trouble in a given practice and how to open and close the act of practice. As can be seen, classroom interaction is a broad term, and it encompasses different features and acts.

Interaction is also an important component of the language learning process. When students actively participate in classroom activities, their learning experience is enhanced. Those who engage by taking turns in the classroom environment can improve their language skills. Conversely, students who adopt a passive role in the classroom may miss out on valuable language learning opportunities (Soraya, 2017). Fostering an active dynamic between teachers and students is crucial for creating a positive classroom interaction. Both parties should actively partake in communication and interactions within the classroom. Consequently, the effectiveness of the teaching and learning process hinges largely on how teachers and students actively engage with each other.

Applying the notion of Interactional Competence (IC) to the classroom discourse, Walsh (2011) introduced the term Classroom Interaction Competence (CIC). Walsh (2011) defines CIC as "*teachers' and learners' ability to use interaction as a tool for mediating and assisting learning*". It places interaction in a central position within the realm of education and contends that enhancing their CIC will lead to an immediate enhancement in both learning and learning opportunities for both teachers and learners. The key point in prioritizing CIC is that as teachers gain a deeper understanding of classroom interaction, this will naturally translate into an enhanced learning experience, particularly in settings where learning is seen as a social activity heavily shaped by involvement, engagement, and active participation (Walsh, 2013). He illustrated three fundamental aspects of CIC: (a) employing pedagogically aligned language suitable for learners; (b) establishing room for interaction (such as making ample use of pauses, minimizing the need for corrections, providing clear instruction cues, extending opportunities for learners to speak, and echoing); (c) shaping learner participation (that is, seeking clarification, providing support, demonstrating, or fixing learner input).

Researchers have long emphasized the significance of employing efficient strategies for classroom interaction to facilitate the linguistic growth of students. For instance, Kramsch (1986) proposes that in order to cultivate students' communicative competence, they should engage in turn-taking with both their peers and the instructor, seek feedback, request clarification, and initiate conversations. Rivers (1987), on the other hand, contends that to encourage productive classroom interaction, educators should steer clear of monopolizing one-sided discussions, adopt a cooperative approach, and consider the emotional aspects of students. According to Mackey (1999), educators should create interactive learning settings that enable students to engage in communication with one another to generate meaning in the target language. To put it differently, teachers must facilitate classroom interaction that encourages students to actively participate in the production of the target language by incorporating elements such as turn-taking, feedback, and negotiation. Based on the information presented in the literature, it is obvious that classroom interaction is a key factor in promoting learning for the students who learn a second language. In this process, teachers have responsibilities, and they are expected to help their students by creating an environment in which the interaction between the students will be high.

By examining the CIC observed during classroom interactions and learning from it, we can gain valuable insights into our specific educational context. Additionally, we can gain a deeper understanding of how teachers and learners utilize their interactional and linguistic abilities to establish and sustain classroom discourse, ultimately improving effective classroom communication. Enhancing their CIC can empower both teachers and learners to create more favorable conditions for learning, thereby reinforcing the educational outcomes achieved (Supakorn,

2020). Additionally, examining interactions within L2 classrooms has the potential to assist educators and researchers in analyzing classroom conversations, thereby providing insights into class-based learning and enhancing teachers' self-awareness about their instructional methods. In the realm of Applied Linguistics, various approaches are employed to gauge, dissect, and portray classroom interactions and participant behavior. These approaches encompass linguistic analysis, systemic functional linguistic analysis, interaction analysis, discourse analysis, critical discourse analysis, conversation analysis, and a range of qualitative and quantitative methodologies. While linguistic and discourse analyses have been the primary focus of much research on L2 classroom interaction, there is a growing trend toward employing CA to scrutinize this form of institutional communication (Allami & Mozaffari, & Manzouri, 2022). Due to the powerful tools of CA for SLA research, this paper offers reflections on the use of CA as a tool in identifying the CIC.

Conversational Analysis

CA is a methodical examination of dialogue that occurs in everyday human interactions, specifically referred to as talk-in-interaction (Hutchby & Wooffitt, 2008). Its origins trace back to the 1960s through the pioneering work of Sacks, Schegloff, and Jefferson (1974). CA primarily delves into the structure of turn-taking and how we carry out actions through language. Over time, it has evolved into a multidisciplinary approach, giving rise to "Institutional CA." This expansion occurred as CA was applied in diverse contexts, such as doctor-patient consultations, commercial transactions, legal proceedings, and educational settings, among others. Within these contexts, the differing roles of participants influence both how they take turns in conversation and the various strategies they employ to achieve institutional objectives (Heritage & Clayman, 2010).

The examination of CIC through the lens of CA has exerted influence in various educational and teacher development contexts. This influence encompasses aspects such as teachers' practices related to limited wait times and opportunities for student participation (Yaqubi & Rokni, 2012), the shaping of student contributions (Can Daşkın, 2015; Cancino, 2017; Moradian, Miri & Qassemi, 2015), the comprehension of CIC through multimodal CA within content and language integrated learning settings (Escobar Urmeneta & Walsh, 2017), and the cultivation of CIC through teacher development workshops (Perkins, 2018). These investigations collectively suggest that by scrutinizing the dynamics of CIC within classroom interactions and deriving insights from these observations, we can gain a nuanced understanding of our specific educational context. This understanding extends to how the interactive and linguistic tools employed by both teachers and students shape and sustain the flow of classroom discourse, ultimately enhancing effective classroom communication. Consequently, as teachers and learners refine their CIC, they create more extensive learning opportunities and fortify the learning experiences that occur.

CA offers several advantages as a methodology for examining interactions in L2 classrooms, making it particularly suitable for the aims of this study. One key reason is its emphasis on actions rather than isolated functions, providing a more comprehensive and detailed account of the data. Unlike top-down methodologies, CA offers a deeper level of insight into the data and relies on evidence-based analysis, focusing solely on what can be observed and proven in the data. CA also promotes an open-minded approach by avoiding pre-defined categories and assumptions. Furthermore, CA's strength lies in its examination of natural conversation as data, which ensures that researchers studying authentic language use rather than contrived or artificial communication (Atar & Seedhouse, 2018). Therefore, in the current study, scaffolding strategies teacher employed as a component of classroom interactional competence was investigated from a conversation-analytic perspective.

Purpose of the study

Based on the information presented in the literature, it is obvious that classroom interaction is a key factor in promoting learning for the students who learn a second language. In this process, teachers have responsibilities,

and they are expected to help the students by creating an environment in which the interaction between the students will be high. Scaffolding is one of the techniques emphasized in the literature that could be used in the classes to help learners learn better. Although CA is a powerful tool in examining CIC, the amount of CA work is still quite limited in the EFL context. Accordingly, the aim of this study is to investigate the CIC in an EFL online class from the perspective of CA. The lack of studies investigating specifically scaffolding strategies used by teachers in online EFL classes in terms of CIC makes this study unique. Therefore, as a reflective practice, the following questions were addressed:

1- Which modes are applied in an online EFL class?

2-What are the scaffolding strategies utilized by the teacher in an online EFL class?

METHOD

The present study is a reflective practice with a qualitative research design. As a research approach, CA was adopted. CA centers on elucidating spoken communication, with a particular emphasis on dissecting how speakers structure their dialogue sequentially and how they collectively navigate their conversation (Seedhouse, 2004). Additionally, CA delves into how language serves as a tool for social interaction (Sacks, Schegloff & Jefferson, 1974), exploring its relationship with meaning and context. The dynamic creation of the social context is expressed and revealed through the sequential organization of interactions.

CA analysis relies on naturally occurring data that has been recorded and transcribed, specifically, real instances of conversation. Therefore, CA data is not derived from interviews, observations, or experimental interventions, as these methods involve manipulation, selection, or reconstruction by an analyst or informant, often based on preconceived notions of what is noteworthy or possible (Heritage & Atkinson, 1984). CA discourages analysts from interpreting participants' intentions or psychological states (Mori & Zuengler, 2008), and it avoids pre-emptively linking observed behaviors to broader sociological categories like age, gender, personal history, ethnicity, or native/nonnative status, unless such categories are explicitly demonstrated as relevant. Instead, CA promotes the examination of tangible elements within participants' speech, including linguistic characteristics and intonation patterns. Through these linguistic features, which shape how participants construct their conversational contributions and structure their involvement, analysts can potentially infer the participants' comprehension of the preceding dialogue.

Participants and Setting

The study was conducted in an online EFL class at a public university in Türkiye. The class lasted 90 minutes. The participants were twelve L2 English preparatory class students at A2 level. In determining the participant, convenience sampling method was employed. The convenience sampling method involves including individuals from the target population who are conveniently situated around the location (Edgar & Manz, 2017). Therefore, in selecting the participants, the students enrolled in the same class and taught by one of the researchers were selected. The majority of the students were Turkish and one of them was Somalian. The age of the participant ranged between 18 and 20. Of them, 7 were male and 5 were female. They had been learning English as a foreign language in the preparatory school to be able to study for their degrees at the undergraduate level. The teacher had a teaching experience of twelve years, and she was Turkish, too. The strategy was implemented during the Fall semester of 2020/2021 academic year.

In the application process, the Microsoft Teams educational platform was preferred, and the lesson was conducted synchronously through the Microsoft Teams platform. The teacher and students accessed the platform using their

institutional email addresses. On this platform, the researcher created a code for the team, and shared it with the students. So, they joined the team by using this code. In this way, all students were successfully added to the team. This platform allows content sharing with students, enables students to write texts using the chat section, grants control rights to students, allowing them to share and manage content, and provides the opportunity for binary group work through created chat rooms (breakout rooms).

Data Collection and Analysis

The aim of this study was to understand how scaffolding was achieved in interaction. Consequently, the nature of this study requires a qualitative and in-depth analysis of the L2 classroom data. The study was carried out across an online class, necessitating the collection of data via video recordings of the instructional sessions. Subsequently, the selected excerpts from these recordings underwent meticulous analysis employing CA techniques, with the data being coded following the transcription conventions outlined by Have (2007, p. 68). In accordance with the recommendations outlined by Ten Have (2007, p. 68), this study adhered to a fundamental procedure comprising four key stages: (1) recording authentic interactions; (2) transcribing the recordings, wholly or partially; (3) analyzing selected extracts and (4) presenting the research findings.

As a result, in the study researcher used video recording to capture the classroom interaction for teacher-student interaction. By adopting the CA approach, a ninety-minute online English class was critically examined within the scope of Walsh's (2006) self-evaluation of teacher talk (SETT) framework and concept of classroom interactional competence (CIC). Within this context, the video recording of the online class was watched carefully. Then the recording was transcribed. To avoid any missing points, the transcription was checked by watching the video recording again. Among the transcription, two extracts were selected. These extracts were analyzed by CA approach.

FINDINGS

Based on the analysis of classroom interaction, the dominant modes throughout the class were found to be the skills and systems mode and the materials mode, respectively. The class began with a managerial mode and there was a switch to this mode when the teacher introduced a new topic. Sometimes a "mode side sequence", as Walsh (2011) calls it, emerged. The objectives of the skills and systems mode in this class were to practice previously learned grammatical structures - Simple Present Tense vs. Present Continuous Tense - as well as to teach and practice a new grammar topic on object pronouns. The materials mode mainly revolved around a reading text from the textbook complemented with some vocabulary and speaking activities. Classroom context mode was rarely employed in this class partly due to the pedagogical goals of the class, and partly due to the absence of physical interaction within a classroom. There was a mode side sequence following "materials-classroom context-materials" mode pattern where the classroom context was derived from a pre-reading activity.

Scaffolding Strategies Used by the Teacher

To understand the scaffolding strategies used by the teacher in online EFL classes, video recordings of the classes were examined in detail. According to the findings, the teacher was found to apply restating, reformulation, inviting participation from students, providing explanation, modelling, extension, further explaining students' understanding and checking scaffolding strategies.

Two sample extracts are provided below.

Extract 1

1	T:	ok so (.) for this one for example what should you err look for ↑ (2) the time
2		expression <u>at the moment</u> so (2) if we have this time phrase↑ (2) which tense
3		is it↓ (.) Is it present simple↑ or present continuous tense↓
4	L1	present continuous
5	L2	[present continuous]
6	T	it's present continuous tense (.) <yes> it refers to <u>now</u> (1) so (1) with the
7		present continuous tense err we don't (1) use you know the auxiliary verb (.)
8		do or does (.) right↑ we should use (2) to be plus verb -ing (.) but (.)
9		which form of <u>BE</u> (.) do we use with I (5) am↑ is↑ or are↓
10	L3	am
11	L2	am↑
12	T	it's <u>am</u> (.) yes ok (1) and verb -ing doing <u>I</u> am doing my homework <u>at</u> the
13		moment this is the correct option

As can be seen in the extract, T scaffolds learners' contributions by restating (lines 6 and 12) the learners' responses and extending on the explanation. Since this was a part of a skills and systems mode and the goal was to achieve accuracy, there was no extended learner turn. The same pattern was observed in several other extracts in the skills and systems mode. There are other instances where the teacher shapes learners' contributions through scaffolding. In the following extract that took place in the materials mode, students were asked referential questions as a pre-reading activity. Students responded to the question "What do you like spending money on?"

Extract 2

1	L1	I like (.) to spend money on technologic (misp. Technological) things because 2 I
		layv(misp.love) them
3	T	yeah ok so (1) you are interested in technology (.) and that's why you like
4		spending money on technological items↑ that's nice (4) how about the others
5		(1) what do you like spending money on do you like spending money <on> clothing 6
		for example (…) accessories↑ <on> makeup↑
7	L2	[(…..utterance not clear)]
8	T	yes elifnur↑
9	L2	I like spending money on books
10	T	BOOKS (0.2) yes (1) why↑
11	L2	(4) I love reading (.) I love reading books
12	T	yes (.) ok (.) very good so (1) you love reading books (1) that's why (1) you
13		like spending money on them↓ (3) any other opinions↑ any other ideas↑ (10) 14
		no↑ (1) ok

In line 3, the teacher shapes the learner's response through reformulation. L1 mispronounced 2 words, but since this activity was seen as a chance to work on fluency with a shift to classroom context mode, T ignored the errors and rephrased L1's response to make sure other learners could follow. The teacher then asked for the others' opinions. In line 10, T asked L2 for clarification to encourage her to speak further. It seems to work since L2 shared her reason for spending money on books. In line 12, T made use of the reformulation technique again, rephrasing what L2 had said in the previous line. Throughout the lesson, the teacher also provided other techniques such as modelling and extension to scaffold learners and promote interaction within the classroom.

DISCUSSION

The study identified two dominant modes of interaction in the online EFL class. These dominant modes were the "skills and systems mode" and the "materials mode." Skills and Systems Mode likely refers to interactions centered around the development of language skills (e.g., speaking, listening, writing) and the teaching of language systems (e.g., grammar, vocabulary). In an EFL context, this mode may involve exercises, drills, or discussions aimed at improving language proficiency. The dominance of skills and systems mode and materials mode suggests that the class might have focused heavily on language acquisition through structured exercises and resources. This could reflect a particular teaching approach or the preferences of the instructor. The materials mode suggests that the class heavily relied on instructional materials such as textbooks, worksheets, or online resources. This mode often involves teachers and students working through structured content, which can include exercises, readings, or multimedia resources: In contrast to the dominance of the skills and systems mode and materials mode, the "classroom context mode" was rarely employed in this online EFL class. This mode typically involves discussions and interactions related to the broader classroom environment, teaching methods, student-teacher relationships, or classroom management. It may encompass interactions that facilitate a positive classroom atmosphere and effective learning. The limited use of classroom context mode may indicate less emphasis on fostering a classroom community or addressing non-linguistic aspects of learning. Exploring ways to incorporate more classroom context discussions could enhance student engagement and a sense of belonging in the online class. The study might prompt a review of the course design to ensure a balanced approach that not only covers language skills and materials but also considers the broader classroom context and its impact on learning. In summary, this finding highlights the predominant modes of interaction in an online EFL class and suggests areas for potential improvement or adjustment in the instructional approach to create a more comprehensive and engaging learning experience. In the study conducted by Suryati (2015), a combination of managerial, materials, and system and skills modes were found to be a common practice. Similarly, the classroom context mode was found to be very limited. This finding is in line with the results of Howard's (2010) research, which indicates that teachers do not fully engage in the utilization of the classroom context mode. The infrequent use of the classroom context mode could imply that teachers may lack the knowledge of effectively organizing lessons and controlling classroom discussions through the application of suitable interaction tactics.

According to the findings, the teacher was found to apply restating, reformulation, inviting participation from students, providing explanation, modelling, extension, further explaining students' understanding and checking scaffolding strategies. The use of these diverse strategies reflects a thoughtful and adaptable teaching approach that considers students' needs and learning processes. This finding underscores the importance of employing a repertoire of teaching strategies to cater to the diverse learning styles and needs of students. It also highlights the teacher's dedication to facilitating a dynamic and engaging learning environment. Further research could explore the specific impacts of these strategies on student learning outcomes and their effectiveness in different educational contexts. Suryati (2015) obtained the finding that strategies including scaffolding, content-focused feedback, clarification requests, referential questions and extended students' turn rarely occurred. Supakorn (2020) found that teachers used reformulations, paraphrasing, minimally repairing learners' input in the form of recasts or embedded corrections and extending learner's input as scaffolding strategies to shape (accept and

improve) learner contribution. Zarandi and Rahbar (2016) discovered that the utilization of scaffolding methods proved effective in enhancing the speaking skills of English as a Foreign Language (EFL) students. Khatib and Chalak (2022) concentrated on the efficacy of four distinct scaffolding strategies in enhancing the grammar knowledge of Iranian EFL students. Their findings indicated that the group exposed to scaffolding interventions outperformed the control group, underscoring the effectiveness of scaffolding in bolstering grammar proficiency. Naibaho (2019) investigated the influence of scaffolding on learners' speaking achievements, highlighting its efficacy. Piamsai (2020) provided evidence of the effectiveness of scaffolding in elevating writing skills, with a particular emphasis on its impact on the academic writing abilities of less proficient students. Shirmhammadi and Salehi (2017) explored the effects of scaffolding on reading comprehension among English for Specific Purposes (ESP) students, finding scaffolding to be notably more effective in this context. Similarly, Birjandi and Jazebi (2014) examined the diverse scaffolding techniques employed by EFL instructors. They identified a total of 55 strategies serving various functions, categorizing them into linguistic, cognitive, social, cultural, metacognitive, and affective categories. Furthermore, other studies have ventured into exploring the impact of scaffolding strategies on all four language skills: reading (Ghaffarsamar & Dehghan, 2013; Rahimi & Ghanbari, 2011; Bhooth et al., 2014), speaking (Abdul-Majeed & Muhammad, 2015; Ezza, 2013), writing (Veerappan, Suan & Sulaiman, 2011; Zarandi & Rahbar, 2014; Chairinkam & Yawiloeng, 2021), and listening (Ahmadi Safa & Rozati, 2016). These investigations collectively highlight the significant benefits of scaffolding in enhancing language learning across various language skills. In conclusion, the concept of scaffolding in language learning represents a crucial means of support, facilitating the progression of learners to higher levels of proficiency. Finally, studies exploring the influence of scaffolding on all four language skills—reading, speaking, writing, and listening—collectively underscore the substantial advantages it brings to language learning across diverse contexts.

CONCLUSION & SUGGESTIONS

The aim of this reflective practice was to find out how and to what extent the teacher employed scaffolding as a component of classroom interactional competence in an online EFL class. The teacher in this study was found to employ a range of effective teaching strategies. These strategies encompassed various dimensions of teaching, from reinforcing key points through restating to fostering active student participation and providing additional explanations where needed. Furthermore, the teacher demonstrated a commitment to extending students' learning experiences beyond the core curriculum. The class observation reveals that the teacher uses scaffolding techniques, such as extending learners' responses, rephrasing what learners say, asking follow-up questions and repeating the short responses. These techniques helped to promote interaction in the class up to a point. The responses were short, and the interaction was limited in the skills and systems mode, which is in line with Walsh's suggestion that each mode has its unique features. Students could give full responses later in the classroom context mode. However, the interaction could be expanded at most for four lines with each learner. In order to promote longer interaction, the teacher-researcher can develop new techniques, advise a critical friend, and ask for students' reflections. Overall, it can be said that the amount of scaffolding employed in the class is more than satisfactory given the fact that this is an online class.

However, in some instances, learners did not contribute further. One reason for this can be due to lack of face-to-face interaction. Students sometimes lose their attention on a computer. Another reason might be related to the topic. In the skills and systems and the materials mode, the topics are limited, so it can be hard for students to build on them. One other reason could be that the teacher's scaffolding techniques were insufficient or ineffective. Therefore, it can be said that in the implementation stage of this study, the teacher-research should try new ways of shaping learners' contributions. Yet, given the fact that this was an online class, the learners' contributions were satisfactory.

In conclusion, while this study centers on the observation of CIC within the specific setting of EFL classrooms at a particular university, it is anticipated that the results will hold relevance for diverse contexts where second

language (L2) instruction occurs. Furthermore, this research might present an alternative perspective centered on classroom interaction, potentially contributing to enhancements in ELT practices in Türkiye.

LIMITATIONS

Since the class was conducted online, the interactions were sometimes hindered due to technical problems. Moreover, the interactions among learners in pair-work and group-work activities could not be recorded since breakout rooms were used for this purpose and they were not recorded, separately. Additionally, consistent with the inherent characteristics of CA, this research cannot present the entirety of the collected data. Consequently, the data necessitates selective analysis and presentation to highlight specific areas of interest. Given the study's concentration on a single teacher, it is conceivable that her language usage and interactional attributes could be unique or individualistic.

Declarations on Ethical Standards

Financial support There is not received any financial support to conduct this research and/or publication of the article.

Conflicts of interest There is no conflict of interest regarding the publication of this article.

Ethical Approval At the beginning of the research, the participants were informed about the purpose of the research. The scale was filled by pre-service teachers who volunteered to participate in the research. Scientific and ethical principles were complied with during the data collection, analysis, and reporting of the article.

References

Abdul-Majeed, M. A. & Muhammad, N. M. (2015). The effect of using scaffolding strategies on EFL students' reading comprehension achievement. *Arts Journal, 3*(1), 91-118. https://www.iasj.net/iasj/download/187f44bbb68fbb00

Ahmadi Safa, M., & Rozati, F. (2017). The impact of scaffolding and nonscaffolding strategies on the EFL learners' listening comprehension development. *The Journal of Educational Research, 110*(5), 447-456. https://doi.org/10.1080/00220671.2015.1118004

Allami, H., Mozaffari, F., & Manzouri, H. A. (2022). Reflections on conversation analytic research in ELT. *Research in English Language Pedagogy, 10*(3), 369-388. https://doi.org/10.30486/relp.2022.1961317.1385

Ardiningtyas, S. Y., Butarbutar, R., Weda, S., & Nur, S. (2023). Online scaffolding behavior for speaking EFL improvement: narrative inquiry issues. *Interactive Learning Environments*, 1-11. https://doi.org/10.1080/10494820.2023.2207608

Atar, C., & Seedhouse, P. (2018). A Conversation-analytic perspective on the organization of teacher-led clarification and its implications for L2 teacher training. *International Journal of Instruction, 11*(2), 145-166. https://doi.org/10.12973/iji.2018.11211a

Bhooth, A., Azman, H., & Ismail, K. (2014). The role of the L1 as a scaffolding tool in the EFL reading classroom. *Procedia-Social and Behavioral Sciences*, 118, 76-84. https://doi.org/10.1016/j.sbspro.2014.02.011

Birjandi, P., & Jazebi, S. (2014). A comparative analysis of teachers' scaffolding practices. *International Journal of Language and Linguistics, 2*(3), 154-164. http://www.sciencepublishinggoroup.com/j/ijll

Brown, H. D. (2000). *Principles of language teaching and learning* (The 4th Edition). White Plains, New York: Longman.

Cancino, M. (2017). Shaping learner contributions in the EFL language classroom: A conversation analytic perspective. *Lenguas Modernas, 49*, 53-76. https://repositorio.unab.cl/xmlui/handle/ria/11013

Can Daşkın, N. (2015). Shaping learner contributions in an EFL classroom: Implication for L2 classroom interactional competence. *Classroom Discourse, 6*(1), 33-56. https://doi.org/10.1080/19463014.2014.911699

Chairinkam, J., & Yawiloeng, R. (2021). Peer scaffolding behaviors in English as a foreign language writing classroom. *Asian Journal of Education and Training, 7(*4), 226-234. 10.20448/journal.522.2021.74.226.234

Ellis, R. 2000. Task-based research and language pedagogy, *Language Teaching Research*, 49,193–220. https://doi.org/10.1177/13621688000040030

Escobar Urmeneta, C. & Walsh, S. (2017). Classroom interactional competence in content and language integrated learning. In A. Llinares, & T. Morton (Eds.), *Applied Linguistics Perspectives on CLIL* (pp. 189-206). Amsterdam, Holland: John Benjamins.

Ezza, E. Y. (2013). Scaffolding pronunciation in Saudi EFL classroom at Majma'ah University. *International Journal of Applied Linguistics & English Literature. 2*(3), 62-68. 10.7575/aiac.ijalel.v.2n.3p.62

Ghaffarsamar, R. & Dehghan, M. (2013). Sociocultural theory and reading comprehension: The scaffolding of readers in an EFL context. *International Journal of Research Studies in Language Learning. 2*(3), 67 – 80. 10.5861/ijrsll.2012.183

Heritage, J. & Clayman, S. E. (2010). *Talk in Action: Interactions, Identities and Institutions*. Wiley-Blackwell.

Hutchby, I., & Wooffitt, R. (2008). *Conversation analysis*. Polity Press.

Khatib, F., & Chalak, A. (2022). Utilizing scaffolding strategies to improve Iranian intermediate EFL students' grammatical knowledge. *Journal of Foreign Language Teaching and Translation Studies, 7*(1), 61-80. 10.22034/EFL.2022.326326.1144

Kramsch, C. J. (1986). From language proficiency to interactional competence. *The Modern Language Journal, 70*(4), 366-372. https://doi.org/10.2307/326815

Mackey, A. (1999). Input, interaction and second language development: An empirical study of question. *Studies in Second Language Acquisition, 21*(4), 557-587. https://doi.org/10.1017/S0272263199004027

Moradian, R. M., Miri, M., & Qassemi, Z. (2015). Dynamic assessment and microgenetic development of EFL teachers' classroom interactional competence. *Teaching English Language, 9*(2),1-36. 10.22132/TEL.2015.53621

Mori, J., & Zuengler, J. (2008). *Conversation analysis and talk-in-interaction in classrooms*. Encyclopedia of language and education, 3, 15-26.

Naibaho, L. (2019). The effectiveness of scaffolding method on students' speaking achievement. International Journal of Research-Granthaalayah, 7(5), 193-201. http://repository.uki.ac.id/807/

Perkins, L. (2018). *Developing classroom interactional competence through a teacher development workshop* (Unpublished Master's Thesis). King's College London, London.

Piamsai, C. (2020). The effect of scaffolding on non-proficient EFL learners' performance in an academic writing class. *LEARN Journal: Language Education and Acquisition Research Network, 13*(2), 288-305. https://so04.tci-thaijo.org/index.php/LEARN/article/view/243714

Rahimi, A. & Ghanbari, N. (2011). The impact of teachers' scaffolding on Iranian high school students' reading comprehension. *Procedia-Social and Behavioral Sciences 28*(2011) 1072-1075. https://doi.org/10.1016/j.sbspro.2011.11.193

Sacks, H., Schegloff, E., & Jefferson, G. (1974). A simplest systematics for the organization of turn-taking for conversation. *Language, 50*(4), 696–735. https://doi.org/10.1016/B978-0-12-623550-0.50008-2

Seedhouse, P. (1996). Communicative CALL: Focus on the Interaction Produced by CALL Software. On-Call, 10(3), 10-17. https://www.learntechlib.org/p/81928/.

Shirmohammadi, M., & Salehi, M. (2017). Comparative effect of scaffolding instruction and self-regulated learning on ESP learners' reading comprehension. Studies, 5(4), 203-213.

Soraya, M. (2017, October). Classroom Interactional Competence of English Classes in Higher Education. In *International Conference on Teacher Training and Education 2017* (ICTTE 2017). Atlantis Press.

Supakorn, S. (2020). A Conversation Analytic Study of Classroom Interactional Competence. *LEARN Journal: Language Education and Acquisition Research Network, 13*(2), 15-40. https://files.eric.ed.gov/fulltext/EJ1258546.pdf

Suryati, N. (2015). Classroom interaction strategies employed by English teachers at lower secondary schools. *TEFLIN Journal, 26* (2), 247–264. 10.15639/teflinjournal.v26i2/247-264

Ten Have, P. (2007). *Doing conversation analysis*. Sage.

Wagner, E. D. (1994). In support of a functional definition of interaction. *The American Journal of Distance Education, 8*(2), 6-29. https://doi.org/10.1080/08923649409526852

Walsh, S., 2006. *Investigating classroom discourse*. London: Routledge .

Walsh, S. 2011. *Exploring classroom discourse: Language in action*. Abingdon: Routledge.

Walsh, S. (2013). *Classroom discourse and teacher development*. Edinburgh University Press.

Veerappan, V. A. L., Suan, W. H. & Sulaiman, T. (2011). The effect of scaffolding technique in journal writing among the second language learners. *Journal of Language Teaching and Research, 2*(4), 934-940. 10.4304/jltr.2.4.934-940

Yaqubi, B., & Rokni, M. P. (2012). Teachers' limited wait-time practice and learners' participation opportunities in EFL classroom interaction. *Journal of English Language Teaching and Learning*, 10, 127-160. https://elt.tabrizu.ac.ir/article_610_0.html

Young, R. F. (2008). *Language and interaction*. London and New York: Routledge.

Zarandi, S. Z. A., & Rahbar, B. (2016). Enhancing speaking ability through intervening scaffolding strategies. Theory and Practice in Language Studies, 6(11), 2191. http://dx.doi.org/10.17507/tpls.0611.17

APPENDICES

APPENDIX-A

Framework of Interactional Features in L2 Classroom Modes

Mode	Pedagogic Goals	Interactional features
Managerial	a. To transmit information b. To organize the physical learning environment c. To refer learners to the material d. To introduce or conclude an activity e. To change from one mode of learning to another	A single extended teacher turn which uses explanation and/or instruction The use of transitional markers The use of confirmation checks An absence of learner contribution
Materials	a. To provide language practice around a piece of material b. To elicit responses in relation to the material c. To check and display answers d. To clarify when necessary e. To evaluate contribution	Predominance of IRF pattern Extensive use of display question Form-focused feedback Corrective repair Scaffolding
Skills and systems	a. To enable learners to produce correct forms b. To enable learners to manipulate the target language c. To provide corrective feedback d. To provide learners with practice in sub-skills	The use of direct repair scaffolding extended teacher turns display questions teacher echo clarification request form-focused feedback
Classroom Context	a. To enable learners to express themselves clearly b. To establish a context c. To promote oral fluency	Extended learner turns Short teacher turn Minimal repair Content feedback Referential question Scaffolding Clarification request

APPENDIX-B

Symbol	Name	Use
[text]	Brackets	Indicates the start and end points of overlapping speech.
=	Equal Sign	Indicates the break and subsequent continuation of a single interrupted utterance.
(# of seconds)	Timed Pause	A number in parentheses indicates the time, in seconds, of a pause in speech.
(.)	Micropause	A brief pause, usually less than 0.2 seconds.
. or ↓	Period or Down Arrow	Indicates falling pitch.
? or ↑	Question Mark or Up Arrow	Indicates rising pitch.
,	Comma	Indicates a temporary rise or fall in intonation.
-	Hyphen	Indicates an abrupt halt or interruption in utterance.
>text<	Greater than / Less than symbols	Indicates that the enclosed speech was delivered more rapidly than usual for the speaker.
<text>	Less than / Greater than symbols	Indicates that the enclosed speech was delivered more slowly than usual for the speaker.
°	Degree symbol	Indicates whisper or reduced volume speech.
ALL CAPS	Capitalized text	Indicates shouted or increased volume speech.
underline	Underlined text	Indicates the speaker is emphasizing or stressing the speech.
:::	Colon(s)	Indicates prolongation of an utterance.
(hhh)		Audible exhalation
? or (.hhh)	High Dot	Audible inhalation
(text)	Parentheses	Speech which is unclear or in doubt in the transcript.
((italic text))	Double Parentheses	Annotation of non-verbal activity.

Explicit vs. Implicit Grammar Teaching in EFL Classrooms: A Literature Review

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Abstract: *This study aims to explore the effectiveness of explicit and implicit grammar instruction in the context of teaching English as a foreign language (EFL). The primary objective of the study is to conduct an in-depth examination of the existing body of literature pertaining to explicit and implicit grammar teaching in EFL classrooms, providing valuable guidance to English language educators in their choice of the most suitable method for their students. In this manner, a multitude of articles and books have been examined, encompassing various aspects, including advantages, drawbacks, and other attributes associated with both explicit and implicit approaches to grammar instruction. The findings derived from this extensive review reveal that both explicit and implicit grammar teaching approaches yield positive outcomes, and each has its own efficiency, depending on various factors.*

Keywords: grammar teaching, explicit grammar, implicit grammar, EFL.

INTRODUCTION

In the process of acquiring a second language, grammar assumes a pivotal role and is recognized as a fundamental component in EFL classrooms. The difficulty of learning and improving grammatical proficiency has been firmly established, especially when comparing it to other aspects of language acquisition. Akakura (2009) underscores the assertion that attaining mastery of any grammatical structure cannot be accomplished arbitrarily. Therefore, the provision of effective scaffolding strategies becomes a critical matter, potentially making the difference between success and failure in grasping grammar. Nevertheless, learners frequently encounter difficulties in this endeavour. It is commonly held that grasping grammar is not a straightforward task. Despite the extensive research conducted on grammar, learners continue to face numerous challenges in their grasp of grammatical principles. These considerations lead us to the inquiry regarding the optimal methods, namely explicit and implicit grammar teaching, for instructing grammar to learners of English as a Foreign Language (EFL).

It has always been an issue and is still an ongoing puzzle that educators face in EFL classrooms: Should English grammar be taught explicitly or implicitly? A multitude of articles and books have investigated various aspects, including advantages, drawbacks, and numerous other attributes, associated with both explicit and implicit approaches to grammar instruction. Nevertheless, a consensus regarding the preferred approach to grammar instruction remains elusive. On one hand, proponents of traditional explicit grammar instruction coexist with non-interventionists who argue that language acquisition should ideally occur without explicit grammar instruction (Larsen-Freeman, 2009). On the other hand, there is still ambiguity surrounding which grammatical structures are most amenable to explicit instruction (Cook, 2016).

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This study aims to provide a comprehensive exploration of the two primary approaches to grammar instruction, namely explicit and implicit methods; in addition, to offer guidance to English language educators in the realm of English as a Foreign Language (EFL) for making informed choices regarding the most suitable instructional approach for their students. To accomplish these aims, the research entails an extensive review of diverse articles addressing these topics and their implications for learners. Accordingly, the investigation explores the discourse surrounding explicit and implicit grammar teaching to provide valuable insights for educators, helping them make informed teaching choices.

LITERATURE REVİEW

Role of Grammar in Language Teaching

Beginning with a clear definition of grammar is a valuable initial step in comprehending the teaching of grammar. According to Higgs (1985), grammar can be described as a system that transforms meaning into language. Crystal (2004) asserts that grammar serves as the fundamental structure enabling us to communicate effectively. Increased awareness of its mechanics empowers us to better assess the significance and efficiency of our language usage, enhancing precision, identifying ambiguity, and utilizing the full expressive potential of the English language. This understanding benefits not only English instructors but educators in any field, as teaching fundamentally involves comprehending and conveying meaning.

The timing and extent to which grammar should be taught to language learners have continuously been subjects of debate. According to Ellis (2006), grammar teaching encompasses various teaching methods that direct learners' focus toward particular grammatical structures, enabling them to either comprehend these structures in a conscious, analytical manner or employ them in their understanding and production of language, ultimately internalizing the knowledge. Rutherford and Sharwood (1988) suggest that grammar instruction has frequently been closely linked with teaching foreign languages, underscoring the significance of grammar in the process of language acquisition. Celce-Murcia (1991) contends that grammar went through phases of being highly significant in language teaching, followed by a period of reduced emphasis, and eventually regained a position of increased importance over the last twenty-five years.

Nassaji and Fotos (2004) put forth four compelling reasons underscoring the indispensable role of grammar in language instruction. Firstly, it is argued that learners must actively identify and recognize the target grammatical forms in the language input, as this is crucial for acquisition; otherwise, input is processed purely for comprehension, neglecting the specific linguistic forms that need to be internalized. Another reason is that empirical evidence from morpheme studies suggests that language learners progress through identifiable developmental stages. Research that compares individuals who receive formal instruction and those who learn a language in natural settings consistently (e.g. Ellis, 1994; Pica, 1983) shows a parallel order of acquiring grammatical morphemes. As third reason, it is indicated that instructional methods that prioritize communication exclusively, without considering grammar, are insufficient. Several research (Harley & Swain, 1984; Lapkin, Hart, & Swain, 1991) underscore the necessity of some focus on grammatical forms for achieving high levels of accuracy in the target language, indicating that purely communicative language teaching is insufficient. Ending with the last reason, the clear positive effects of grammar instruction in the second language classroom are well-established. This conclusion is rooted in an extensive body of evidence, encompassing a multitude of laboratory and classroom-based studies, as well as comprehensive reviews of instructional impact assessments spanning the past four decades (R. Ellis, 1985, 1994, 2001b, 2002; long-Freeman & Long, 2014; Long, 1983, 1988, 1991).

The significance and role of grammar in second language teaching cannot be overstated. Grammar serves as the crucial foundation upon which effective communication is constructed, providing the essential structure that allows individuals to organize their words and ideas, ensuring the clear and meaningful conveyance of messages.

Beyond being a mere set of rules, grammar constitutes the core component of a language, influencing various language skills, including reading, writing, speaking, and vocabulary. Furthermore, it plays a vital role in shaping other linguistic aspects, such as meaning and function (Abune, 2019). As proposed by Cook (2016), grammar acts as the computational system that bridges the gap between sound and meaning, a seemingly straightforward yet indispensable concept for effective communication. Batstone (1994) underscores that the absence of grammar would hinder our ability to navigate the intricate landscape of language since it provides the rules governing the construction of meaningful language units. Consequently, in the process of acquiring a second language, the teaching of grammar takes on paramount importance, especially when natural acquisition methods are limited. It serves as the key to unlocking proficiency in a foreign language and promoting successful communication.

In conclusion, the role of grammar in language teaching and second language acquisition is undeniably significant. It serves as the foundational structure upon which linguistic competence is built, empowering individuals to convey their thoughts and ideas clearly and meaningfully. The ongoing debate about the timing and extent of grammar instruction, as well as the varying methods employed, underscores its continued significance. The comprehensive body of evidence presented by researchers further solidifies the positive impact of grammar instruction on language learners. Grammar is the cornerstone of language, guiding the path toward achieving linguistic competence in second language instruction and promoting effective communication in a foreign language. It serves as a foundational element in both spoken and written communication, with its mastery being essential for effective language use. However, the challenge of learning and enhancing grammatical proficiency, especially when compared to other aspects of language acquisition, is well-established. Traditional grammar-teaching methods have often proven inadequate, and learners continue to face difficulties in grasping grammatical principles. To address these challenges, this study aims to investigate whether explicit or implicit grammar instruction is more effective in facilitating second language acquisition. By delving into implicit and explicit knowledge in EFL classrooms, we can gain a better understanding of which type of formal instruction is most beneficial for learners to achieve grammatical proficiency in second language acquisition.

Explicit and Implicit Knowledge

A significant differentiation revolves around the kind of knowledge acquired through grammar instruction. Implicit knowledge refers to an intuitive and abstract understanding of language (De Graaff & Housen 2009), which is learned subconsciously through real communication. It is the key to using language fluently and accurately in spontaneous situations, without the need for conscious formulation of language output. Implicit knowledge can be associated with procedural memory, responsible for skills like speaking a language (Cook 2016). It's important to note that implicit knowledge and procedural knowledge are not synonymous (DeKeyser 2009). On the other hand, according to Ellis (2008), explicit knowledge is characterized as being conscious, declarative, irregular, and inconsistent when compared to implicit knowledge. Explicit knowledge enables the learner to analyse, make generalizations, and apply reasoning when dealing with various grammatical structures (De Graff & Housen 2009). Consequently, both implicit and explicit knowledge collectively contribute to predicting overall language proficiency. However, the impact on general proficiency can vary depending on whether different grammar structures are acquired as implicit or explicit knowledge (Ellis 2006).

The connection between explicit grammatical knowledge and implicit grammatical knowledge and how they impact the development of second language knowledge has drawn significant attention from researchers in the field of second language acquisition. As noted by Ellis (2006), and Nassaji and Foto (2011), explicit knowledge is gained through deliberate, controlled processes that occur within the declarative memory, while implicit knowledge is acquired through processes that are less conscious or even subconscious. According to Ellis (2008), instruction is considered implicit when its aim is to facilitate learners in deducing rules without their conscious awareness. Consequently, implicit teaching is characterized by not explicitly presenting or instructing rules, with the expectation that learners will analyse the input to determine if it can be formulated into a rule (De Graaff &

Housen, 2009; Hulstijn, 2005). Table 1 illustrates the significant differences between explicit and implicit language instruction.

Table 1. *Key Characteristics of Implicit and Explicit Knowledge (Ellis, 2008, as cited in Aydin, Rahmanpanah, & Mohseni, 2023)*

Characteristics	Implicit knowledge	Explicit knowledge
Awareness	The learner is intuitively aware of linguistic norms.	The learner is consciously aware of linguistic norms.
Type of knowledge	The learner has procedural knowledge of rules and fragments.	The learner has declarative knowledge of grammatical rules and fragments.
Systematicity	Knowledge is variable but systematic.	Knowledge is often anomalous and inconsistent.
Accessibility	Knowledge is accessible using automatic processing.	Knowledge is accessible only through controlled processing.
Use of L2 knowledge	Knowledge is typically accessed when the learner is performing fluently.	Knowledge is typically accessed when a learner experiences a planning difficulty.
Self-report	Non-verbalizable.	Verbalizable.
Learnability	Potentially only learnable within the critical period.	Learnable at any age.

As seen in the table below, implicit and explicit knowledge in language teaching exhibit significant differences in several key aspects. Implicit knowledge is characterized by learners' intuitive awareness of linguistic norms, often acquired without conscious reflection. It involves procedural knowledge of language rules and fragments and maintains a degree of systematicity. Implicit knowledge is accessible effortlessly through automatic processing and is typically used when learners employ the language fluently and spontaneously. However, it is challenging for learners to verbalize or describe their implicit knowledge, and it may primarily be acquired within the critical period of language development. In contrast, explicit knowledge involves the conscious recognition of linguistic norms, resulting in declarative knowledge of grammatical rules and fragments, which often display anomalies and inconsistencies. Access to explicit knowledge requires controlled, conscious processing and is typically employed when learners encounter planning or articulation difficulties. Explicit knowledge is more easily verbalized and learned at any age, making it accessible for self-reflection and analysis.

To conclude, explicit and implicit knowledge each possess distinctive characteristics that can be effectively incorporated into the teaching of grammar in EFL classrooms. Some results of many research indicate benefits in employing explicit techniques in language teaching. The utilization of explicit methods in the context of foreign language classrooms seems to yield better results (Ellis, 2008; Spada & Tomita, 2010). Nevertheless, a definitive preference between the two approaches remains undetermined, and there is no conclusive verdict on which one should be favoured over the other. Therefore, we need to explore explicit and implicit grammar teaching in detail.

Explicit and Implicit Grammar Teaching

One of the main elements of a language has always been grammar. All languages have their own grammar rules and structures. Sheen (2002) asserts that the endeavour to formulate the most effective approach for instructing grammar poses a significant challenge. According to Akakura (2009) each grammar structure cannot be acquired with the same method. For this reason, to determine the most effective approach to teaching grammar, extensive research and various methodologies have been employed. Among these, explicit and implicit grammar instruction stand out as two widely acknowledged yet contentious methods. Consequently, the ongoing debate in English as a Foreign Language (EFL) classroom revolves around whether grammar instruction should be carried out implicitly or explicitly. Hammerly (1975) points out that the usage of implicit and explicit approach in terms of grammar teaching is one of the most stimulating and questionable topics. Despite being very disputable, the two approaches are the major ones that most grammar teaching methods based on. Therefore, they are commonly used in EFL classrooms. Without a doubt, teachers' lesson plans yield varying outcomes depending on the chosen topic or instructional approach. Consequently, these disparities lead to the adoption of diverse teaching methods (Deng & Lin, 2016). In any case, it is reasonable to assert that these differences have a positive influence on students' comprehension of grammar.

Explicit grammar teaching has its roots dating back to 1967 when the concept of "explicit learning" was initially introduced through experiments involving finite state grammar (Ling, 2015). Despite being categorized as an older approach, explicit grammar instruction continues to hold significance and relevance in language education. According to Krashen (1982) this approach's main aim is that educators should explain the topic clearly and learners should find practice chance until the rule is fully understood. Explicit grammar teaching puts emphasis on learning grammatical rules on purpose to become more efficient and accurate in language use. Nunan (1994) expresses that explicit teaching method can happen only when students learn the rules deliberately and teachers should give specific information. There are some procedures of a grammar lesson that is taught explicitly. Erlam (2003) emphasizes the importance of beginning the lesson with a deductive explanation of the grammar pattern rules, considering this as the initial rule in explicit grammar teaching. On the other hand, there are three important steps during the acquisition of explicit grammar structures. Nazari (2013) defines these steps as encounter, process, and use. She explains that students should know and use these three steps to make the grammar structure a part of their interlanguage. According to Altun and Dinçer (2020), explicit grammar teaching has a lot of advantages for students' development not only in grammar but also in different aspect of language, such as writing and accuracy. Additionally, Bhatia (1997) and Widodo (2006) both advocate for the positive impacts of explicit grammar instruction on different aspect of language, contending that it plays a significant role in enhancing students' communication skills.

The traditional approach to language instruction centres on the teacher's emphasis on language structure by elucidating grammar rules and reinforcing them through repetitive exercises. In this method, grammar takes precedence over other facets of the language (Alenezi, 2019). Explicit grammar teaching involves the direct instruction of language rules, which is why it is the most well-known method for explicit learning. Nevertheless, in contemporary education, explicit grammar teaching goes beyond the confines of traditional grammar instruction, representing a broader concept distinct from conventional grammar learning methods (Pehlivan & Seckin, 2022).

Implicit teaching, on the other part, is also a preferred research subject for grammar teaching in EFL classrooms. Implicit grammar instruction is often regarded as the more dynamic of the two approaches. This teaching method prioritizes language fluency over accuracy and accomplishes this by actively involving learners in interactive activities. Implicit instruction promotes learner independence and fosters a natural environment for second language acquisition. Furthermore, it converts input into intake, mirroring the process seen in first language

acquisition (Birsen, 2012). Krashen (1981) explains the importance of implicit teaching by expressing that there is no need to acquire a language consciously because there are other ways to learn a language, not just one.

In grammar teaching, the implicit approach seeks to infer grammar rules subconsciously. Implicit grammar teaching depends on the idea that while learning grammar, students must be naturally acquired through situational scene (Ling, 2015). The focus is on the meaning instead of the grammar rules. In reading classes, particularly, text comprehension serves as a means for instructors to impart grammar rules indirectly. Within this process, offering feedback becomes an essential element for students to grasp the structures of the presented grammar patterns. Nevertheless, it is worth noting that mere exposure to the content can also be sufficient for learners to internalize these forms. On the other hand, implicit instruction also yields a positive impact on communication skills. Proficient and confident verbal expression serves as evidence of implicit language proficiency, contributing to enhanced fluency and self-assuredness in a learner's communication. Another beneficial outcome of implicit knowledge is its capacity to foster the student habit formation. Sik (2015) explains it by giving the reason that activities in implicit teaching are done until the structure usage becomes a self-acting performance. As indicated, implicit instruction undeniably contributes positively to students' skill development. According to Dekeyser (1995) student' metalinguistic awareness works out since they do not focus on a specific rule.

By juxtaposing explicit instruction and implicit instruction, their fundamental disparities can be discerned more distinctly. While implicit instructions are flexible and dynamic, explicit instructions are seen as technical, memorization, drilling and rule-governed (Alenezi, 2019). In implicit instructions learner are expected to be efficient in language fluency whereas the learners are expected to produce their own speech correctly in explicit instructions. According to Ling (2015) explicit grammar rules are necessary for learners to formulate correct output. Another attribute of explicit instruction pertains to the role of the instructor within the classroom setting. The instructor is the main source of information, and in the centre acts like a conductor who gives rules and directions. On the other hand, in implicit instruction the role of the instructor is transferred to the students. In the classroom where learners come to the forefront, the involvement and interactivity of the learners is necessary. As a result, implicit instruction educates them to become independent and autonomous learners. Like acquiring the first language (L1), input is converted into intake in implicit grammar instruction (Birsen, 2012). In addition to the distinction in the instructor's role, the manner in which the instructor presents himself or herself in the classroom varies significantly between explicit and implicit teaching. In explicit teaching, instructors typically take the lead and directly present information to students during lessons, whereas in implicit teaching, the presentation approach can differ (Erlam, 2003). The grammar rule is introduced by the instructor at the end of the lesson (Seliger, 1975) and students try to discover the rule (Robinson, 1996; Rosa & O'Neill, 1999) but the rules are never explained directly by the instructor (Shaffer, 1989). While the instructor draws attention to the rule as soon as possible in explicit instruction, the given task gets attention instead of the rule in implicit teaching (Hulstijn, 2005; Norris & Ortega, 2000). According to Alenezi (2019) both explicit and implicit teaching methods result in automatization, that's why, which method to implement in the classroom needs attentive consideration. Also, Cook (2016) explains that the main issue is to connect conscious understanding of a rule to the ability that can use it. In this context, explicit teaching method should be used on learners tend to learn consciously and have second language acquisition difficulty. In order to understand the grammar form of the language, maybe, strict rules can be seen as the key point for the learners. Larsen-Freeman (2003) explains that both in explicit and implicit grammar acquisition grammar should be accepted as a skill or dynamic process instead of a static area of knowledge.

The ongoing discussion regarding whether to incorporate explicit or implicit grammar teaching in the EFL classroom likely stems from the distinct characteristics and merits associated with each method. Consequently, some research endeavours to analyse the comparative aspects of these methods, while others focus on determining the superiority of one over the other. The debate over which method is more effective in teaching grammar has also

created some assertions on L1 and L2 acquisition differences. Some linguists assert that L1 acquisition is not gained from explicit rules, but through the experiences while using the language. On the other hand, some linguists claim that L2 acquisition is much different. Acquisition of L2 needs noticing and knowing the grammar rules by the learner. (Krashen, 1982; Long 1988; Schmidt 1990).

In summary, both approaches exhibit distinctions and unique advantages. When instructing grammar in an EFL classrooms, both explicit and implicit instruction can contribute to the effectiveness of English language teaching. Achieving this can be facilitated by employing appropriate methods tailored to the learners' needs and conducting research on instructional approaches.

Previous Studies about Explicit and Implicit Grammar Teaching

The efficacy of instructing based on the principles of both explicit and implicit instruction has long been a subject of debate spanning several decades (Aydin, Rahmanpanah, & Mohseni, 2023). In consequence, extensive research has been conducted to assess the effectiveness of grammar teaching instructions, particularly pertaining to explicit and implicit methods.

Akakura (2012) conducted a study examining the effectiveness of explicit grammar instruction on explicit and implicit knowledge among participants with L2 proficiency levels ranging from B2 to C1, as per the CEFR framework. The research primarily focused on English generic and non-generic articles. Findings from this study revealed that explicit grammar instruction had a positive impact on both implicit and explicit knowledge. However, explicit knowledge acquisition was more pronounced in the context of ungrammatical exemplars of the target structure, whereas implicit knowledge continues to improve even further at the delayed post-test, showing no signs of deterioration over time.

In a similar vein, Ebadi, Saad, and Abedalaziz (2014) conducted research that encompassed participants with L2 proficiency levels at the B1 range according to the CEFR framework. This study covered a broad spectrum of target structures for ESL learners, including modals, past tense -ed, present perfect, comparatives, and unreal conditionals. The investigation demonstrated that explicit instruction, coupled with explicit corrective feedback, significantly benefited both implicit and explicit knowledge.

One of the subjects under investigation is the distinction between fluency and accuracy in grammar, which has prompted researchers to reevaluate their approaches to grammar instruction. The study about the attitudes of teachers towards grammar instruction in the classroom, carried out by Sopin (2015), showed that grammar teaching and accuracy have a significant role in English language teaching. Sopin (2015) underlines that all of the respondents agreed on the importance of accuracy and grammar. According to the study, the rate of the respondents in favour of explicit teaching is %84. In addition, %64 agreed on the difficulty in learning for the students with implicit grammar instructions.

On the contrary, a study conducted by Soleimani, Jahangiri, and Gohar (2015) investigated how implicit and explicit grammar instructions affect the implicit knowledge of simple past tense in English. The results showed that both implicit and explicit groups got very similar results in the tests. According to Soleimani, Jahangiri, and Gohar (2015) in acquisition of implicit knowledge of L2, explicit grammar instructions have no superiority comparing to implicit instructions.

In a study conducted by Ling (2015) among English major students at the tertiary level, the effectiveness of explicit and implicit grammar teaching methods was investigated, with a focus on Chinese students. The study also explored the use of multimedia teaching and English newspapers in grammar instruction. Ling's findings revealed that explicit teaching resulted in students who could construct accurate grammar sentences but struggled with

basic English communication, whereas implicit teaching fostered more interactive students with greater proficiency and accuracy in output. Ling's conclusion suggests that either teaching approach can be chosen judiciously, emphasizing the absence of a substantial difference between the two methods. Furthermore, the study highlights that explicit and implicit grammar teaching are not entirely distinct approaches but rather complementary methods contingent upon various factors.

Another study by Naderi (2018) investigated the impact of explicit text-based and implicit emoticon/emoji-based feedback on EFL learners' grammar knowledge development. Three groups, including a control group, received English verb instruction, while two experimental groups used separate Telegram groups for feedback – one explicit and one implicit, with the control group receiving no feedback. Post-test results, supported by analysis, showed significant effects of both feedback types on grammar knowledge, with explicit text-based feedback performing better. Interviews with some participants revealed a preference for explicit text-based feedback.

Altun and Dinçer's (2020) research explores the effectiveness of implicit and explicit teaching approaches concerning grammar and writing skills. The study involved 40 intermediate-level Turkish students aged between 18 and 20. After an eight-week period, the explicit group achieved higher scores compared to the implicit group. While the progress of the implicit group during this period was commendable, the explicit group outperformed them, particularly in writing scores. This outcome was attributed to the positive impact of explicit grammar instruction on their writing skills, ultimately demonstrating the success of the explicit teaching method.

Michaud and Ammar (2023) examined the impact of explicit grammar instruction on implicit and explicit knowledge, focusing on the French subjunctive tense. Their study included participants with L2 proficiency levels spanning from B1 to B2, according to the CEFR categorization. Contrary to the sequence of instruction, whether explicit instruction occurred before, within, or after a task, their findings consistently indicated a positive effect on both types of knowledge. Explicit instruction, in the form of deductive Focus on FormS, was found to be effective in enhancing both explicit and implicit knowledge in their research.

A recent study by Nejadansari, Moeen, and Dabaghi (2023) aimed to explore the impact of implicit and explicit grammar teaching, facilitated through teacher scaffolding, on the enhancement of speaking motivation and self-efficacy among pre-intermediate EFL learners in Iran. Employing a quasi-experimental design, the research involved 90 ESP students from architecture and art programs at Azad University of Yazd, who were divided into explicit, implicit, and control groups. The findings revealed that the use of scaffolding techniques, coupled with both explicit and implicit grammar instruction, had a significant positive influence on the self-efficacy and motivation of Iranian pre-intermediate EFL learners. Importantly, the study demonstrated that the effectiveness of scaffolding techniques was consistent regardless of whether explicit or implicit grammar instruction was employed, underscoring their substantial impact on learner self-efficacy and motivation.

DISCUSSION & CONCLUSION

The effectiveness of explicit and implicit grammar teaching in EFL classrooms has been a topic of ongoing debate, and the studies discussed in the literature review provide a nuanced view. Some studies, such as Akakura (2012) and Ebadi, Saad, and Abedalaziz (2014), suggest that explicit instruction has a positive impact on both explicit and implicit knowledge. These findings imply that explicit grammar instruction can be beneficial for learners, particularly in terms of acquiring a clear understanding of grammar rules. However, the effectiveness of implicit instruction is also evident in some studies, like the one conducted by Soleimani, Jahangiri, and Gohar (2015), which found that both implicit and explicit groups achieved similar results in tests. This suggests that the choice between explicit and implicit methods should consider various factors, including learner preferences and goals.

The choice between explicit and implicit grammar teaching is influenced by a range of factors. Ling's (2015) study highlights the importance of considering learners' specific needs when selecting an approach. Explicit instruction may be more suitable for students who need to construct grammatically accurate sentences, while implicit teaching can foster greater interactive proficiency. Naderi's (2018) research further demonstrates that the type of feedback provided can impact the development of grammar knowledge. Additionally, Altun and Dinçer's (2020) study underscores the positive impact of explicit grammar instruction on writing skills, indicating that the instructional context can play a significant role in the decision-making process.

Another important point to recognize is that explicit and implicit grammar teaching are not mutually exclusive; rather, they can be considered complementary methods. The research by Ling (2015) and Nejadansari, Moeen, and Dabaghi (2023) suggests that the choice between these approaches should be flexible and based on the specific learning objectives and context. The study by Michaud and Ammar (2023) even indicates that explicit instruction can be effectively incorporated at different stages of instruction, highlighting its adaptability and the potential for combining elements of both approaches. This complementary nature of explicit and implicit teaching allows for a more comprehensive approach to grammar instruction in EFL classrooms.

The choice between explicit and implicit grammar teaching methods is a complex and contentious decision for educators in the realm of English as a Foreign Language (EFL) instruction. Both approaches have distinct characteristics and unique advantages. The exploration of explicit and implicit grammar instruction sheds light on their unique attributes. According to Bhatia (1997) and Widodo (2006), explicit teaching emphasizes clear presentation of grammar rules and systematic practice, contributing to learners' accuracy in language use. Akakura (2009) rightly emphasizes that mastering grammar structures is not a random process, requiring deliberate strategies to support learners. On the other hand, implicit teaching focuses on fluency and language use in context, aligning with Krashen's (1981) assertion that language acquisition often occurs without conscious grammar learning. Implicit teaching's dynamic nature fosters learner independence and mirrors the natural processes of first language acquisition (Birsen, 2012). Additionally, implicit teaching has the added benefit of habit formation (Sik, 2015).

As one of the key objectives of this study is to elucidate the distinctions between explicit and implicit grammar instruction and provide valuable guidance to English language educators in selecting the most suitable method for their students, it is evident that there is no definitive answer to the question of whether grammar should be explicitly or implicitly taught. Instead, the more pertinent inquiry is, "When should explicit or implicit grammar instruction be preferred?" This decision depends on a multitude of factors, including the educator's knowledge base and the proficiency level of the English learners. Furthermore, educators must consider how their own knowledge, professional experience, and institutional requirements influence their approach to grammar instruction. Continuous self-development and training to stay up to date with educational innovations should be essential components of an educator's career. Flexibility in teaching approaches is also crucial, enabling educators to meet the evolving needs of their students effectively.

In conclusion, the choice between explicit and implicit grammar teaching methods is nuanced and complex, and the best approach may vary depending on the context and the specific needs of the learners. As the field of language education continues to evolve, educators should remain open to adopting a diverse range of strategies and approaches to ensure that they provide the most effective and tailored instruction to their students. For these reasons, further research will be needed to understand the nuanced character of the explicit and implicit grammar teaching methods in EFL classrooms, shedding more light on the intricacies and subtleties of each approach and helping educators make informed decisions about which method to employ in different teaching situations.

Declarations on Ethical Standards

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References

Abune, A. A. (2019). Effects of Peer Scaffolding on Students' Grammar Proficiency Development. *Online Submission*, 7(5), 105-120. https://doi.org/105-120. 10.14662/IJELC2019.081

Akakura, M. A. (2009). *Effect of explicit instruction on implicit and explicit second language knowledge: An empirical study on English article acquisition.* (Unpublished Doctoral Thesis). University of Auckland, Auckland.

Akakura, M. (2012). Evaluating the effectiveness of explicit instruction on implicit and explicit L2 knowledge. *Language Teaching Research*, 16(1), 9-37. https://doi.org/10.1177/1362168811423339

Alenezi, S. M. (2019). Exploring explicit and Implicit grammar teaching. *International Journal of Applied Linguistics and English Literature*, *8*(1), 104-106. https://journals.aiac.org.au/index.php/IJALEL/article/view/5251

Altun, L., & Dincer, R. (2020). A Comparison of Implicit and Explicit Teaching in Terms of Grammar and Skills of Intermediate Learners. *Bartın University Journal of Faculty of Education*, 9(1), 96-105. https://doi.org/10.14686/buefad.601184

Aydin, H., Rahmanpanah, H., & Mohseni, A. (2023). Application of Grammatical Judgment Tests to the Measurement of Explicit versus Implicit Knowledge in EFL Classroom. *Journal of Language and Translation*, *13*(1), 131-149. https://doi.org/10.30495/TTLT.2023.699064

Batstone, R. (1994). *Grammar*. Oxford: Oxford University Press.

Bhatia, V. K. (1997). The Power and Politics of Genre. *World Englishes*, 16(3), 359-371. https://doi:10.1111/1467- 971x.00070

Birsen, T. (2012). Grammar in EFL Pedagogy: To be or not to be: Explicit or implicit grammar instruction in EFL. *International Journal of Humanities and Social Science*, 2, 120-122. https://www.ijhssnet.com/journals/Vol_2_No_5_March_2012/12.pdf

Celce-Murcia, M. (1991). Grammar pedagogy in second and foreign language teaching. *TESOL Quarterly*, 25(3), 459–480. https://doi.org/10.2307/3586980

Cook, V. (2016). *Second language learning and language teaching*. (5th ed.) New York: Routledge.

Crystal, D. (2004). The past, present, and future of World English. In A. Gardt & B.-R. Hüppauf (Eds.), *Globalization and the future of German* (pp. 27–45). KG, Berlin: Walter de Gruyter GmbH & Co.

De Graaff, R., & Housen, A. (2009). Investigating the effects and effectiveness of L2 instruction. *The handbook of language teaching*, 726-755. https://doi.org/10.1002/9781444315783

DeKeyser, R. M. (1995). Learning Second Language Grammar Rules. *Studies in Second Language Acquisition*, 17(3), 379-410. https://doi:10.1017/s027226310001425x

DeKeyser, R. M. (2009). Cognitive-psychological processes in second language learning. In H. M. Long, and C. J. Doughty (Eds.), *The handbook of language teaching* (pp.119-138). Hoboken, NJ: Blackwell.

Deng, F., & Lin, Y. (2016). A Comparative Study on Beliefs of Grammar Teaching between High School English Teachers and Students in China. *English Language Teaching*, 9(8), 1-10. http://dx.doi.org/10.5539/elt.v9n8p1

Ebadi, Mandana R., Saad, Mohd R. M. & Abedalaziz, N. (2014). Explicit form focus Instruction: The effects on implicit and explicit knowledge of ESL learners. *Malaysian Online Journal of Educational Science*, 2(4), 25-34. https://ajba.um.edu.my/index.php/MOJES/article/download/12846/8240

Ellis, N.C. (2008). Implicit and Explicit Knowledge about Language. In Hornberger, N.H. (Eds.), *Encyclopedia of Language and Education* (pp.1878-1890). Boston, MA: Springer.

Ellis, R. (1985). *Understanding Second Language Acquisition*. Oxford: Oxford University Press.

Ellis, R. (1994). A theory of instructed second language acquisition. In N. Ellis (Eds.), *Implicit and explicit language learning* (pp. 79-114). London: Academic Press.

Ellis, R. (2001b). Investigating Form-Focused Instruction. In R. Ellis (Eds.), *Form-Focused Instruction and Second Language Learning* (pp. 1—46). Oxford: Blackwell.

Ellis, R. (2002). Does Form-Focused Instruction Affect the Acquisition of Implicit Knowledge. A Review of Research. *Studies in Second Language Acquisition*, 24, 223- 236.https://doi.org/10.1017/S0272263102002073

Ellis, R. (2006). Current Issues in the Teaching of Grammar: An SLA Perspective. *Tesol Quarterly*, 40(1), 83-107. https://doi.org/10.2307/40264512

Erlam, R. (2003). The Effects of Deductive and Inductive Instruction on the Acquisition of Direct Object Pronouns in French as a Second Language. *The Modern Language Journal*, *87*(2), 242–260. http://www.jstor.org/stable/1193035

Hammerly, H. (1975). The Deduction/Induction Controversy. *The Modern Language Journal*, 59(1/2), 15-18. https://doi.org/10.2307/325441

Harley, B., & Swain, M. (1984). The interlanguage of immersion students and its implications for second language teaching. In Davies, A., Criper, C. & Howatt, APR, (Eds.), *Interlanguage* (pp.311). Edinburgh: Edinburgh University Press.

Higgs, T. V. (1985). Teaching Grammar for Proficiency. *Foreign Language Annals*, 18(4), 289–296. https://doi.org/10.1111/j.1944-9720.1985.tb01806.x

Hulstijn, J. H. (2005). Theoretical and Empirical Issues in the Study of Implicit and Explicit Second-Language Learning: Introduction. *Studies in Second Language Acquisition*, 27(2), 129-140. https://doi:10.1017/S0272263105050084

Krashen, S. D. (1981). *Second Language Acquisition and Second Language Learning*. Oxford: Oxford University Press.

Krashen, S. D. (1982). *Principles and Practice in Second Language Acquisition*. New York: Prentice Hall.

Lapkin, S., Hart, D., & Swain, M. (1991). Early and Middle French Immersion Programs: French Language Outcomes. *Canadian Modern Language Review*, 48(1), 11-44. https://doi/pdf/10.3138/cmlr.48.1.11

Larsen-Freeman, D. (2003). *Teaching language: From grammar to grammaring.* Boston: Thomson/Heinle.

Larsen-Freeman, D. (2009). Teaching and Testing Grammar. In Doughty, C & Long, M. (Eds.), *The Handbook of Second Language Acquisition* (pp.518-542). Chichester, England: Wiley-Blackwell As Sociates Inc.

Larsen-Freeman D., Long M.H. (2014). *An introduction to second language acquisition research*. London: Routledge.

Ling, Z. (2015). Explicit Grammar and Implicit Grammar Teaching for English Major Students in University. *Sino-US English Teaching*, *12*(8), 556-560. https://doi:10.17265/1539-8072/2015.08.002

Long, M. (1983). Does Second Language Instruction Make a Difference? A Review of the Research. *Tesol Quarterly*, 17(3), 359-382. https://doi.org/10.2307/3586253

Long, M. H. (1988). Instructed Interlanguage Development. In L. Beebe (Eds.), *Issues in Second Language Acquisition: Multiple Perspectives* (pp.115-141). Rowley, MA: Newbury House.

Long, M. H. (1991). Focus on Form: A Design Feature in Language Teaching Methodology. In K.de Bot, R. Ginsberg & C. Kramsch (Eds.), *Foreign Language Research in Cross- Cultural Perspective* (pp.39-52). Amsterdam: John Benjamin.

Michaud, G., & Ammar, A. (2023). Explicit Instruction within a Task: Before, During, or After?. *Studies in Second Language Acquisition*, 45(2), 442-460. https://doi:10.1017/S0272263122000316

Naderi, S. (2018). EFL Learners' Grammar Knowledge Development through Explicit and Implicit Feedback: Social Networks in Focus. *Anatolian Journal of Education*, 3(1), 31-38. https://doi.org/10.29333/aje.2018.313a

Nassaji, H., and Fotos, S. (2004). Current Developments in Research on the Teaching of Grammar. *Annual Review of Applied Linguistics*, 24, 126-145. https://doi:10.1017/S0267190504000066

Nassaji, H., & Fotos, S. S. (2011). *Teaching grammar in second language classrooms: Integrating form-focused instruction in communicative context*. Oxfordshire: Routledge.

Nazari, N. (2013). The Effect of Implicit and Explicit Grammar Instruction on Learners' Achievements in Receptive and Productive Modes. *Procedia-Social and Behavioral Sciences*, 70, 156-162. https://doi:10.1016/j.sbspro.2013.01.051

Nejadansari, D., Moeen, A., & Dabaghi, A. (2023). The Impact of Implicit vs. Explicit Grammar Teaching through Scaffolding on Iranian Learners' Speaking Motivation and Self-Efficacy: ESP Students in Focus. *Iranian Evolutionary and Educational Psychology Journal*, 5(1), 64-73. https://doi.org/10.52547/ieepj.5.1.64

Norris, J. M., & Ortega, L. (2000). Effectiveness of L2 Instruction: A Research Synthesis and Quantitative Meta-Analysis. *Language Learning*, 50(3), 417-528. https://doi.org/10.1111/0023-8333.00136

Nunan, D. (1994). Linguistic Theory and Pedagogic Practice in Perspectives on Pedegogical Grammar. In T. Odlin (Eds.), *Perspectives on pedagogical grammar* (pp.253-271). Cambridge, England: Cambridge University Press.

Pehlivan, A. & Seçkin Aydın, İ. (2022). Discussions about grammer teaching today. *Journal of Language Education and Research*, 8(1), 166-206. https://doi.org/10.31464/jlere.1050268

Pica, T. (1983). Adult Acquisition of English As a Second Language Under Different Conditions of Exposure. *Language learning*, 33(4), 465-497. https://doi.org/10.1111/j.1467-1770.1983.tb00945.x

Rahman, A. M. A. & Rashid, R. A. (2017). Explicit and Implicit Grammar Instructions in Higher Learning Institutions. *English Language Teaching*, 10(10), 92-101. https://doi:10.5539/elt.v10n10p92

Ranalli, J. M. (2001). *Consciousness-Raising versus Deductive Approaches to Language Instruction: A Study of Learner Preferences*. (Unpublished Master's Thesis). The Centre for English Language Studies, University of Birmingham, Birmingham.

Robinson, P. (1996). Learning Simple and Complex Second Language Rules Under Implicit, Incidental, Rule-Search, and Instructed Conditions. *Studies in Second Language Acquisition*, 18(1), 27-67. https://doi:10.1017/S0272263100014674

Rosa, E., & O'Neill, M. D. (1999). Explicitness, intake, and the issue of awareness: Another piece to the puzzle. *Studies in second language acquisition*, 21(4), 511-556. https//doi:10.1017/S0272263199004015

Rutherford, W., & Sharwood Smith, M. (1988). *Grammar and Second Language Teaching*. New York: Newbury House.

Schmidt, R. W. (1990). The Role of Consciousness in Second Language Learning. *Applied Linguistics*, 11(2), 129-158. https://doi.org/10.1093/applin/11.2.129

Seliger, H. W. (1975). Maturational Constraints in the Acquisition of Second Language Accent. *Language Sciences*, 36, 20-22. https://api.semanticscholar.org/CorpusID:148901439

Shaffer, C. (1989). A comparison of inductive and deductive approaches to teaching foreign languages. *The Modern Language Journal*, *73*(4), 395-403. https://doi.org/10.2307/326874

Sheen, R. (2002). 'Focus on Form' and 'Focus on Forms'. *ELT Journal*, 56(3), 303-305. https://doi.org/10.1093/elt/56.3.303

Sik, K. (2015). Tradition or Modernism in Grammar Teaching: Deductive vs. Inductive Approaches. *Procedia-Social and Behavioral Sciences*, 197, 2141-2144. https://doi.org/10.1016/j.sbspro.2015.07.340

Soleimani, H., Jahangiri, K., & Gohar, M. J. (2015). Effect of Explicit and Implicit Instruction on Implicit Knowledge of English Past Simple Tense. *International Journal of Asian Social Science*, 5(5), 257-265. https://doi:10.18488/journal.1/2015.5.5/1.5.257.265

Sopin, G. (2015). Teachers' Beliefs and Perceptions of Grammar Teaching in EFL/ESL Classroom at Misurata University, Libya. *SMART MOVES JOURNAL IJELLH*, *3*(10). https://ijellh.in/index.php/OJS/article/view/990

Spada, N., & Tomita, Y. (2010). Interactions between type of instruction and type of language feature: A meta-analysis. *Language learning*, *60*(2), 263-308. https://doi.org/10.1111/j.1467-9922.2010.00562.x

Widodo, H. (2006). Designing a genre-based lesson plan for an academic writing course. *Journal of English Teaching: Practice and Critique,* 5(3), 173-199. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=67c303aed3a18e966f7a1fdaf8edf713 a57a77be

The Investigation of the Secondary School Students' Acceptance Levels of Flipped Mathematics Classroom

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Abstract*: In this study, it is aimed to determine the secondary school students' acceptance levels of flipped mathematics classrooms and to examine their acceptance levels in terms of gender, grade level, internet access, and perception of ability in learning mathematics alone at home. Another aim of the present study is to determine whether students' autonomous learning levels predict their acceptance levels of flipped mathematics classrooms. The research was carried out using descriptive and correlational survey models. The study group for the research consisted of 345 secondary school students. The Personal Information Form, Flipped Mathematics Classroom Acceptance Scale, and Autonomous Learning Scale were used as data collection tools. As a result of the research, it was determined that the students' acceptance of flipped mathematics classrooms was at a good level. While the acceptance levels of the students did not differ according to the variables of gender and grade level, statistically significant differences were determined in terms of the variables of internet access and the perception of ability in learning mathematics alone at home. In addition, it was determined in the present study that students' autonomous learning levels were statistically significant predictors of their acceptance levels of flipped mathematics classrooms.*

Keywords: *Flipped classroom, Mathematics, Acceptance level, Autonomous learning.*

INTRODUCTION

Technological changes and developments have greatly affected the function and structure of educational institutions. As a result of the reflections of technological developments on education, different learning and teaching methods have begun to be investigated (Talan & Gülseçen, 2018). In addition, the COVID-19 pandemic, which emerged in 2019, has left deep effects on psychological, social life, economic, health, and, most importantly, on education all over the world (Can, 2020). With these effects, there has been a paradigm shift in learning worldwide, and most institutions in the world have switched from face-to-face education in the traditional classroom to digital learning via distance education (Mulenga & Marbán, 2020). One of the models that attracted attention with the COVID-19 pandemic was the blended learning model (Shrivastava & Shrivastava, 2022). Numerous studies have been conducted using the blended learning model (e.g., Ma & Lee, 2021; Sankar et al., 2022; Srivatanakul, 2023; Zagouras et al., 2022). The blended learning model is explained as combining online and face-to-face learning experiences (Garrison & Kanuka, 2004). It offers innovative educational solutions by effectively integrating traditional classroom teaching with mobile learning and online activities (Rao, 2019). One of the blended learning models is the flipped classroom model (Hayırsever & Orhan, 2018; Staker & Horn, 2012).

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The flipped classroom model is a "blended" teaching approach that requires students to complete individual learning tasks before class in preparation for the learning activities they will carry out with their peers in the relevant course (Jong, 2023). A flipped classroom is explained as in-class activities being carried out outside the classroom and out-of-class activities being carried out in the classroom (Karadeniz, 2015). The flipped classroom model provides the opportunity for more practices and activities in the classroom by enabling students to comprehend the content of the course through outside-of-class studies (Yıldız-Durak, 2017). Akgün and Atıcı (2017) concluded in their study that the success of students in a flipped classroom increased; they participated more actively in the lesson; they remembered what they learned better; and they were more motivated towards the lesson.

The flipped classroom model has attracted the attention of many researchers, and many studies have been conducted on the model in different disciplines such as foreign languages (Andujar et al., 2020), geography (Graham et al., 2017), history (Oura et al., 2018), chemistry (Candas et al., 2022), and physics (Hinojo-Lucena et al., 2020). One of the disciplines in which the flipped classroom model has been frequently studied is mathematics (e.g., Ağırman, 2023; Bhagat et al., 2016; Bolatlı & Korucu, 2020; Katsa et al., 2016; Wei et al., 2020; Zengin, 2017). When the studies are examined, there are national and international studies determining that the use of the flipped classroom model in mathematics education improves the academic success of students (e.g., Ağırman, 2023; Akdeniz, 2019; Bhagat et al., 2016; Bolatlı & Korucu, 2020; Katsa et al., 2016; Tekin, 2018; Wei et al., 2020; Zengin, 2017), motivation (Bhagat et al., 2016; Bolatlı & Korucu, 2020; Katsa et al., 2016), attitude towards mathematics (Tekin, 2018), self-efficacy (Algarni & Forgues, 2022), class participation (Clark, 2015; Çevikbaş, 2018; Zeineddine, 2018). Despite the positive results obtained in the national and international literature, it is possible to say that the use of the flipped class model is not widespread in our country (Hayırsever & Orhan, 2018). As a matter of fact, it is stated that many learning methods, such as computer-assisted learning, web-based learning, and distance education, are used in the Turkish education system due to technological developments, but these methods are not accepted enough due to reasons such as lack of face-to-face interaction and classroom environment and separation from the social environment (Gençer, 2015). Similarly, it is stated that students have difficulty accepting the learning culture in a learning process that takes place in the form of lessons at home and homework at school (Demiralay, 2014). In line with the explanations made, it is considered important that the flipped classroom model be accepted by students in order to obtain the positive outcomes mentioned in mathematics lessons and to apply the model effectively. At this point, it is thought that it is necessary to determine the current acceptance status of students and investigate the affecting factors in order to improve their acceptance status.

There are studies on the acceptance of flipped classroom in the literature. Demiralay (2014) examined the process of adoption of the lesson at home, and homework at school model by school administrators, teachers, students, and parents within the framework of Diffusion of Innovations Theory. Agyei and Razi (2022) investigated high school students' acceptance of flipped classroom in English lessons within the framework of the Unified Theory of Acceptance and Use of Technology (UTAUT) model. There are also studies investigating the factors affecting university students' adoption of flipped learning (e.g., Alyoussef, 2022; Cai et al., 2019). Additionally, there are studies investigating the acceptance of flipped classroom by instructors of English language (Abd Rahman et al., 2021), science and technology (Plageras et al., 2023), computer science (Bakheet & Gravell, 2020), higher education (Long et al., 2019) within the framework of the UTAUT model. When the studies on flipped classroom in Turkey were examined, it was determined that the research was mostly conducted at the undergraduate level and in the foreign language education, and its effect on student success was investigated (Ekmekçi, 2019; Özbay & Sarıca, 2019). The results of review studies on flipped classrooms (Ekmekçi, 2019; Özbay & Sarıca, 2019) indicated that studies conducted both in mathematics education and at the secondary school level were limited. Also, no studies on the acceptance of flipped mathematics classrooms have been found. For this reason, it was

deemed important to investigate the secondary school students' acceptance levels of a flipped mathematics classroom.

In this study, in addition to determining students' acceptance levels of flipped classroom, it was deemed important to investigate the factors affecting their acceptance levels. In the studies on flipped classroom, gender (Adams et al., 2018; Hao, 2016a), grade level (Adams et al., 2018; Kazu & Kurtoğlu, 2020), and internet access (Yildiz-Durak, 2018; Wut et al., 2022) variables were examined. In addition, in the flipped learning model, learners have various responsibilities that require learner autonomy, such as accessing information from different sources, taking responsibility for learning, and acquiring the habit of independent learning (Kozikoğlu et al., 2021). For this reason, it is thought that students' perception of ability in learning mathematics alone at home and their autonomous learning levels may be related to their acceptance levels of flipped mathematics classroom. In this study, students' acceptance of flipped mathematics classroom was investigated in terms of gender, grade level, internet access, perception of ability in learning mathematics alone at home and autonomous learning. Since there is no other research in the literature examining secondary school students' acceptance levels of flipped mathematics classroom in terms of the variables discussed within the scope of this study, it is thought that this research will contribute to the literature.

METHOD

Research model

This research was conducted using descriptive and correlational survey models. In the study, a descriptive survey model was used to determine the secondary school students' acceptance levels of flipped mathematics classrooms. The comparative causal approach models were used to examine students' acceptance levels of flipped mathematics classrooms in terms of gender, grade level, internet access, and perception of ability in learning mathematics alone at home. Whether students' autonomous learning levels predict their acceptance of flipped mathematics classrooms was investigated with a correlational approach.

Study group

The study group for the research consisted of 345 students (48.1% of whom were female) studying in two secondary schools in Malatya in the fall semester of the 2022-2023 academic year. 31% of the students participating in the research were in the 5th grade, 24.1% in the 6th grade, 25.8% in the 7th grade, and 19.1% in the 8th grade. In the beginning of the application, the aim and scope of the research were explained to the students, and the data collection tool was applied to students who volunteered to participate in the research.

Data collection tools

In this research, the Personal Information Form, the Flipped Mathematics Classroom Acceptance Scale, and the Autonomous Learning Scale were used as data collection tools.

Personal information form: With the Personal Information Form, students' gender (female, male), grade level (5th, 6th, 7th, and 8th grades), internet access (no access, insufficient, partially sufficient, sufficient), and perception of ability in learning mathematics alone at home (insufficient, partially sufficient, sufficient) were obtained.

Flipped Mathematics Classroom Acceptance Scale: The Flipped Mathematics Classroom Acceptance Scale was developed by the Açıkgül and Fırat (2023) to measure secondary school students' acceptance levels of flipped mathematics classrooms. During the scale development process, the pilot study was carried out with the participation of secondary school students (5th-8th grades) studying in the city of Adıyaman. The scale includes

the Performance Expectancy (PE), Effort Expectancy (EE), Facilitating Conditions (FC), Hedonic Motivation (HM), and Behavioral Intention (BI) factors, which are included in the UTAUT proposed by Venkatesh et al. (2003), and the Technology Self-Efficacy (TSE) factor. The scale is a 5-point Likert type, and the answer options are: strongly disagree, slightly agree, moderately agree, mostly agree, and completely agree. As a result of Exploratory Factor Analysis (EFA) conducted within the scope of construct validity studies, a 6-factor structure consisting of 38 items and explaining 77.826% of the variance was obtained, which included 6 items in the PE factor, 3 items in the EE factor, 6 items in the FC factor, 6 items in the HM factor, 6 items in the BI factor, and 11 items in the TSE factor. Confirmatory Factor Analysis (CFA) results showed that the 6-factor structure was confirmed in a different study group. Cronbach's alpha and Composite Reliability Coefficients showed that the scores obtained from the scale were reliable (Açıkgül & Fırat, 2023).

In the present study, the construct validity of the scale for the scores obtained from 345 students was investigated with second-order CFA. CFA results (χ^2/df=1234.63/657=1.879, RMSEA=0.051, IFI=0.98, RFI=0.95, CFI=0.98, GFI=0.84, AGFI= 0.82, RFI= 0.95, NFI=0.96, NNFI=0.98, and SRMR=0.080) showed that the scale had construct validity and total points could be obtained from the scale. Additionally, the Cronbach alpha internal consistency coefficient for the participants of this study was calculated as 0.948. It can be said that the data obtained from the measurement tool has a good level of reliability for the participants of this study (Kline, 2011).

Autonomous Learning Scale: The Autonomous Learning Scale was developed by Macaskill and Taylor (2010) to evaluate students' autonomous learning levels. The scale adapted to Turkish culture by Arslan and Yurdakul (2015). The scale has a 5-point Likert-type response option and consists of 12 items. As a result of the EFA conducted by Macaskill and Taylor (2010) with the participation of 214 first-year psychology students, a 2-factor structure was obtained, explaining 25.55% and 24.04% of the variance, respectively. In the original version of the scale, Cronbach's alpha values were calculated as 0.73 for the first factor, 0.76 for the second factor, and 0.78 for the overall scale (Macaskill & Taylor, 2010). 752 secondary school students between the ages of 11 and 16, enrolled in three public schools in different regions of the city of Sakarya, Turkey, participated in the adaptation study of the scale carried out by Arslan and Yurdakul (2015). CFA results performed with the data obtained (χ^2=207.03, df= 53, RMSEA=0.062, IFI=0.96, CFI=0.96, GFI=0.96, AGFI= 0.94, RFI=0, 93, NFI=0.94, NNFI=0.95, and SRMR=0.044) showed that the two-factor structure consisting of 12 items in the original scale was confirmed. In addition, item-total correlation coefficients ranging between 0.29 and 0.59 and Cronbach's alpha internal consistency coefficient of α=0.80 provided evidence of the validity and reliability of the scale adapted to Turkish culture (Arslan & Yurdakul, 2015).

In the present study, the construct validity of the scale for the scores obtained from 345 students is investigated with second-order CFA. CFA results (χ^2/df= 106.93/52=2.056, RMSEA=0.056, IFI=0.98, RFI=0.96, CFI=0.98, GFI=0.95, AGFI= 0.92, RFI= 0.96, NFI=0.97, NNFI=0.98, and SRMR=0.039) showed that the scale had construct validity and total points could be obtained from the scale. In addition, the Cronbach's alpha internal consistency coefficient calculated by the study participants as α=0.882 showed that the scores obtained from the scale were sufficiently reliable (Kline, 2011).

Data analysis

During the data analysis phase, arithmetic mean and standard deviation values were calculated in order to determine the acceptance levels of the flipped mathematics classrooms of secondary school students. Then, the effects of gender, grade level, internet access, and perception of ability in learning mathematics alone at home on students' acceptance levels were examined using the F test. Simple linear regression analysis was conducted to determine the extent to which secondary school students' autonomous learning levels predicted their acceptance levels of flipped mathematics classrooms.

Before starting the F test analysis, it was determined that the skewness and kurtosis coefficients of the participants' scores for each level of the variables of gender, grade level, internet access, and perception of ability in learning mathematics alone at home were within ±1, and the scores were close to normal distribution. Additionally, Levene test results for each of the independent variables (gender: $F_{(1,343)}=5.990$, $p=0.015$; grade level: $F_{(3,341)}=1.152$, $p=0.328$; internet access: $F_{(3.340)}=1.563$, $p=0.198$; perception of ability in learning mathematics alone at home: $F_{(2,341)}=0.625$, $p=0.536$) showed that the variances were homogeneous. To determine the practical importance of the significant differences obtained as a result of the F test, Cohen's f effect size values were calculated. 0.10 was interpreted as "small", 0.25 as "medium", and 0.40 as "large" effect size (Cohen, 1988).

The normality of scores was examined before a simple linear regression analysis was performed. Skewness-kurtosis values in the range of ±1 (for acceptance scores, skewness = -0.464, kurtosis = -0.40, and for autonomous learning scores, skewness = -0.545, kurtosis = 0.0629) showed that acceptance and autonomous learning scores were close to normal distribution. The scatter plot drawn between autonomous learning and acceptance scores indicated that the relationship between the two variables was linear. The normality of the error terms was determined by drawing a Q-Q plot chart, and the homoscedasticity of the error terms was determined by drawing a scatter plot. For the correlation coefficient value (R), 0.10-0.29 was considered a "small" relationship, 0.30-0.49 was considered a "medium" relationship, and 0.50-1.0 was considered a "large" relationship (Cohen, 1988). For R^2 effect size values, <0.1 was interpreted as "weak", 0.11–0.3 as "small", 0.31–0.5 as "medium", >0.5 as "large" effect (Muijs, 2004). In interpreting the students' acceptance levels of flipped mathematics classroom, 1.00-1.80 was "strongly disagree", 1.81-2.60 was "somewhat agree", 2.61-3.40 was "moderately agree", 3.41-4.20 was "somewhat agree", and 4.21-5.00 was "completely agree".

FINDINGS

Secondary school students' acceptance levels of flipped mathematics classrooms

Findings regarding secondary school students' acceptance levels of flipped mathematics classrooms are presented in Table 1.

Table 1. Secondary school students' acceptance levels of flipped mathematics classroom (n=345)

Factor	$\overline{X}$	SD	Acceptance Level
PE	3.26	1.13	Moderately Agree
EE	3.03	1.09	Moderately Agree
FC	3.76	1.09	Mostly Agree
HM	3.41	1.04	Mostly Agree
BI	3.26	1.12	Moderately Agree
TSE	3.64	1.00	Mostly Agree
Total	3.45	0.82	Mostly Agree

According to the results in Table 1, students' acceptance averages for flipped mathematics classrooms varied between 3.03 and 3.76. The mean scores in the PE, EE, and BI factors were in the range of "Moderately Agree", FC, HM, TSE, and the overall scale were in the range of "Mostly Agree". According to these findings, it can be said that students' acceptance levels of flipped mathematics classrooms were at a moderate level in the PE, EE, and BI factors and at a good level in the FC, HM, TSE factors and on the overall scale.

Investigation of secondary school students' acceptance levels of flipped mathematics classrooms in terms of gender variable

Descriptive statistics regarding the acceptance levels of female and male students to flipped mathematics classrooms are presented in Table 2, and the F test results regarding the differentiation of acceptance levels in terms of gender variable are presented in Table 3.

Table 2. Descriptive statistics regarding the variable of gender

Gender	N	$\overline{X}$	SD
Female	166	3.55	0.72
Male	179	3.37	0.89
Total	345	3.45	0.82

Table 3. F test results regarding the variable of gender

	The source of variance	Sum of squares	df	Mean Square	F	p
	Between Groups	2.697	1	2.697	4.073	0.044
Acceptance Level	Within Groups	227.100	343	0.662		
	Total	229.797	344			

*p<0.01

As seen in Table 3, students' acceptance levels of flipped mathematics classrooms did not differ statistically significantly according to the gender variable (p>0.01).

Investigation of secondary school students' acceptance levels of flipped mathematics classrooms in terms of grade level variable

Descriptive statistics regarding the acceptance levels of students studying in the 5th-8th grade to flipped mathematics classrooms are presented in Table 4, and the F test results regarding the differentiation of acceptance levels in terms of the grade level variable are presented in Table 5.

Table 4. Descriptive statistics regarding the variable of grade level

Grade Level	N	$\overline{X}$	SD
5th grade	107	3.57	0.87
6th grade	83	3.37	0.80
7th grade	89	3.44	0.77
8th grade	66	3.40	0.80
Total	345	3.45	0.82

Table 5. F test results regarding the variable of grade level

	The source of variance	Sum of squares	df	Mean of Square	F	p
Acceptance Level	Between Groups	2.286	3	0.762	1.142	0.332
	Within Groups	227.511	341	0.667		
	Total	229.797	344			

*p<0.01

As seen in Table 5, students' acceptance levels of flipped mathematics classrooms did not differ statistically significantly according to the grade level variable (p>0.01).

Investigation of secondary school students' acceptance levels of flipped mathematics classrooms in terms of internet access variable

Descriptive statistics regarding students' acceptance levels of flipped mathematics classrooms in terms of the internet access variable are presented in Table 6, and F test results regarding the differentiation of acceptance levels in terms of the internet access variable are presented in Table 7.

Table 6. Descriptive statistics regarding the variable of internet access

Internet access	N	$\overline{X}$	SD
1. No access	15	2.80	1.07
2. Insufficient	20	2.67	0.83
3. Partially Sufficient	47	3.22	0.75
4. Sufficient	262	3.60	0.75
Total	344	3.46	0.82

Table 7. F test results regarding the variable of internet access

	The source of variance	Sum of squares	df	Mean of Squares	F	p	Difference (Scheffe)	Cohen f	Power
Acceptance Level	Between Groups	26.436	3	8.812	14.755	0.000*	4>1,2,3	0.36	0.999
	Within Groups	203.048	340	0.597					
	Total	229.484	343						

*p<0.01

As seen in Table 7, students' acceptance levels of flipped mathematics classrooms differed statistically significantly according to the internet access variable (F(3,340) = 14.755, p<0.01). Scheffe test results showed that the acceptance scores of students with sufficient internet access (x̄=3.60) were statistically significantly higher than the acceptance scores of students no access (x̄=2.80), insufficient (x̄=2.67) and partially sufficient (x̄=3.22). Additionally, Cohen's f=0.36 effect size value showed that the difference was at a moderate level.

Investigation of secondary school students' acceptance levels of flipped mathematics classrooms in terms of the perception of ability in learning mathematics alone at home

Descriptive statistics regarding students' acceptance levels of flipped mathematics classrooms in terms of the perception of ability in learning mathematics alone at home are presented in Table 8, and F test results regarding the differentiation of acceptance levels in terms of the perception of ability in learning mathematics alone at home are presented in Table 9.

Table 8. Descriptive statistics regarding the variable of perception of ability in learning mathematics alone at home

Perception of ability	N	$\bar{X}$	SD
Insufficient	40	2.89	0.85
Partially sufficient	149	3.33	0.75
Sufficient	155	3.72	0.77
Total	344	3.46	0.82

Table 9. F test results regarding the variable of perception of ability in learning mathematics alone at home

	The source of variance	Sum of squares	df	Mean of Squares	F	p	Difference (Scheffe)	Cohen f	Power
Acceptance Level	Between Groups	25.903	2	12.952	21.708	.000*	3>2,1 2>1	0.36	0.999
	Within Groups	203.451	341	0.597					
	Total	229.355	343						

*p<0.01

As seen in Table 9, students' acceptance levels of the flipped mathematics classroom differed statistically significantly according to their perception of their ability in learning mathematics alone at home (F(2,341) = 21.708, p<0.01). According to the Scheffe test results, the acceptance scores of the students who perceived themselves as sufficient in learning mathematics alone at home (x̄= 3.72) were statistically significantly higher than the acceptance scores of the students who perceived themselves as partially sufficient (x̄= 3.33) and insufficient (x̄= 2.89). Also, it was determined that the acceptance scores of students who perceived themselves as partially sufficient (x̄=3.33) were statistically significantly higher than the acceptance scores of students who perceived themselves as insufficient (x̄=2.89). Cohen's f =0.36 effect size value showed that the difference is moderate.

Investigation of whether secondary school students' autonomous learning levels predict their acceptance levels of the flipped mathematics classrooms

Descriptive statistics on whether secondary school students' autonomous learning levels predict their acceptance levels of flipped mathematics classrooms are presented in Table 10, and the simple linear regression analysis results are presented in Table 11.

Table 10. Descriptive statistics (N=345)

	$\bar{X}$	SD
Flipped learning acceptance	3.45	0.82
Autonomous Learning	3.60	0.83

Table 11. Simple linear regression analysis results

Variables	B	Standart Error	Beta	t	p
Constant	1.826	0.174		10.526	.000*
Autonomous Learning	0.452	0.047	0.461	9.626	.000*
R = 0.461	R^2= 0.213				
$F_{(1,343)}$=92.661	p= .000				
p<0.01					

As seen in Table 11, there was a moderate and statistically significant relationship between secondary school students' autonomous learning scores and flipped mathematics classroom acceptance scores (R = 0.461, R^2 = 0.213; F (1,343) = 92.661, p = .000). According to this finding, students' scores on autonomous learning explained 21.3% of the variance in acceptance scores of flipped mathematics classrooms. Considering the standardized regression coefficient, it was determined that students' autonomous learning scores predicted the acceptance scores of flipped mathematics classrooms at a statistically significant level (β= 0.461, p<0.01). On the other hand, the R^2 = 0.213 value indicated a small effect.

DISCUSSION & CONCLUSION

This study was conducted to determine secondary school students' acceptance levels of flipped mathematics classrooms and to investigate their acceptance levels in terms of gender, grade level, internet access, and perception of ability in learning mathematics alone at home variables. Additionally, it was aimed to determine whether students' autonomous learning levels predicted their acceptance levels of flipped mathematics classrooms.

In the study, it was found out that secondary school students' acceptance levels of flipped mathematics classrooms were at a good level. Aydın (2020) used the flipped classroom method in teaching the subject of operations on whole numbers in 7th grade and stated that the students had positive opinions, such as that they liked the application, that it attracted their attention, and that they wanted it to be used in other lessons. Gençer (2015) stated that 6th grade students accepted the flipped classroom model. Abeysekera and Dawson (2015) stated that despite the lack of specific evidence regarding the effectiveness of the flipped classroom approach, it has been adopted with great enthusiasm. Balcı (2023) mentioned that secondary school students found the use of the gamified flipped classroom model regarding the algorithm instructive and entertaining, but technological inadequacies had a negative impact on the process. But Yavuz and Kahraman (2021) stated that secondary school students who are accustomed to traditional methods did not adopt the flipped learning model in the first weeks. Similarly, Chen et al. (2014) stated that the model was effective at the higher education level, students were satisfied with the course, their participation in the course increased, and their study efforts increased, but it was concluded that some students did not fully adopt the model because they continued their old passive learning habits. On the other hand, students' readiness for flipped classrooms is also considered important in their acceptance of flipped classrooms (Hao, 2016b). Açıkgül and Fırat (2023) also determined that secondary school students' readiness for flipped mathematics classrooms was at a good level.

In the study, it was observed that students' acceptance levels of flipped mathematics classrooms did not differ significantly in terms of gender and grade level variables. Similarly, Chen et al. (2016) did not find any difference in terms of gender variable in high school students' views on course design in flipped mathematics classrooms. Açıkgül and Fırat (2023) and Kazu and Kurtoğlu (2020) determined that the readiness of secondary school students for flipped classrooms did not differ according to gender and grade level variables.

There may be limitations due to internet access in flipped classrooms (Görü Doğan, 2015). When secondary school students' acceptance levels of flipped mathematics classrooms were examined in terms of internet access, a

significant difference was observed in favor of those who have internet access. Similarly, it has been stated that internet access affects students' readiness for flipped classrooms (Hao, 2016a; Kazu & Kurtoğlu, 2020; Yildiz-Durak, 2018). Balcı (2023) pointed out the importance of internet access in the application of the model and emphasized that information about students' internet access should be collected before the application and that students' deficiencies should be eliminated.

In the flipped learning model, students have important learning responsibilities, especially in out-of-school learning (Kozikoğlu et al., 2021). In this study, it was determined that the acceptance levels of flipped mathematics classrooms differed statistically significantly in favor of those who considered themselves more sufficient in terms of their perception of ability in learning mathematics alone at home. On the other hand, the flipped classroom structure is seen to be associated with student autonomy as it requires students' active participation in learning (Chen et al., 2014; Han, 2015; Jenkins et al., 2017; Kozikoğlu et al., 2021). Supporting this situation, the study found a moderate and statistically significant relationship between secondary school students' autonomous learning scores and flipped mathematics classroom acceptance scores. Considering the standardized regression coefficient, it was determined that students' autonomous learning scores predicted the acceptance scores of flipped mathematics classrooms at a statistically significant level. From here, it can be stated that if students' autonomous learning levels increase, the acceptance level of flipped mathematics classrooms may also increase. On the other hand, the R^2 value indicated a small effect. In their study with teachers, Kozikoğlu et al. (2021) concluded that as the autonomy supporting behavior of teachers increases, the perception of self-efficacy in flipped learning also increases.

Future directions

Some suggestions can be made in line with the results of the research. In this study, it was determined that the acceptance levels of the flipped mathematics classrooms of secondary school students were at a good level. Considering that half of the students (n=152) have not participated in flipped mathematics classrooms before, it is recommended to provide detailed information about flipped classrooms and ensure that they participate in flipped classroom practices. On the other hand, it was determined that secondary school students' acceptance scores of flipped mathematics classrooms differed at a statistically significant level in terms of internet access and competence perception for learning mathematics alone at home. How these differences affect flipped classrooms can be investigated in detail through qualitative studies.

In addition, the study investigated to what extent students' autonomous learning acceptance scores predicted their acceptance scores in flipped mathematics classrooms. As a result of the research, it was determined that the scores on autonomous learning explained 21.3% of the variance in the acceptance scores of flipped mathematics classrooms. With new research, the predictive ability of different variables that may be related to acceptance level scores can be examined.

Declarations on Ethical Standards
Financial support There is not received any financial support to conduct this research and/or publication of the article.
Conflicts of interest There is no conflict of interest regarding the publication of this article.
Ethical Approval. It has been confirmed by Social and Human Sciences Scientific Research Ethics Committee that the research process does not pose an ethical problem.

References

Abeysekera, L., & Dawson, P. (2015), Motivation and cognitive load in the flipped classroom: Definition, rationale and a call for research. *Higher Education Research & Development, 34*(1), 1–14. https://doi.org/10.1080/07294360.2014.934336

Abd Rahman, S. F., Md Yunus, M., & Hashim, H. (2021). Applying UTAUT in predicting ESL lecturers intention to use flipped learning. *Sustainability, 13*(15), 8571. https://doi.org/10.3390/su13158571

Açıkgül, K. & Fırat, S. (2023). *Flipped Mathematics Classroom Acceptance Scale: Validity and reliability studies*. [Manuscript in preparation]

Adams, D., Sumintono, B., Mohamed, A. & Noor, N.S.M. (2018). E-learning readiness among students of diverse backgrounds in a leading Malaysian higher education institution. *Malaysian Journal of Learning and Instruction, 15*(2), 227-256. https://files.eric.ed.gov/fulltext/EJ1201661.pdf

Agyei, C., & Razi, Ö. (2022). The effect of extended UTAUT model on EFLs' adaptation to flipped classroom. *Education and Information Technologies, 27*(2), 1865-1882. https://doi.org/10.1007/s10639-021-10657-2

Ağırman, N. (2023). *Ters yüz sınıf modelinin ilkokulda uygulanabilirliğinin incelenmesi: Üçüncü sınıf matematik dersi örneği.* [An investigation of the applicability of flipped classroom model in primary school: The sample of third grade mathematics class]. Doctoral dissertation, Atatürk University Institute of Educational Sciences, Erzurum.

Akdeniz, E. (2019). *Ters yüz sınıf modelinin akademik başarı, tutum ve kalıcılık üzerine etkisi*. Master thesis, Necmettin Erbakan University Institute of Educational Sciences, Konya.

Akgün, M. & Atıcı, B. (2017). Ters-Düz sınıfların öğrencilerin akademik başarısı ve görüşlerine etkisi [The effect of flipped classroom on learners' academic achievements and views]. *Kastamonu Education Journal, 25*(1): 329-344. https://dergipark.org.tr/en/download/article-file/297664

Algarni, B. & Forgues, H.L. (2022). An evaluation of the impact of flipped-classroom teaching on mathematics proficiency and self-efficacy in Saudi Arabia. *British Journal of Educational Technology (BJET), 54*(1), 414-435. https://doi.org/10.1111/bjet.13250

Alyoussef, I. Y. (2022). 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*, *8*, e12529 . https://doi.org/10.1016/j.heliyon.2022.e12529

Arslan, S., & Yurdakul, C. (2015). Turkish adaptation and validation of autonomous learning scale. *Journal of International Social Research, 8*(39), 565-569.

Andujar, A., Salaberri-Ramiro, M. S., & Martínez, M. S. C. (2020). Integrating flipped foreign language learning through mobile devices: Technology acceptance and flipped learning experience. *Sustainability, 12*(3), 1110. https://doi.org/10.3390/su12031110

Aydın, H. (2020). *Ters-yüz edilmiş sınıf modelinin tam sayılarda işlemler konusunun öğreniminde akademik başarıya etkisi.* [The effect of flipped classroom model on academic success in teaching the operations with integer numbers] Master thesis, Atatürk University Institute of Educational Sciences, Erzurum.

Bakheet, E., & Gravell, A. (2020). Investigating factors based on an extended UTAUT Model to confirm Computer Science instructors' behavioural intention to adopt the flipped classroom. *International Journal of Information and Education Technology, 10*(10), 736-743. https://doi.org/10.18178/ijiet.2020.10.10.1451

Balcı, B. (2023). *Ortaokul öğrencilerinin algoritma konusundaki oyunlaştırılmış ters yüz sınıf modeli ile geleneksel model arasındaki akademik başarı ve görüşlerinin karşılaştırılması* [A comparison of gamified flipped and traditional classroom model: secondary school students' academic achievements and opinions in algorithm]. Master thesis, Tokat Gaziosmanpaşa University Institute of Graduate Education, Tokat.

Bhagat, K. K., Chang, C. N., & Chang, C. Y. (2016). The impact of the flipped classroom on mathematics concept learning in high school. *Journal of Educational Technology & Society, 19*(3), 134-142.

Bolatlı, Z., & Korucu, A. T. (2020). Determining the academic achievement of students who use flipped classroom method supported by a mobile application and their views on collaborative learning. *Bartın University Journal of Faculty of Education, 9*(2), 229-251. https://doi.org/10.14686/buefad.631835

Can, E. (2020). Coronavirüs (COVID-19) pandemisi ve pedagojik yansımaları: Türkiye'de açık ve uzaktan eğitim uygulamaları [Coronavirus (COVIDien-19) pandemic and pedagogical implications: Open and distance education applications in Turkey]. *Açık Ögretim Uygulamaları ve Araştırmaları Dergisi, 6*(2), 11–53. https://dergipark.org.tr/en/pub/auad/issue/55662/761354

Candas, B., Kiryak, Z., & Özmen, H. (2022). Developing Prospective Science Teachers' Using of Chemical Knowledge with Flipped Learning Approach in the Context of Environmental Problems. *Science Education International, 33*(2), 192-202. https://doi.org/10.33828/sei.v33.i2.7

Cai, J., Yang, H. H., & Gong, D. (2019). Understanding undergraduates' adoption of flipped learning: integrating UTAUT and social presence. In Blended Learning: Educational Innovation for Personalized Learning: 12th International Conference, ICBL 2019, *Hradec Kralove, Czech Republic, July 2*–4, 2019, Proceedings 12 (pp. 9-21). Springer International Publishing.

Chen, Y., Wang, Y., & Chen, N. S. (2014). Is FLIP enough? Or should we use the FLIPPED model instead?. *Computers & Education*, *79*, 16-27. https://doi.org/10.1016/j.compedu.2014.07.004

Chen, S. C., Yang, S. J., & Hsiao, C. C. (2016). Exploring student perceptions, learning outcome and gender differences in a flipped mathematics course. *British Journal of Educational Technology, 47*(6), 1096-1112. https://doi.org/10.1111/bjet.12278

Clark, K. R. (2015). The effects of the flipped model of instruction on student engagement and performance in the secondary mathematics classroom. *Journal of Educators Online, 12*(1), 91-115. https://files.eric.ed.gov/fulltext/EJ1051042.pdf

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Erlbaum.

Çevikbaş, M. (2018). *Ters-yüz sınıf modeli uygulamalarına dayalı bir matematik sınıfındaki öğrenci katılım sürecinin incelenmesi* [Investigation of the student engagement process in a mathematics class based on flipped classroom practices]. Doctoral dissertation, Gazi University Institute of Educational Sciences, Ankara.

Demiralay, R. (2014). *Evde ders okulda ödev modelinin benimsenmesi sürecinin yeniliğin yayilimi kurami çerçevesinde incelenmesi* [Examining the process of flipped classroom model acceptance in the context of diffusion of innovations theory]. Doctoral dissertation, Gazi University Institute of Educational Sciences, Ankara.

Ekmekçi, E. (2019). An analysis of master's and doctoral research on flipped instruction in Turkey. *Ekev Akademi Dergisi, 80*, 137-149.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The internet and higher education, 7*(2), 95-105. https://doi.org/10.1016/j.iheduc.2004.02.001

Gençer, B. G. (2015). *Okullarda ters-yüz sınıf modelinin uygulanmasına yönelik bir vaka çalışması* [A case study towards the implementation of the flipped classroom model in the schools]. Master Thesis, Bahçeşehir University Institute of Educational Sciences, İstanbul.

Görü Doğan, T. (2015). Sosyal medyanın öğrenme süreçlerinde kullanımı: Ters-yüz edilmiş öğrenme yaklaşımına ilişkin öğrenen görüşleri. *Açıköğretim Uygulamaları ve Araştırmaları Dergisi, 1*(2), 24- 48.

Graham, M., McLean, J., Read, A., Suchet-Pearson, S., & Viner, V. (2017). Flipping and still learning: experiences of a flipped classroom approach for a third-year undergraduate human geography course. *Journal of Geography in Higher Education, 41*(3), 403-417. https://doi.org/10.1080/03098265.2017.1331423

Han, Y. J. (2015). Successfully flipping the ESL classroom for learner autonomy. *NYS Tesol Journal, 2*(1), 98-109.

Hao, Y. (2016a). Middle school students' flipped learning readiness in foreign language classrooms: exploring its relationship with personal characteristics and individual circumstances. *Computers in Human Behavior, 59*, 295-303 https://doi.org/10.1016/j.chb.2016.01.031

Hao, Y. (2016b). Exploring undergraduates' perspectives and flipped learning readiness in their flipped classrooms. *Computers in Human Behavior, 59,* 82-92. https://doi.org/10.1016/j.chb.2016.01.032 .

Hayırsever, F., & Orhan, A. (2018). Ters yüz edilmiş öğrenme modelinin kuramsal analizi [A theoretical analysis of flipped learning]. *Mersin University Journal of the Faculty of Education, 14*(2), 572-596. https://doi.org/10.17860/mersinefd.431745

Hinojo-Lucena, F. J., Lopez Belmonte, J., Fuentes Cabrera, A., Trujillo Torres, J. M., & Pozo Sanchez, S. (2020). Academic effects of the use of flipped learning in physical education. *International journal of environmental research and public health, 17*(1), 276. https://doi.org/10.3390/ijerph17010276

Jenkins, M., Bokosmaty, R., Brown, M., Browne, C., Gao, Q., Hanson, J., & Kupatadze, K. (2017). Enhancing the design and analysis of flipped learning strategies. *Teaching & Learning Inquiry*, *5*(1), 1-12. https://doi.org/10.20343/teachlearninqu.5.1.7

Jong, M.S.Y. (2023). Flipped classroom: motivational affordances of spherical video-based immersive virtual reality in support of prelecture individual learning in pre-service teacher education. *Journal of Computing in Higher Education, 35*, 144-165. https://doi.org/10.1007/s12528-022-09334-1

Karadeniz, A. (2015). Ters-yüz edilmiş sınıflar [Flipped classrooms]. *Journal of Research in Education and Teaching, 4*(3), 322-326.

Katsa, M., Sergis, S., & Sampson, D. G. (2016). Investigating the potential of the flipped classroom model in K-12 mathematics teaching and learning. *International Association for Development of the Information Society.* https://eric.ed.gov/?id=ED571429

Kazu, İ.Y. & Kurtoğlu, C. (2020). Research of flipped classroom based on students' perceptions. *Asian Journal of Education and Training, 6*(3), 505-513. https://files.eric.ed.gov/fulltext/EJ1267088.pdf

Kline, R. B. (2011). Principles and practice of structural equation modeling (3rd ed.). Guilford Press.

Kozikoğlu, İ., Erbenzer, E., & Gülşah, A., (2021). Öğretmenlerin ters yüz öğrenme öz-yeterlik algıları ile öğrenen özerkliğini destekleme davranışları arasındaki ilişki [The relationship between teachers' flipped learning self-efficacy perceptions and behaviors of supporting learner autonomy]. *Atatürk University Journal of Kazım Karabekir Education Faculty, 42*, 344-366. https://doi.org/10.33418/ataunikkefd.796531

Long, T., Cummins, J., & Waugh, M. (2019). Investigating the factors that influence higher education instructors' decisions to adopt a flipped classroom instructional model. *British journal of educational technology*, *50*(4), 2028-2039. https://doi.org/10.1111/bjet.12703

Ma, L., & Lee, C. S. (2021). Evaluating the effectiveness of blended learning using the ARCS model. *Journal of computer assisted learning, 37*(5), 1397-1408. https://doi.org/10.1111/jcal.12579

Macaskill, A. & Taylor, E. (2010). The development of brief measure of learner autonomy in university students. *Studies in Higher Education, 35*(3), 351- 359. https://doi.org/10.1080/03075070903502703

Muijs, D. (2004). *Doing quantitative research in education with SPSS*. *Sage*

Mulenga, E. M., & Marbán, J. M. (2020). Is COVID-19 the gateway for digital learning in mathematics education? *Contemporary Educational Technology, 12*(2), 1-11. https://doi.org/10.30935/cedtech/7949

Oura, H., IkejirI, R., Fushikida, W., Anzai, Y., & Yamauchi, Y. (2018). Evaluation of a Flipped Learning Model in a MOOC on History. *Educational Technology Research, 41*(1), 105-124. https://doi.org/10.15077/etr.42147

Özbay, Ö. & Sarıca, R. (2019). Ters yüz sınıfa yönelik gerçekleştirilen çalışmaların eğilimleri: Bir sistematik alanyazın taraması [The trends of studies regarding flipped classroom: a systematic review of literature]. *Ahi Evran University Institute of Social Sciences Journal, 5*(2), 332-348. https://doi.org/10.31592/aeusbed.595036

Özsoy, S. & Özsoy, G. (2013). Eğitim araştırmalarının etkilerinin tahmin edilmesi. *İlköğretim Online, 12* (2), 334-346.

Plageras, A., Xenakis, A., Kalovrektis, K., & Vavouyios, D. (2023). An Application Study of the UTAUT Methodology for the Flipped Classroom Model Adoption by Applied Sciences and Technology Teachers. *International Journal of Emerging Technologies in Learning (Online), 18*(2), 190-202. https://doi.org/10.3991/ijet.v18i02.35585

Rao, C.S. (2019). Blended learning: a new hybrid teaching methodology. *Journal for Research Scholars and Professionals of English Language Teaching, 13*(3), 1-6. https://eric.ed.gov/?id=ED611486

Sankar, J. P., Kalaichelvi, R., Elumalai, K. V., & Alqahtani, M. S. M. (2022). Effective blended learning in higher education during COVID-19. *Information Technologies and Learning Tools, 88*(2), 214-228. https://doi.org/10.33407/itlt.v88i2.4438

Staker, H. & Horn, M. B. (2012). *Classifying K-12 blended learning*. http://192.248.16.117:8080/research/handle/70130/5105

Shrivastava, A. & Shrivastava, M. (2022). An exploration of students' perceptions on the blended learning mode in management education: a case of selected colleges in India. *International Journal of Education and Development using Information and Communication Technology (IJEDICT), 18*(2), 207-214. https://eric.ed.gov/?id=EJ1359551 Srivatanakul, T. (2023). Emerging from the pandemic: instructor reflections and students' perceptions on an introductory programming course in blended learning. *Education and Information Technologies, 28*(5), 5673-5695. https://doi.org/10.1007/s10639-022-11328-6

Talan, T., & Gülseçen, S. (2018). Ters-yüz sınıf ve harmanlanmış öğrenmede öğrencilerin öz-düzenleme becerilerinin ve öz-yeterlik algılarının incelenmesi [Evaluation of the Students' Self-Regulation Skills and Perceived Self-Efficacy in Flipped Classroom and Blended Learning Environments]. *Turkish Journal of Computer and Mathematics Education (TURCOMAT), 9*(3), 563-580. https://doi.org/10.16949/turkbilmat.403618

Tekin, O. (2018). *Tersyüz sınıf modelinin lise matematik dersinde uygulanması: Bir karma yöntem çalışması* [Flipped classroom in high school mathematics: a mixed design study]. Doctoral dissertation, Tokat Gaziosmanpaşa University, Tokat.

Wei, X., Cheng, I., Chen, N. S., Yang, X., Liu, Y., Dong, Y., & Zhai, X. (2020). Effect of the flipped classroom on the mathematics performance of middle school students. *Educational Technology Research and Development, 68*(3), 1461-1484. https://doi.org/10.1007/s11423-020-09752-x

Wut, T.M., Xu, J., Lee, S.W. & Lee, D. (2022). University student readiness and its effect on intention to participate in the flipped classroom setting of hybrid learning. *Education Sciences, 12*(7), 442. https://doi.org/10.3390/educsci12070442

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425-478. https://doi.org/10.2307/30036540

Yavuz, M. & Karaman, S. (2021). Ters yüz sınıf modelinin ortaöğretim düzeyindeki öğrencilerin akademik başarılarına ve deneyimlerine etkisinin incelenmesi [An investigation of the effects of the flipped classroom model on the academic success and experience of secondary school students]. *Bolu Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi, 21*(4), 1127-1144. https://dx.doi.org/10.17240/aibuefd.2021..-918498

Yıldız-Durak, H. (2017). Ortaokul öğrencileri için ters yüz öğrenme hazırbulunuşluk ölçeğinin Türkçe'ye uyarlanması [Turkish adaptation of the flipped learning readiness scale for middle school students]. *Bartin University Journal of Faculty of Education, 6(3), 1056-1068*. https://doi.org/10.14686/buefad.328826

Yildiz-Durak, H. (2018). Flipped learning readiness in teaching programming in middle schools: Modelling its relation to various variables. *Journal of Computer Assisted Learning, 34,* 939-959. https://doi.org/10.1111/jcal.12302

Zagouras, C., Egarchou, D., Skiniotis, P., & Fountana, M. (2022). Face to face or blended learning? A case study: Teacher training in the pedagogical use of ICT. *Education and Information Technologies, 27*(9), 12939-12967. https://doi.org/10.1007/s10639-022-11144-y

Zeineddine, D. (2018). Investigate the effects of flipped learning on understanding of mathematics for secondary students. *Journal of Mathematics Education, 11*(1), 62-80. https://doi.org/10.26711/007577152790021

Zengin, Y. (2017). Investigating the use of the Khan Academy and mathematics software with a flipped classroom approach in mathematics teaching. *Educational Technology & Society, 20* (2), 89–100.