

Research Article

Effects of a Flipped Classroom on EFL Learners' L2 Grit, Language Learner Immunity, and Self-Efficacy: A Mixed-Methods Study

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ABSTRACT

Introduction: Among the non-cognitive factors that influence second language (L2) learning, language learner immunity (LLI), L2 grit, and self-efficacy (SE) have each been linked to learning outcomes, but no previous study has examined all three constructs together within a flipped classroom environment. This mixed-methods study therefore examined the effects of flipped classroom instruction on Iranian EFL learners' LLI, L2 grit, and SE, and explored how learners perceived these effects.

Methodology: Thirty male Iranian EFL learners (beginner level) from a private language institute were assigned to an experimental group ($n = 15$, flipped classroom) and a control group ($n = 15$, traditional classroom) over one academic term. The Language Learner Immunity Questionnaire, the Language-Domain-Specific Grit Scale (L2-Grit), and the English Self-Efficacy Questionnaire were administered before and after the intervention. Group equivalence at pretest and within- and between-group changes were examined using independent-samples and paired-samples t -tests. Semi-structured interviews were conducted with six participants (three per group) before and after the intervention and were analyzed thematically.

Results: The two groups were statistically equivalent at pretest on all three measures. Learners in the flipped classroom showed significantly greater gains than the control group in L2 grit, $t(28) = -3.57$, $p = .001$, $d = 1.30$, and self-efficacy, $t(28) = -2.28$, $p = .031$, $d = 0.83$. LLI improved significantly within the experimental group, $t(14) = -3.97$, $p = .001$, but the between-group difference at posttest was not statistically significant, $t(28) = -1.50$, $p = .145$, $d = 0.55$. Six themes, including coping strategies, resilience, problem-solving strategies, self-determination, persistence, and self-perception, emerged from the interviews with experimental-group participants describing broader and more adaptive strategy use than control-group participants.

Conclusion: Flipped classroom instruction appears to support the development of L2 grit and self-efficacy more consistently than language learner immunity, although qualitative evidence suggested that flipped instruction also fostered psychological resources associated with immunity, such as coping and resilience. The findings carry implications for teachers, teacher trainers, and curriculum designers who wish to use flipped instruction to support learners' non-cognitive development, and they point to the need for larger-scale studies that directly model the interrelationships among LLI, L2 grit, and self-efficacy.

1. Introduction

According to Duckworth et al. (2007), grit is a personality trait characterized by the ability to maintain effort and interest over the long-run while facing different challenges and difficulties. Grit has

two dimensions. The first dimension is perseverance of effort (PE), which refers to the long-lasting effort an individual exerts when pursuing a goal despite difficulties. The second dimension is consistency of

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interest (COI), which pertains to maintaining interest over an extended period of time (Alhadabi & Karpinski, 2020). Gritty language learners exert considerable effort to achieve their goal of learning another language, despite the challenges they face along the way.

Self-efficacy is another personality-related construct that contributes to learners' success in second language learning. According to Bandura (1997), self-efficacy refers to individuals' belief in their abilities to organize and execute the courses of action required to attain a designated type of performance. Learners with high self-efficacy tend to attribute their failures or successes to the amount of effort they invest in a task rather than solely to external factors (Brown, 2007). Therefore, learners with high self-efficacy are more likely to have confidence in their ability to learn a new language and succeed in the learning process.

Just as grit and self-efficacy are influential in language learning, LLI represents another construct that may help learners cope with psychological and emotional challenges and obstacles encountering language learning process (Samavarchi et al., 2019). According to the literature, previous studies have examined grit and self-efficacy and their contributions to language learning in traditional and flipped classroom contexts (Alhadabi & Karpinski, 2020; Li & Yang, 2021; Malureanu et al., 2021; Namaziandost & Çakmak, 2020). However, research examining LLI alongside L2 grit and self-efficacy in a flipped classroom context appeared to be limited. Consequently, the current study aims to examine the effects of a flipped classroom on English language learners' LLI, L2 grit, and self-efficacy.

To the best of the authors' knowledge, no previous study has investigated language LLI, L2 grit, and self-efficacy simultaneously in a flipped classroom context. Therefore, further research is needed to better understand how a flipped classroom environment may influence these three constructs and how learners perceive changes in them over the course of an intervention.

The research questions guiding the present study were as follows:

- Does the implementation of a flipped classroom have any statistically significant impact on language learners' L2 grit?
- Does the implementation of a flipped classroom have any statistically significant impact on language learners' immunity?
- Does the implementation of a flipped classroom have any statistically significant impact on language learners' self-efficacy?
- What are the participants' perceptions at the

initial and final stages of a flipped classroom concerning their L2 grit, their language learning immunity, and self-efficacy?

2. Literature Review

2.1. Language Learner Immunity

Following research on teacher immunity, the concept of language learner immunity (LLI) was introduced to explain how language learners respond to the challenges and stressors associated with second language learning (Attaran, 2017; Attaran et al., 2019; Samavarchi & Hosseini, 2019). Language learning can involve various psychological, social, and educational challenges, including anxiety, demotivation, difficulties with teachers and peers, learning materials, examinations, and other contextual factors (Dörnyei, 1998, 2001; Ghonsooly et al., 2017; Samavarchi & Hosseini, 2019).

Anxiety is particularly relevant to language learning because of the communicative and performance-related demands of language classrooms. Horwitz (1996) and Horwitz et al. (1986) described foreign language anxiety as a combination of feelings, beliefs, and behaviors associated with language learning. Anxiety can have either facilitating or debilitating effects on learning (Alpert & Haber, 1960), depending on how learners respond to it.

According to Attaran (2017), language learning involves processes of socialization and resocialization through which learners adapt to changing psychological, social, and educational conditions. Through these processes, learners may develop resources that help them cope with difficulties and continue learning. Samavarchi and Hosseini (2019) define language learner immunity as "a protective system (innate or acquired) that enables language learners to show flexibility and resistance and to actively or passively deal with both favorable and unfavorable emotions and conditions" (p. 5). They also identified five forms of LLI, namely productive auto-immunity, maladaptive auto-immunity, productive adaptive immunity, maladaptive immunity, and non-immunity.

Since the current study relies on the definition provided by Attaran (2017), LLI can therefore be understood as a dynamic protective system that acts within three main procedures of threat recognition, response generation, and self-regulation. This means that:

LLI is a dynamic system that is shaped by L2 learners to maintain their equilibrium in the face of the educational and social-psychological forces in their language learning process. At the educational level, LLI is the representation of learners' constant adaptation to a variety of complex relationships in

their educational setting in sync with their language learning purposes (Attaran et al., 2019).

2.2. Self-Efficacy

Bandura (1997) defined self-efficacy from a social-cognitive perspective as individuals' beliefs about their capabilities to produce desired levels of performance and exercise control over events that affect their lives (p. 71). Individuals with high self-efficacy tend to attribute success and failure to the amount of effort they exert, whereas those with low self-efficacy are more likely to attribute failure to external factors or limited abilities (Brown, 2007). Self-efficacy can therefore influence the amount of effort and persistence individuals demonstrate when performing a task. People with higher levels of self-efficacy tend to invest greater effort and persist longer when facing difficulties (Bandura, 1986).

Self-efficacy is a domain- and situation-specific construct, meaning that individuals' perceived capabilities may vary across different tasks and contexts (Cassidy & Eachus, 1998). Therefore, self-efficacy should be assessed in relation to a specific domain to obtain a more accurate measurement. Bandura (1982) identified four major sources of self-efficacy: enactive mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states. These sources contribute to individuals' judgments about their capabilities and can consequently influence their motivation, emotional responses, and behavior.

In educational contexts, self-efficacy has been associated with learners' engagement, achievement, motivation, and self-regulation (Honick & Broadbent, 2016; Raoofi et al., 2012; Schunk, 1991). Learners with higher levels of self-efficacy are more likely to engage in self-regulated learning and take greater responsibility for acquiring knowledge rather than relying solely on teachers (Zimmerman, 1998). Self-efficacy has also been found to be associated with grit and academic performance. For example, Alhadabi and Karpinski (2020) reported a positive relationship between self-efficacy and the two dimensions of grit, namely perseverance of effort and consistency of interest. Similarly, Tilfarlioğlu and Ciftci (2011) found a positive relationship between self-efficacy and academic success.

Self-efficacy is particularly relevant to second-language learning, where learners may experience anxiety and other emotional challenges. Hsieh and Schallert (2008) found that self-efficacy can predict language learners' success and failure, while Pajares (2003) highlighted its role in learners' motivation. Given the relationship between self-efficacy, persistence, motivation, and language-learning outcomes, examining this construct in different instructional contexts, including flipped classrooms, is

warranted.

2.3. Grit

Grit is a personality trait introduced by Duckworth et al. (2007) and defined as "perseverance and passion for long-term goals" (p. 1087). It consists of two dimensions: perseverance of effort, referring to sustained effort despite challenges, and consistency of interest, referring to maintaining interest in a goal over an extended period (Duckworth et al., 2007).

Grit has been associated with achievement and other psychological factors. Research has examined its relationship with well-being, motivation, anxiety, and academic performance (Changlek & Palanukulwong, 2015; Datu et al., 2016; Eskreis-Winkler et al., 2014). In educational contexts, grittier students have generally been found to demonstrate greater persistence and, in some studies, higher academic achievement. However, findings regarding the relationship between grit and academic achievement have not always been consistent. For example, Wei et al. (2019) reported a weak positive relationship between L2 grit and English language grades, whereas Yamashita (2018) found no significant relationship between grit and course grades among Japanese language learners.

Research on L2-specific grit has also expanded with the growing interest in domain-specific forms of grit. Studies have investigated its relationships with motivation, anxiety, proficiency, age, and gender (Changlek & Palanukulwong, 2015; Oxford & Khajavy, 2021; Teimouri et al., 2020). Evidence suggests that L2-specific perseverance of effort may be more strongly associated with second- and third-language achievement than domain-general grit (Sudina & Plonsky, 2020, as cited in Oxford & Khajavy, 2021).

To assess domain-specific grit in second language acquisition, Teimouri et al. (2020) developed a nine-item L2 grit scale comprising two dimensions: consistency of interest and perseverance of effort. Given the role of persistence and sustained interest in language learning, L2 grit may be particularly relevant in learning environments that require greater learner autonomy and engagement, such as flipped classrooms.

2.4. Flipped Classroom

The flipped classroom is a technology-enhanced instructional approach in which learners access instructional materials, such as video lectures, before class and engage in active, collaborative, and problem-solving activities during class time (Bishop & Verleger, 2013). Unlike traditional classrooms, where instructional content is primarily delivered during class and practice is often assigned as homework, flipped classrooms shift content delivery outside the classroom and use class time for interaction, practice, and problem-solving (Bergman & Sams, 2012;

Jamaludin & Osman, 2014).

This approach can promote learner autonomy, self-directed learning, active participation, and engagement. Learners can also access instructional materials at their own pace and review them when necessary, while classroom time can be devoted to collaborative activities and receiving feedback from teachers and peers (Jdaitawi, 2019; Strayer, 2012). Thus, the flipped classroom changes the role of teachers from primary knowledge providers to facilitators of learning and gives learners greater responsibility for their learning process.

Previous research has also reported positive associations between flipped classrooms and learners' self-efficacy. For example, Namaziandost and Çakmak (2020) found that learners in a flipped classroom demonstrated significantly higher self-efficacy than those in traditional classrooms. Similarly, Makale (2017) reported higher self-efficacy among pre-service teachers who participated in a flipped classroom compared with those in a traditional classroom.

The flipped classroom may also be relevant to learners' grit because its emphasis on learner autonomy, preparation before class, active participation, and problem-solving requires sustained effort and persistence. Yoon et al. (2020) reported that grit was associated with achievement in learning contexts, suggesting that persistence and consistency of interest may be particularly relevant to learning environments that require greater learner responsibility.

Despite these potential benefits, flipped classrooms may also present challenges. Their effectiveness can depend on learners' motivation and willingness to engage with instructional materials before class. In addition, unequal access to technological resources may limit some learners' participation (Du et al., 2014). Therefore, further research is needed to examine how flipped classroom instruction may influence learners' psychological characteristics, particularly language learner immunity, L2 grit, and self-efficacy.

3. Methodology

This study employed an explanatory sequential mixed-methods design (Creswell & Plano Clark, 2018), combining a quasi-experimental, pretest-posttest control-group quantitative phase with a follow-up qualitative phase based on semi-structured interviews, in order to both test the effect of flipped classroom instruction on the three constructs and explore learners' perceptions of that effect.

3.1. Participants

The participants were 30 male English language learners recruited through convenience sampling

from the Foreign Language Institute of Jihad Daneshgahi in Neyshabur, Iran. All participants were at the beginner level of English proficiency and were informed about the purpose of the study before participation. Following recruitment, participants were randomly assigned to an experimental group ($n = 15$) or a control group ($n = 15$) using a random-number sequence generated for this study and no participant crossover occurred. Participants ranged in age from 14 to 28 years; 15 were high-school students, 10 were middle-school ("junior") students, three held a B.A. degree, and two held an M.A. degree. Demographic information for the quantitative phase is presented in Table 1.

Table 1.
Demographic Information of Participants in the Quantitative Phase

Gender	N	Educational Level	N	English Proficiency	N
Male	30	High school student	15	Beginner	30
		Middle-school (junior) student	10		
		B.A.	3		
		M.A.	2		
		Total	30		
Total	30	Total	30	Total	30

For the qualitative phase, six participants (three from the experimental group and three from the control group) were selected using purposive sampling. They were male learners aged 14–28 years with the same beginner proficiency level but different educational backgrounds: two high-school students, one middle-school student, two B.A. holders, and one M.A. holder. Data collection continued until no new codes emerged across the six interviews, at which point data saturation was considered to have been reached (Table 2).

Table 2.
Demographic Information of Participants in the Qualitative Phase

Gender	N	Educational Level	N	English Proficiency	N
Male	6	High school student	2	Beginner	6
		Middle-school (junior) student	1		
		B.A.	2		
		M.A.	1		
		Total	6		
Total	6	Total	6	Total	6

3.2. Instruments

Three questionnaires were used to collect the quantitative data: the Language Learner Immunity Questionnaire (LLIQ), which yields scores on three sub-constructs (L2 Immunity Stressors, Immunity-related L2 Learners' Characteristics, and L2 Immunity-related Coping Behaviors); the Language-Domain-Specific Grit Scale (L2-Grit); and the English Self-Efficacy Questionnaire (ESQ). A semi-structured interview protocol was used to collect the qualitative data.

3.2.1. Language Learner Immunity Questionnaire (LLIQ)

Language learner immunity was measured using the LLIQ developed by Attaran (2017). The questionnaire consists of two parts: a demographic information section and 66 items measuring three sub-constructs, namely L2 Immunity Stressors (LIS), Immunity-related L2 Learners' Characteristics (ILLC), and L2 Immunity-related Coping Behaviors (LICB). Items are rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was administered in Farsi. In the present study, it demonstrated high internal consistency (Cronbach's $\alpha = .91$).

3.2.2. English Self-Efficacy Questionnaire (ESQ)

Students' self-efficacy in language learning was measured using the English Self-Efficacy Questionnaire developed by Rahemi (2007). The questionnaire consists of 10 items rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). It was adapted from the General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995), with items informed by the Beliefs About Language Learning Inventory (BALLI; Horwitz, 1988). In the present study, the questionnaire showed high internal consistency (Cronbach's $\alpha = .89$).

The questionnaire was translated into Farsi using a back-translation procedure (Brislin, 1970). The Farsi version was translated back into English by three qualified translators and compared with the original version to identify discrepancies. The resulting comparison indicated approximately 91% similarity

between the translated and original versions.

3.2.3. Language-Domain-Specific Grit Scale (L2-Grit)

L2 grit was measured using the Language-Domain-Specific Grit Scale developed by Teimouri et al. (2020). The scale consists of nine items rated on a five-point scale ranging from 1 (not like me at all) to 5 (very much like me) and includes two sub-components: Perseverance of Effort (PE) and Consistency of Interest (CI). Five items assess perseverance of effort and four assess consistency of interest. The scale demonstrated high internal consistency in the present study (Cronbach's $\alpha = .87$).

As no Farsi version was available, the scale was translated into Farsi using a back-translation procedure. The overall comparison between the back-translated and original versions indicated approximately 93% similarity. The Farsi version was subsequently used in the study.

3.2.4. Qualitative Phase Instrument

Data for the qualitative phase were collected through semi-structured interviews focusing on L2 grit, language learner immunity, and self-efficacy. Interview questions were developed based on the relevant literature and were translated into Farsi. All interviews were conducted in Farsi to facilitate participants' expression and comprehension. The semi-structured format also allowed the researcher to ask follow-up questions when clarification was needed (Creswell & Plano Clark, 2018). The interview questions are presented in Table 3.

Table 3.
Semi-Structured Interview Questions

Variable	Interview Questions
	When you face a stressful situation in class, how do you deal with it?
Language Learner Immunity (LLI)	How do you overcome your demotivation, anxiety, or tiredness during the language-learning process? Have you ever felt you lost interest in learning English? What did you do to overcome that feeling? How do you resist the difficulties you experience and continue learning effectively in the classroom?
L2 Grit	How do you keep yourself motivated and avoid losing interest in learning English? How hard have you worked to learn English, and why did you not give up?
Self-Efficacy	How do you feel when you use English in different situations (e.g., speaking, listening, reading, writing)? How confident are you about your ability to learn English?

3.3. Procedure

3.3.1. Data Collection

The present study was conducted during the 2023 spring semester. This mixed-methods study employed both quantitative and qualitative approaches to answer the research questions and also to take into consideration the voice of the participants. The context where this study was conducted was an institute in Neyshabur (Foreign Language Institute of Jihad Daneshgahi), in which many languages, such as French, German, Turkish, etc., are taught, including English. It is a private institute but under the

supervision of the Ministry of Education of Iran. The textbooks taught in this institute are the Let's Go series for children, English File, Solution series, and Summit for adult learners. The participants of this study in both groups (Control group and experimental group) used the Solution Elementary book, which is used to teach adult English learners at the beginner level. Classes were all held for 90 minutes

Since the study included participants who were younger than 18 years old, the researchers informed the learners and their parents of the purpose of this study. In this regard, they held a session in the

institute, invited all the participants' parents and learners, gave an overview of the study, and answered every question that concerned learners and their parents. Due to the nature of the flipped classroom, teaching happens before class time. In order to make sure that participants will follow the program, the researcher asked the participants' parents in the experimental group to monitor the participants and make sure that they will watch the videos.

In this study, first, students were interviewed individually for approximately 10 minutes in a semi-structured interview, once at the beginning and once at the end of the course. To measure the three questionnaires of the study, L2-grit, ESQ, and LLIQ were distributed among learners before the term began. Learners had 5 minutes to fill out the L2-grit questionnaire, and to fill out the ESQ questionnaire, learners had 5 minutes, and to fill out the LLI questionnaire, learners had 15 minutes. In addition, demographic information of the students, such as age, level of education, and gender, was collected. At the end of the term and after the treatment of the flipped classroom, the same questionnaires were given to the same students.

For each session, learners received a video lecture made by the instructor to teach the contents of each lesson before class time. The researcher made a group for the participants in Rubica (a social media program) and sent them the videos the day before each session. The length of each video varied between 7 and 10 minutes. In these videos, vocabulary and grammar were taught through pictures, voices, and short videos. Learners in the treatment group were asked to watch the video before the class and ask any questions regarding the contents of the videos before class. Further instructions and questions and answers were

provided through voice messages, and the class time was dedicated to interactive problem-solving and doing activities related to content they had already learned. Students in the controlled group received the content of the videos but in a standardized lecture during class time, and they were given the same problems to solve and the same activities to do outside the classroom.

3.3.2. Data Analysis

Quantitative data were analyzed using SPSS (version 27). Group equivalence at pretest was examined using independent-samples t tests, given that the experimental and control groups comprised different, unrelated participants. Within-group change from pretest to posttest was examined for each group separately using paired-samples t tests, and between-group differences at posttest were examined using independent-samples t tests, for each of the three constructs (L2 grit, LLI, and self-efficacy). Interview transcripts from both the initial and final stages of the treatment were imported into NVivo, and codes and themes were extracted through thematic analysis.

4. Results

4.1. Preliminary Analysis: Normality

Prior to the main analyses, the normality of the distributions was examined using the Kolmogorov-Smirnov test. A non-significant result ($p > .05$) indicates that a distribution does not differ significantly from a normal distribution. As shown in Table 4, all variables yielded non-significant Kolmogorov-Smirnov statistics ($p > .05$), indicating that the data were approximately normally distributed and that parametric analyses were appropriate for all subsequent comparisons.

Table 4.
Descriptive Statistics and Kolmogorov-Smirnov Normality Test Results

Variable	n	M	SD	K-S D	p
Immunity – Control, pretest	15	192.87	23.26	.131	.200
Immunity – Control, posttest	15	192.20	20.32	.134	.200
Immunity – Experimental, pretest	15	191.60	9.27	.107	.200
Immunity – Experimental, posttest	15	201.47	12.65	.160	.200
Grit – Experimental, pretest	15	31.80	4.57	.184	.183
Grit – Experimental, posttest	15	37.53	3.36	.143	.200
Grit – Control, pretest	15	32.20	6.47	.142	.200
Grit – Control, posttest	15	32.40	4.45	.154	.200
Self-efficacy – Experimental, pretest	15	37.20	5.47	.108	.200
Self-efficacy – Experimental, posttest	15	42.13	3.89	.108	.200
Self-efficacy – Control, pretest	15	38.80	5.39	.192	.143
Self-efficacy – Control, posttest	15	38.27	5.31	.206	.087

4.2. Baseline Equivalence of the Experimental and Control Groups

To confirm that the experimental and control groups did not differ before the intervention, independent-samples t tests were conducted on

pretest scores for L2 grit, language learner immunity, and self-efficacy. As shown in Table 5, no significant differences were found between the groups on any of the three measures, confirming that the groups were statistically equivalent at the outset of the study.

Table 5.
Independent-Samples t Test Results for Pretest Group Equivalence

Variable	Control M (SD)	Experimental M (SD)	t(28)	p	d
Language learner immunity	192.87 (23.26)	191.60 (9.27)	0.20	0.846	0.07
L2 grit	32.20 (6.47)	31.80 (4.57)	0.20	0.846	0.07
Self-efficacy	38.80 (5.39)	37.20 (5.47)	0.81	0.426	0.30

4.3. Flipped Classroom and Learners' L2 Grit, Language Learner Immunity, and Self-Efficacy

Table 6 summarizes the within-group (paired-samples) and between-group (independent-samples) results for L2 grit, self-efficacy, and language learner immunity reported below.

Within-group paired-samples t tests showed that L2 grit increased significantly in the experimental group from pretest ($M = 31.80$, $SD = 4.57$) to posttest ($M = 37.53$, $SD = 3.36$), $t(14) = -3.50$, $p = .004$, $d_z = 0.90$, whereas the change in the control group was not significant, $t(14) = -0.10$, $p = .919$. A between-group independent-samples t test at posttest confirmed that the experimental group scored significantly higher on L2 grit than the control group, $t(28) = -3.57$, $p = .001$, $d = 1.30$ (a large effect).

Self-efficacy likewise increased significantly in the

experimental group from pretest ($M = 37.20$, $SD = 5.47$) to posttest ($M = 42.13$, $SD = 3.89$), $t(14) = -2.80$, $p = .014$, $d_z = 0.72$, whereas the control group showed no significant change, $t(14) = 0.40$, $p = .695$. At posttest, the experimental group scored significantly higher on self-efficacy than the control group, $t(28) = -2.28$, $p = .031$, $d = 0.83$ (a large effect).

Language learner immunity improved significantly within the experimental group from pretest ($M = 191.60$, $SD = 9.27$) to posttest ($M = 201.47$, $SD = 12.65$), $t(14) = -3.97$, $p = .001$, $d_z = 1.02$, whereas the control group showed no significant change, $t(14) = 0.11$, $p = .915$. However, the between-group difference at posttest was not statistically significant, $t(28) = -1.50$, $p = .145$, $d = 0.55$, indicating that although flipped instruction was associated with a significant within-group gain in immunity, it did not produce a significantly larger gain than traditional instruction.

Table 6.
Within-Group (Paired-Samples) and Between-Group (Independent-Samples) Results for L2 Grit, Self-Efficacy, and Language Learner Immunity

Variable	Group	Pretest M (SD)	Posttest M (SD)	Within t(14)	p	d _z	Between t(28)	p	d
L2 grit	Experimental	31.80 (4.57)	37.53 (3.36)	-3.50	.004	0.90	-3.57	.001	1.30
L2 grit	Control	32.20 (6.47)	32.40 (4.45)	-0.10	.919	0.03	—	—	—
Self-efficacy	Experimental	37.20 (5.47)	42.13 (3.89)	-2.80	.014	0.72	-2.28	.031	0.83
Self-efficacy	Control	38.80 (5.39)	38.27 (5.31)	0.40	.695	0.10	—	—	—
Language learner immunity	Experimental	191.60 (9.27)	201.47 (12.65)	-3.97	.001	1.02	-1.50	.145	0.55
Language learner immunity	Control	192.87 (23.26)	192.20 (20.32)	0.11	.915	0.03	—	—	—

4.4. Findings of the Qualitative Phase

The purpose of the qualitative phase of this study was to explore the participants' perceptions at the initial and final stages of the Flipped Classroom on how Flipped Classroom improves their L2 grit, language learning immunity, and self-efficacy. Participants were divided into two groups: a control group that received traditional classroom instruction and an experimental group that received flipped classroom instruction. Both groups were interviewed through a semi-structured interview. To collect the data, both groups were interviewed once at the initial stage and once at the final stage of the treatments. Collected data were transcribed, and participants' responses were coded into themes and sub-themes using thematic analysis. The following emerged themes and sub-themes are explained for both groups.

4.4.1. Coping Strategies

This theme refers to the strategies and methods participants use to deal with various difficulties,

stress, emotions, and anxiety that a learner might face in a classroom. The sub-themes of this theme are emotional regulation, motivational regulation, endurance, obligatory learning, optimism, benefits of English, resilience, and social support.

Emotional regulation is the ability to regulate and control emotions when dealing with different situations in an English classroom. The most repeated code in emotional regulation is silence. Silence as a coping strategy was referred to by all the participants in the control group in both pre-and post-interviews to answer the first question of language learner immunity (LLI) interview questions: When you face a stressful situation in class, how do you deal with it?

One participant in the control group answered how he deals with stressful situations:

I try not to think about that situation and keep quiet. Usually, silence in these situations helps me regain control.

Another one said:

In these situations, I remain silent and do not talk to anyone to calm down and digest what happened.

One participant in the experimental group answered as follows:

At first, I keep quiet a little and behave more calmly, and after mastering myself, I try to get out of this stressful situation by asking questions to the teacher.

Besides staying silent, some participants in both groups preferred keeping calm and trying to regain control. This type of behavior was mentioned in both the experimental and control groups' responses. as one of the participants in the control group responded:

Before anything, I try to keep calm, and if possible, I consult with someone. If there is no one I can quickly consult, I try to remain silent until the atmosphere calms down.

Another one in the experimental group said:

I encourage myself, try not to lose myself, and keep calm. Keeping calm always helps me understand the situation better and regain control over the stressful situation that caused me to lose my temper.

Another sub-theme of the coping strategies was seeking support from teachers or classmates. Seeking social support was one of the most repeated sub-themes. Participants in the control group, both pre- and post-interviews, relied on their teachers and peers to help them deal with these stressful situations.

One participant in the control group said:

I try not to think about that situation and keep quiet. Usually, silence in these situations helps me regain control, but sometimes, if I feel comfortable with the person sitting next to me in class, I talk to them about the case to calm down.

Another one said:

I keep silent, try to be calm, and talk to someone about the issue as much as possible.

While only one of the participants in the experimental group relayed to his teacher how to deal with the situation

At first, I keep quiet a little and behave more calmly, and after mastering myself, I try to get out of this stressful situation by asking questions to the teacher.

The third sub-theme of the coping strategy theme was motivational regulation. Motivational regulation is another coping strategy that refers to all the behaviors that can help a person initiate, keep, or boost their motivation (Wolters, 2003). Goal orientation, one of the motivational regulation sub-themes with the most repetition among participants, emerged in response to the interview's second and third LLI questions. Participants in both experimental and control groups mentioned that their goals to learn

English motivate them and make them overcome anxiety and tiredness of the English learning process.

The following quote exemplifies how goal orientation can motivate people to overcome demotivation, tiredness, and anxiety.

To overcome my tiredness and anxiety, I think about the primary motivation for which I started learning English in the first place. My goals of learning English also makes me overcome my demotivation sometimes. My primary goal is to go to university and study English. Every time that I feel like I do not have the enthusiasm that I had in the beginning, I think of my goals, and these thoughts motivate me again.

However, compared to the control group responses in which their previous goals helped them keep their motivation and deal with tiredness and anxiety, in the experimental group, one of the participants mentioned that they had set some new goals.

I think about the successes I can achieve by using the English language and about my new goals; these new goals give me energy and motivation and reduce tiredness and anxiety. I want to become a teacher, but I have always hated how my teachers teach us at school, and now I know that new teaching styles can help me become a better teacher than my own teachers at school.

Besides having goals and making new goals to aid participants in overcoming demotivation, when participants were asked if they had lost interest in learning English and how they overcame that feeling, participants in the control group showed consistent interest in their responses at pre and post-interviews. This is while two out of three participants in the experimental group mentioned that in the final stages of flipped classroom treatment, they felt an increased interest in learning English.

Since the beginning of the semester, I have not lost my interest in learning the English language, and I can even say that it has increased. At first, it was a little challenging for me to learn my lessons by myself and just by watching the videos you (the teacher) sent me. But in the end, I felt it was more manageable, and I am more comfortable with this teaching method.

4.4.2. Resilience

The capacity to overcome trauma, adversity, or stress is resilience. It refers to the process of effectively adjusting to unpleasant or challenging life situations. Resilient people may overcome the harmful effects of stress and trauma and recover more quickly.

In response to the last interview's LLI question, how do you resist the difficulties you experience and continue learning effectively in the classroom? The experimental group's responses led to the emergence

of the resilience sub-theme. To resist difficulties and challenges and solve problems, they relied on their past experiences. This shows that they are trying to adapt to the flipped classroom environment.

To overcome the difficulties, relying on the experiences I have had before, I know that with effort, these difficulties will be resolved, and I will reach the desired result. But this was not the case from the beginning. At first, in the face of difficulties, my strategy was to ignore them completely. If possible, I completely removed myself from that situation instead of staying and trying to solve it.

Another participant in the post-interview said:

When I face difficulties, I always try to think correctly and find a solution. For example, I ask the teacher for help or talk to other people who have experience in this field and find a solution.

4.4.3. Problem-Solving Strategies

English learners use these types of strategies in the face of problems. They think of a good solution for a problem to reach their goals. Applying prior knowledge and getting advice from more experienced ones were two of the most repeated strategies participants in both groups (experimental and control groups) used to solve similar problems they faced. As one of the participants in the control group said:

If I face a difficulty, I will try to get advice or solve this problem according to the previous challenges and how to solve them. In my case, my teachers are the most experienced people that I know can help me solve my English problems.

Solving a problem demands trying many solutions until a proper solution is applied for that specific problem. The motivation that goals and purposes of learning English give to the learner can also play a crucial role in solving a problem and not giving up learning.

One of the participants in the experimental group said:

There may always be some difficulties in doing whatever I like, so I think about it in advance, prepare myself for these situations, and try to find the best solutions when difficulties arise. Usually, I try different ways to find a solution. For example, If I have a problem understanding a grammatical point, I first search the web, if it does not work, I get help from my friends or classmates, and in the end, I ask my teacher to explain the point again.

Another participant in the post-interview of the experimental group said:

The successes I have achieved so far through the English language motivate me to overcome these difficulties. The goals that I need English to achieve make me endure and solve the problems I encounter in learning English.

As can be seen from the responses, participants apply strategies such as getting advice, motivation, and using prior knowledge to overcome their problems in the process of English language learning. The following figure shows the themes and sub-themes that emerged for language learning immunity (LLI) during the interview (see Figure 1).

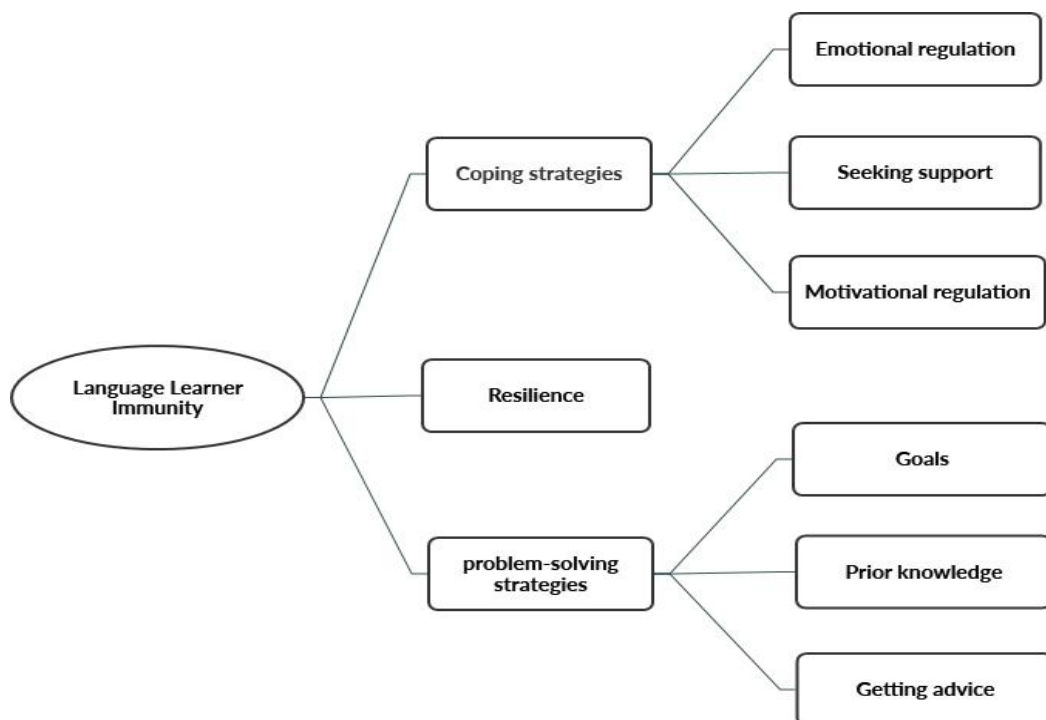


Figure 1.

Subordinate Themes Related to Coping Strategies, Resilience, and Problem-solving Strategies

4.4.4. Self-Determination

This theme emerged in response to the first interview's L2-grit question. A general theory of human motivation called self-determination theory (SDT) asserts that people have three fundamental psychological needs: autonomy, competence, and relatedness. Autonomy in EFL contexts is essential, and this is because learners cannot have access to English classrooms all the time, and they should pursue learning outside of the classroom and by themselves.

Autonomy was the first sub-theme that emerged from the experimental group responses. One participant at the post-interview stated:

From the first day I started learning English, my motivation was high, and it is the same now because I chose this path with my interest and purpose, and I am very satisfied, which motivates me to continue. This classroom environment (flipped classroom) we are experiencing now inspired me to learn more from videos and teachers on YouTube or Instagram.

The above-mentioned quote also points to another feature that is evidence that this participant is self-determined in learning English, which is how he is satisfied with his learning. Satisfaction and enjoyment of learning show that the learner is interested in learning English. Satisfaction was the second sub-theme of self-determination that only in the experimental group post-interview was mentioned. As one of the participants quoted:

I am very interested in English, and I will continue learning English. For example, I challenge myself by watching more educational clips and movies in the original language. I enjoy this type of learning because I can learn whenever and wherever I want.

These sub-themes are summarized in Figure 2.

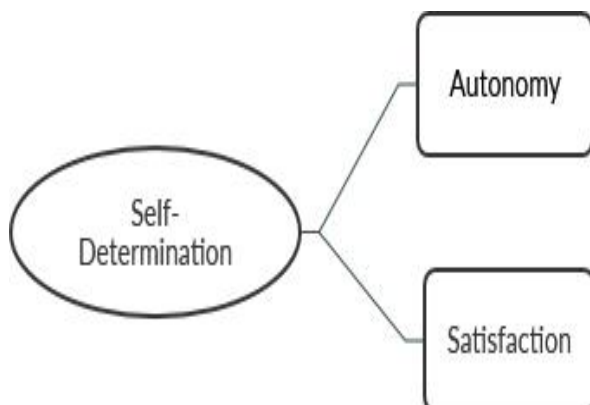


Figure 2.
Subordinate Themes Related to The Self-Determination Theme

4.4.5. Persistence

Being persistent in learning English means that the learner continues pursuing their goals despite challenges along the way. The analysis of the

qualitative data in the L2-grit questions of the interview resulted in emerging persistent as the theme and effort and interest as the sub-themes

One of the participants in the control group, both in pre-and post-interviews, when asked how hard they have tried to learn English and not given up, replied that he tried hard, another one referred to his learning efforts as balanced, and the last one said that he did not try hard.

I am trying hard to learn English and have tried hard enough, and I am satisfied with myself. I know that if I do not do my best to learn English, I will be disappointed with myself later on.

One of the participants blamed his other life concerns as the reason that he did not try hard. He said:

Due to other life concerns, such as university and studies, I have not tried hard and much in learning English. I have progressed in a balanced way to the extent that it meets my language needs, and I have not given up on learning the language because of my goals.

Control group participants seem to prioritize the other goals and did not try too hard to learn English. During the language learning process, they progressed in such a way that their English needs were met not more than that. As is evident in the following quote:

I have tried enough to learn English, but not too much. Sometimes, I have had to stop learning English due to the stress of studying, but after removing the pressure, I have returned to learning again.

This is while the experimental group participants responded to the same question in a way that showed their high effort and interest in learning English.

I tried as much as possible, but I know that I have to do more and devote more time to studying English, which means I should engage more in understanding the English language.

The above quote also proves that the experimental group participants set their English goals as their priority. This shows their interest in English. One flipped classroom learner said:

I have tried hard for the last year to learn English. I tried different methods to learn this language (English). In this last year, all my efforts have paid off, and I have never given up because I can feel my language growth.

When both control and experimental groups were asked how they kept themselves motivated and interested in English, both groups showed that they were interested in learning English. One of the control group participants said:

I have always maintained my interest because I am engaged in learning English with purpose and motivation, not because of other people's advice. But

sometimes, because of other problems, such as work, I had to stop learning for a while.

One of the flipped classroom learners also quoted:

It is rare for me to lose interest in English because I know that the English language has been helpful to me in all stages of my life. I love films and movies in English and living in an English-language country such as America. These reasons keep me motivated. This method change in teaching our class suits me more because I love learning from clips and videos.

Although the control group, compared to the experimental group, had some degree of interest and motivation in English language learning. However, as mentioned in the above quotes, the experimental group showed more effort and interest, as proved by autonomy, satisfaction, and interest sub-themes.

These sub-themes are summarized in Figure 3.

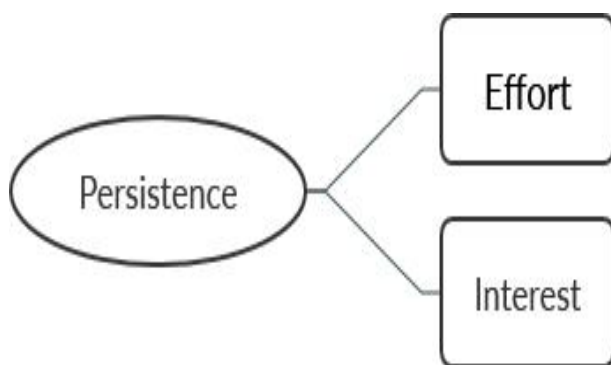


Figure 3.
Subordinate Themes Related to the Persistence Theme

4.4.6. Self-Perception

In different situations, English learners use self-perception to evaluate their English abilities (listening, reading, writing, and speaking). Two sub-themes of self-assessment (evaluating each skill one by one) and Holistic self-assessment (evaluating all the skills generally) emerged out of participants' responses to the interview's self-efficacy questions.

The qualitative data analysis regarding the self-assessment sub-theme showed that the flipped classroom intervention had some positive effects on participants' skills improvement. Two of the experimental group participants in their pre and post-interviews said:

Pre-interview:

I feel good and confident about my English language abilities when I use my skills when I need them, especially when I read and write.

Post-interview:

I have a better feeling about my language abilities than before because I know that they have all improved and have improved in terms of listening and speaking

abilities.

The above-mentioned quotes are from the same person before and after the flipped classroom intervention. Another experimental participant in pre and post-interviews said:

Pre-interview:

When I speak or understand someone in English, I usually feel good about my abilities because I know that I can speak or understand English to some extent. I typically feel better about my language abilities when speaking, listening, and reading than writing.

Post-interview:

I feel better and more confident about my writing ability. My speaking ability is weaker than my writing skills, and my reading and listening abilities are moderate.

This is while participants in the control group did not have any improvement, and based on their self-perception of their skills in the traditional classroom, their abilities were stable during the initial and final stages.

Pre-interview:

It depends on the language level of the situation. Suppose a high language level is asked of me. In that case, I am a little disappointed with my abilities. Still, if it is at my level or lower, I have high confidence in my abilities, especially my reading and writing skills. My speaking and listening skills are not good at all.

Post-interview:

I have high confidence in my reading ability and very high confidence in my speaking and writing ability. I have neither high nor low confidence in my reading ability. My speaking abilities are not good enough, but listening is my weakest skill.

Another participant had high confidence in all his skills in both pre-and post-interviews.

I have confidence and trust in my abilities, and I can handle my work according to what I know. I have relatively good ability in almost all four reading, writing, listening, and speaking skills. I have low confidence in my pronunciation ability. However, I have improved my grammatical skills.

Although control group participants had relatively high skills, they did not show a significant sign of improvement (just some sub-skills improvements) or setback in their abilities. At the same time, experimental group participants improved in some fundamental skills.

While there were some differences between the control and experimental groups in terms of self-assessment of their skills one by one in different situations, they had similar self-confidence in their

holistic self-assessment. All the participants said they generally have moderate or high self-confidence about their skills when asked how confident they are about their abilities in general. As one of the experimental group participants stated:

In general, I have good self-confidence in English. Still, I always feel that I have more room to improve and day by day, I have to add to my learning by practising more because I have witnessed how much my language has improved since the beginning of the semester until now. and it will get better as I continue and I will improve more

Another control group participant said:

I have so much faith and self-confidence in my abilities that if I have to use them somewhere, I don't get too stressed and anxious. Although I know I still have a long way

These sub-themes are summarized in Figure 4.

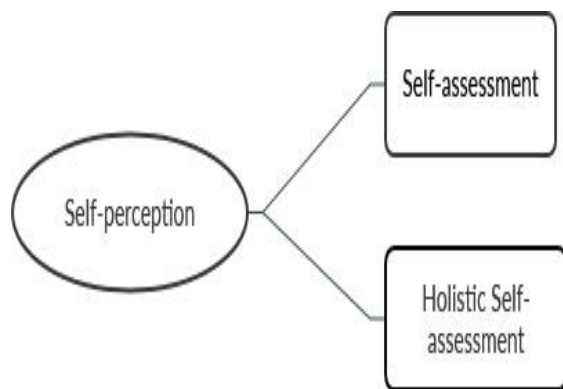


Figure 4.
Subordinate Themes Related to the Self-Perception Theme

5. Discussion

The first research question examined the effect of flipped classroom instruction on EFL learners' L2 grit. The findings showed a significant increase in L2 grit in the experimental group, whereas no significant change was observed in the control group. The post-test comparison also showed a significant difference between the two groups, with higher scores in the experimental group. These findings suggest that flipped classroom instruction can contribute to the development of L2 grit. This finding is partially consistent with Ebn-Abbasi and Nushi (2022), who found an effect mainly for perseverance of effort but not consistency of interest. This difference may be related to the fact that the present study examined L2 grit as an overall construct rather than analyzing its two dimensions separately. The autonomy and responsibility encouraged by flipped learning may help learners maintain effort and interest toward their language-learning goals.

The second research question investigated the effect of flipped classroom instruction on language

learner immunity. Although the experimental group showed a significant improvement in immunity, the post-test comparison between the experimental and control groups was not significant. Thus, flipped instruction was associated with within-group improvement but did not demonstrate a significant advantage over traditional instruction. This finding is consistent with Samavarchi and Hosseini (2019), who suggested that EFL learners can develop immunity against language-learning challenges through different classroom experiences. The absence of a significant between-group difference may indicate that language learner immunity is influenced by factors beyond instructional format, including learners' individual characteristics, previous experiences, motivation, and affective and social resources. The relatively short duration of the intervention may also have limited the development of this complex psychological construct.

The third research question examined the effect of flipped classroom instruction on learners' self-efficacy. The experimental group demonstrated a significant increase in self-efficacy, while no significant change was observed in the control group. The post-test comparison also showed a significant difference between the groups. This finding is consistent with previous research reporting positive relationships between flipped learning and self-efficacy (Fallah et al., 2020; Su Ping et al., 2020). The opportunities for preparation, repeated practice, interaction, and problem-solving in flipped classrooms may provide learners with greater control over their learning and more opportunities to experience successful performance. These experiences may strengthen learners' confidence in their English-learning abilities.

The qualitative findings provided further support for the quantitative results. Six themes emerged from the interview data: coping strategies, resilience, problem-solving strategies, self-determination, persistence, and self-perception. Compared with the control group, experimental-group participants reported greater changes in these areas after the intervention. In particular, they described using a wider range of coping and problem-solving strategies, greater resilience, increased autonomy and persistence, and improved perceptions of their English abilities. These findings suggest that the active and learner-centered nature of flipped instruction may encourage learners to take greater responsibility for their learning and become more engaged in dealing with learning challenges. The findings are consistent with Dörnyei et al. (2015) regarding the importance of coping and resilience in language learning and with Ryan and Deci's (2000) emphasis on autonomy and competence as sources of motivation.

Overall, the findings suggest that flipped classroom instruction may be particularly beneficial for L2 grit

and self-efficacy. Its effect on language learner immunity appears more complex: although immunity improved significantly within the experimental group, the difference between the two instructional conditions was not statistically significant. Nevertheless, the qualitative findings indicate that flipped learning may support psychological resources related to immunity, such as coping, resilience, and problem-solving. Therefore, flipped instruction may provide a useful framework for supporting both language development and important non-cognitive aspects of EFL learning.

6. Conclusion

Taken together, the quantitative and qualitative findings indicate that a one-term flipped classroom intervention produced reliable, medium-to-large gains in Iranian EFL learners' L2 grit and self-efficacy relative to traditional instruction, while its advantage for language learner immunity, though present within the experimental group, was not large enough to be distinguished from traditional instruction at the group level with the present sample size. The interview data suggest that flipped instruction nonetheless supported psychological resources associated with immunity (coping, resilience, and problem-solving) that may develop more slowly than grit and self-efficacy or that may require a larger sample to detect statistically. The present study contributes an initial, exploratory account of how these three constructs co-occur in a flipped EFL classroom; it does not, however, statistically model the associations among LLI, L2 grit, and self-efficacy themselves, and this remains an important next step.

The findings have implications for language teachers, teacher trainers, and curriculum designers. Flipped instruction can be used to provide learners with greater autonomy, opportunities for practice, interaction, and problem-solving, which may support L2 grit and self-efficacy. Teachers and curriculum designers should also consider learners' emotional and social needs and, where appropriate, incorporate activities targeting coping, resilience, and positive psychological resources.

Several limitations should be considered when interpreting these findings. First, the sample was small ($N = 30$, 15 per group) and consisted exclusively of male learners recruited through convenience sampling from a single private language institute, which limits statistical power and the generalizability of the results to other populations, genders, and instructional settings. Second, the intervention lasted a single academic term; longer interventions are needed to determine whether the observed gains, particularly in language learner immunity, are sustained or strengthened over time. Third, although the questionnaires used showed good internal

consistency in this sample, group equivalence at pretest and the translated/back-translated instruments were not further validated through, for example, confirmatory factor analysis or measurement-invariance testing across groups or language versions. Fourth, no a priori power analysis was reported; the present sample size may have been underpowered to detect a moderate between-group effect on immunity, which showed a large within-group effect ($d_z = 1.02$) but only a medium-to-large, non-significant between-group effect ($d = 0.55$). Fifth, the study examined the effect of flipped instruction on each of the three constructs separately; it did not statistically model the associations (e.g., correlations or a path/structural model) among L2 grit, language learner immunity, and self-efficacy, so the co-occurrence of change across the three constructs, while suggestive, cannot be taken as evidence of an underlying structural relationship. Finally, the qualitative sample was limited to six participants, and self-report interview data are subject to social-desirability and recall biases.

Declarations

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Authors' contributions

Behzed Ghonsooly supervised the project and helped with conceptualization. Seyyed Mohammad Zameli performed data collection, formal analysis, and writing the original draft. Elham Naji Meidani helped with conceptualization as well as editing the final draft of the article.

Availability of data and materials

The anonymized dataset and/or interview transcripts can be made available upon reasonable request.

Competing interests

The authors declare no financial or non-financial competing interests.

Ethics approval and consent to participate

This study involved learners under 18 years of age. The authors obtained written parental/guardian consent for participants under 18 and written informed consent from all participants, in addition to the verbal briefing session described in Section 3.3.1.

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Use of artificial intelligence (AI) tools

The authors used Claude for language editing.

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