



The use of L1 in L2 learning in the Indonesian EFL context

Abdul Muqit*,¹ Sahiruddin Sahiruddin,² Aly Imron,¹ Nurhayati Nurhayati,³ Intama Jemy Polii⁴

^{1,2}Politeknik Negeri Malang, Indonesia, ²Universitas Brawijaya, Indonesia, ³Universitas Hasanuddin, Indonesia, ⁴Univeristas Negeri Manado, Indonesia

The issue of L1 usage in the L2 classroom is still open. Historically, using the target language was the most effective method for learning L2. However, some research indicates that incorporating L1 into L2 sessions can also help to improve second language learning. The notion of L1 use in the L2 classroom has also been associated with the notion of translanguaging in the bilingual or multilingual education. The goal of this study is to ascertain the attitudes and beliefs of teachers and students towards the use of first language in the second language classroom and to determine the extent to which such beliefs regarding the use of first language in the L2 classroom is related to one another to facilitate L2 learning. Participants in this study were 115 students (n=115) and 30 university English teachers (n = 30). A questionnaire was used to obtain the data, and descriptive statistics was employed. The study revealed that teachers and students are generally in favor of using L1 in L2 classrooms (bilingual instruction), depending on the context or goals. The L1 is used primarily to enhance L2 proficiency so that as the L2 proficiency progresses, monolingual approach can be implemented. This study partially supports the viability of a bilingual or co-taught method in the L2 classroom.

Keywords: Use of L1, L2 class, co-lingual, bilingual, and monolingual

INTRODUCTION

It has long been debated regarding the teaching and learning processes whether the use of L1 (mother tongue/first language) by teachers, students, or both might help or hinder the acquisition of second languages. Previous research has produced contradicting findings ([Macaro et al., 2017](#); [Sahan, Rose, & Macaro, 2021](#)). It is widely acknowledged that English is the sole language that can be used as a lingua franca and as a medium of communication in a global environment (L2), a lingua franca that has made many people aware of how crucial it is to master English for international business and communication. English as the Medium of Instruction (EMI), or the use of English in the classroom, is common in higher education. The use of EMI in colleges has quickly gained popularity around the globe ([Macaro et al., 2017](#)).

There has been discussion about whether the practice of EMI is monolingual (English only) or bilingual. It is discussed whether the use of monolingual EMI (English only policy in class) can make the language learning successful in relation to the growing importance of multilingual higher education around the world ([Dafouz & Smit, 2020](#); [Fang & Liu, 2020](#); [Graham & Eslami., 2019](#), [Graham & Eslami, 2020](#)). [Fang & Liu \(2020\)](#), for instance, noted that the usage of English does not always convey meaning in communication in the Chinese environment. In addition, [Islam \(2013\)](#) investigated how EMI was implemented in Bangladeshi universities with the help of 17 teachers and 37 undergraduate students, and she

OPEN ACCESS

ISSN 2503 3492 (online)

*Correspondence:

Abdul Muqit
abd.muqit@polinema.ac.id

Received: 13th January 2023

Accepted: 24th March 2023

Published: 10th April 2023

Citation:

Muqit, A., Sahiruddin, S., Imron, A., Nurhayati, N., & Polii, I. J. (2023). The use of L1 in L2 Learning in the Indonesian EFL Context. *JEES (Journal of English Educators Society)*, 8(1). <https://doi.org/10.21070/jees.v8i1.1741>

discovered that the majority of the students struggled with EMI because of their limited vocabulary and low competency. It is advised to use a Bangla language since it aids in comprehension of the subject's material. Additionally, the use of L1 in L2 classes has attracted numerous secondary school researchers from a variety of backgrounds and circumstances for a long time (see for example [Aeurbach, 1993](#); [Cook, 2001](#); [Cummin, 2007](#); [Swain & Lapkin, 2000](#); [Turnbul, 2001](#)). For example, [Aeurbach \(1993\)](#), who examined English-only ESL classes, showed that bilingual and/or L1 choices are crucial for adult ESL learners of all levels, especially those with limited L2 literacy. In this regards, [Cummin \(2007\)](#) supports the use of L1 in classes with multiple languages. [Swain and Lapkin \(2000\)](#) also discovered that L1 use was crucial to students' L2 writing among French immersion students.

Additionally, many scholars who oppose this (English only) policy contend that L1 instruction in L2 classes has been confirmed to facilitate students' learning ([Critchley, 1999](#)). However, academics that advocate for a strategy of teaching entirely in English do so primarily on the grounds that exposure to English (L2) is thought to play a significant role in second language acquisition ([Lightbown & Spada, 2013](#); [Saville-Troike & Barto, 2017](#)). For instance, [Cook \(2001\)](#) discovered that even though L1 and L2 were found interacted when students were doing a translation work, L1 should be avoided to achieve the best L2 results. Similar to this idea, [Turnbull \(2001\)](#) discovered that L2 mastery is benefited when SL or FL teachers employ L2 as much as possible in L2 instruction. Overusing L1 has certain negative effects on learning the L2. There is a lack of knowledge regarding the issue of employing L1 rather than L2 in foreign environments like in Indonesian EFL contexts, particularly with how teachers and students view L1 or L2 use in the English classroom.

Besides, previous research did not address the role of proficiency levels in determining the perception of L1 use in the L2 classroom. The study on the use of L1 in the L2 classroom in an Indonesian higher education context will bring an implication to the nature of L2 learning development model in Indonesia in particular or in Asian context in general. This paper's goal is to investigate the perceptions and reasons of L1 use in L2 teaching and learning by teacher and students. This study is expected to raise an awareness of the importance of L1 in L2 learning among teachers, students, policy makers, and curriculum developers. This study employed [Hall & Cook's \(2013\)](#) questionnaire on L1 utilization in L2 classrooms. The background part of this article, which covers the theoretical underpinnings and pertinent earlier research, served as the organizational framework. The research approach and findings are then given.

The employment of the first language (L1) in the second language (L2) as a method for teaching English in bilingual education has been considered for a long time. To improve English learning outcomes, bilingual teaching using the translanguaging teaching paradigm ([Garcia, 2009](#)) has been suggested. This method shows that languages may coexist

and be used freely and spontaneously in L2 classes. Learning in L1 can improve learning in L2. In this situation, students can use their L1 level or draw from their complete linguistic toolbox while learning ([Cenoz & Santoz, 2020](#)) Language learners are viewed as candidates for or acquiring bilingual or multilingual skills, hence [Garcia et al. \(2017\)](#) argue that teachers should employ a bilingual model in their instruction). [Jing & Kitis \(2023\)](#) reported that translanguaging practice in Chinese context is evident and facilitating L2 learning. While other approaches contest the use of L1 in L2 classrooms, the L2 teaching method theoretically offers some support for the use of L1 in L2 teaching and learning ([Richards and Rodgers, 2014](#)). For instance, until the late 19th century, the L2 teaching method, also known as the grammar translation method, encouraged the use of L1 as a teaching and learning tool. In this way, students' L2 capabilities are assessed based on their capacity to convert L2 competencies into L1 competencies ([Larsen-Freeman, 2000](#)).

Some teachers continue to employ this bilingual strategy despite ongoing disagreements on its efficacy, particularly in hypothetical future situations ([Richards and Rodgers, 2014](#)). The use of L1 in L2 classrooms should be prohibited, according to Henry Sweet in England, Wilhem Viotor in Germany, and other intellectuals across Europe in the 19th century who gave diverse opinions on grammatical translation techniques ([Richards and Rodgers, 2014](#)). As a result, some policy makers and English teachers are starting to completely stop using the L1 language in L2 courses. This idea is congruent with the growth of pragmatic and auditory language approaches, which prevent L1 from falling under the L2 umbrella. It is argued that using L1 to teach L2 is ineffective and ought to be outlawed. This approach is predicated on the idea that the acquisition of L2 reflects the acquisition of L1, allowing kids to pick up L1 quickly and supporting monolingual parenting. The target language alone is the most effective way to learn L2. Researchers from all throughout Europe, including Wilhem Viotor in Germany, contend that L1 instruction in L2 courses ought to be prohibited ([Richards and Rodgers, 2014](#)). As a result, some policy makers and English teachers are starting to completely stop using the L1 language in L2 courses. This idea is congruent with the growth of pragmatic and auditory language approaches, which prevent L1 from falling under the L2 umbrella. It is argued that using L1 to teach L2 is ineffective and ought to be outlawed. This approach is predicated on the idea that the acquisition of L2 reflects the acquisition of L1, allowing kids to pick up L1 quickly and supporting monolingual parenting.

The ideal way to learn L2 is solely through the target language. Researchers from all throughout Europe, including Wilhem Viotor in Germany, contend that L1 instruction in L2 courses ought to be prohibited ([Richards and Rodgers, 2014](#)). As a result, some policy makers and English teachers are starting to completely stop using the L1 language in L2 courses. This idea is congruent with the growth of pragmatic and auditory language approaches, which prevent L1 from falling under the L2 umbrella. It is argued that using L1 to

teach L2 is ineffective and ought to be outlawed. This approach is predicated on the idea that the acquisition of L2 reflects the acquisition of L1, allowing kids to pick up L1 quickly and supporting monolingual parenting. It is ideal to learn L2 exclusively in the target language. (2014). As a result, some policy makers and English teachers are starting to completely stop using the L1 language in L2 courses.

Recent research demonstrates that many teachers employ translanguaging or bilingual practice to foster group discussion, improve knowledge, foster interpersonal ties, and develop multilingual identity ([Fang & Liu, 2020](#); [Jing & Kitis, 2023](#); [Moody et al., 2019](#); [Wang & Curdt-Christiansen, 2019](#)). For instance, bilingual EMI has been found valuable for improving L2 learning in Chinese context ([Moody et al., 2019](#); [Jing & Kitis, 2023](#)), Chinese language instruction at L2 learning in Puerto Rico ([Rivera & Mazak, 2019](#); [Wang and Curdt-Christiansen, 2019](#); [Wang, 2019](#)). In another context, teachers in Qatar used translation or use the L1 in an international class program ([Hillman et al., 2019](#)). [Graham et al. \(2021\)](#) recently conducted a study to assess students' perceptions of teachers' and students' usage of translation (bilingual EMI) revealing that L2 learners exhibited favorable attitudes toward the teacher's use of their first language (Arabic) in class as well as toward other students who also spoke that language. As an explanation, this study also demonstrates a number of variables that affect the utilization of L1, such as professional jargon. It was also found that L1 is utilized to develop a relationship or connection between tutors and students, and that L1 is used for low proficient learners. Some pupils, however, contend that the use of L1 can impede the improvement of English.

The usage of L2 is crucial and promotes L2 learning since L1 can assist L2 learners in producing L2 efficiently ([Johnson and Swain, 1994](#); [Swain & Lapkin \(2000\)](#)). According to [Macaro \(2001\)](#), in applied linguistics, L1 roles in L2 classes typically fall into one of three categories: (a) virtual positions (L1 does not get a place in L2 class because the teacher is sufficiently qualified), (b) maximum position (L1 does not get a place in L2 class but is permitted to use L1 when necessary because the teaching conditions of a typical educational setting (large class) are not ideal and class time is limited), and (c) optimal location (L1 is a valuable and useful resource for increasing L2 during learning). In this instance, it appears that the EFL configuration is mostly responsible for the maximum and optimal positioning. In order to assess the actual conditions of L2 classrooms in relation to the opportunities and obstacles of L2 usage to be seen, studies that look at teacher knowledge and studies in L2 contexts that include motivations for L2 use should be of worth exploring, particularly in an Indonesian EFL setting.

Despite pedagogical disputes in various ESL/EFL contexts, empirical research on teacher attitudes in secondary education is currently drawing a lot of applied linguists and second language acquisition scholars ([Brown, 2000](#); [Bruen & Kelly, 2014](#); [Cook, 2001](#); [De La Campa & Nassaji, 2009](#); [Mohebbi & Alavi, 2014](#); [Nation, 2003](#)). For instance, according to [Bruen and Kelly's \(2014\)](#) study of

faculty and student attitudes toward L1 use in Irish higher education with German and Japanese teachers, they prefer using L1 in specific circumstances that can relieve cognitively debilitating stress, particularly in defining terminology and concepts and fostering a pleasant learning environment. It has been suggested that using L1 helps reduce L2 learning anxiety. According to [Nation \(2003\)](#), English-only (L2) courses represent a barrier that causes two-level learners to reject receiving L2 teaching, particularly among less skilled students.

The researchers mentioned above are in favor of using L1 in the classroom to aid L2 learning in various situations. These findings, however, cannot be applied in other contexts, such as Indonesia. To better understand L1's function in L2 learning, more research is required.

[Gallagher \(2020\)](#), for instance, discovered that 24 teachers in Dublin, Ireland should make the most of their usage of English or a second language in class, but they should also be ready to speak their first language (L1) in multilingual circumstances. Recent analysis of an EMI pedagogical model by [Sahan, Rose, and Macaro \(2021\)](#) includes 85 observations of classroom activities and 21 interviews with EMI university professors at seven Turkish universities (small, large, and elite). According to this survey, L1 (Turkish) is primarily employed in small universities (37%) and major universities (26%) with teacher-student interaction, and top universities (4%).

However, the practice of bilingual EMI frequently creates hurdles, such as a feeling of isolation for overseas students who are not native English speakers and do not speak the local language ([Gallagher, 2020](#); [Hillman et al., 2019](#)). [Turnbull and Arnett's \(2002\)](#) study reveals the value of exposing L2 students to the environment and culture of L2 learners while they are pursuing L2 educational studies. English only increases the progress and achievement of L2 learners in the classroom. When selecting an L2 class, it's crucial to have the learner focus on the L2 only.

It was evident, however, that the translanguaging practice or the use of L1 by teachers and students have several reasons and conditions ([De La Campa & Nassaji, 2009](#); [Rolin-Ianziti & Brownlie, 2002](#)). For instance, the use of L1 in the L2 classes serves a variety of purposes, including responding to students' requests and expressing their emotions (for example by being humorous). ([Rolin-Ianziti & Brownlie, 2002](#)). Other characteristics identified by [De La Campa and Nassaji \(2009\)](#) for the use of L1 by teachers include (1) translation; (2) contrast (comparison of cultural forms and terms); (3) evaluation (discussion of student contributions); (4) instruction manual; (5) performance goals; (6) requests for student contributions; (7) comments personal comments; (8) comprehension tests; (9) discussion of classroom equipment; (10) administrative problems; (11) repetition of L1 students' utterances; and (12) responses to s. Students also use numerous other L1 features in the interim. [Storch and Wiggleworth \(2003\)](#) studied pair work and identified four key purposes for employing L1, such as work management (talking about task completion), task clarification (talking about instructions), vocabulary and

meaning, and grammar are the first three. The main learning enhancement functions of using L1 were suggestion, teaching new vocabulary, grammar for explaining, and building relationships. In addition, [Mohebbi and Alavi \(2014\)](#) tested teachers' beliefs about the various functions of L1 (Persian) in secondary education and demonstrated that these were the main functions. This final factor is supported by numerous researches that demonstrate how translation speeds up the explanation of unfamiliar L2 concepts and vocabulary ([Brown, 2000](#); [Cook, 2001](#); [Jing & Kitis, 2023](#)).

Therefore, there is still discussion surrounding the pedagogical, practical, and educational aspects of L1's place in the L2 setting to make comprehension more thorough about the practice or translanguaging or use of L1 in the L2 setting, attitudes among teachers, students, curriculum designers, policy makers, and parents are required. The use of L1 in L2 classrooms as the main focus of this study is supported by both theoretical arguments as mentioned above, in a number of researches. People who favor the use of L1 in the L2 classes are known as bilingual supporters, whereas those who support an English-only policy are known as supporters of the monolingual approach.

This study has three research questions:

(1) How do teachers and students perceive the use of L1 language in English lessons? (2) To what extent is students' opinion of the need of L1 in English classroom is reflected in their English proficiency levels? And thirdly, what do teachers and students believe the primary goal of employing L1 in the L2 classroom? This study is viable because it can increase understanding of the importance of L1 in L2 learning among educators, learners, decision-makers, and creators of EFL curricula.

METHODS

Participant

This study employed survey design as to address the main issues of this study. According to [Creswell \(2014\)](#), the survey method is a quantitative research approach used in this study. Survey was used in this study as it can collect a large number of data, and that previous studies on perceptions employed this design. Besides, this design was best to respond to pandemic situation. The questions examined what teachers and students think about L1 use in the L2 instruction and what reasons (or functions) are for L1 use. Teachers ($n = 30$) from an English-language undergraduate program and sophomore students ($n = 115$) from an English-language undergraduate program in one of the universities in Indonesia participated in this study. Participants voluntarily participated in this study, and their identities will remain anonymous.

Instrument

A questionnaire with a 14-point Likert scale was used to collect the data. The survey was adopted based on earlier studies ([Hall & Cook, 2013](#); [Sharma, 2006](#)). For instance, [Sharma's \(2006\)](#) sections on utilizing L1 to address complicated grammar issues, define new words, clarify

challenging ideas, and give instructions. This questionnaire was considered valid as this survey was widely used in the similar research. The reliability of the questionnaire was at Cronbach's $\alpha = .70$. There are two groups on the questionnaire; Statement of opinions regarding the usage of the second level in secondary school and classes (strongly agree strongly disagree), as well as the goals and justifications for doing so (always or never choice). How many students or teachers agree that L1 should be removed from teaching L2, how many students or teachers are allowed to use L1 at L2 in teaching, and how many students or teachers are encouraged to use L1 to express cultural identity and language make up the statement about the beliefs of teachers and students. There are 5 questions for students and 9 questions for teachers that look at the use of L1 or the motivations behind acquiring L2. The seven tasks include utilizing L1 to prepare assignments and activities, using L1 to utilize a bilingual dictionary or word list, watching English TV shows or videos with L1 subtitles, and comparing English grammar with your own grammar. The requirement for the teacher to use L1 to clarify grammar, give instructions, explain vocabulary, and establish a positive learning environment in the classroom.

Procedure

Teachers and students who participated in the study were asked for their consent prior to completing a questionnaire. Those who provided their consents to participate in this research were then invited for classroom meeting; meeting with teachers and students at different time. They were provided with around ten to fifteen minutes to complete the survey. In order to examine the answers to the study's research questions, the data were then examined using the statistical program SPSS.22, which included frequency (percentage) analysis. The significance of the data is determined by tabulating each point as a percentage. No "disagree or disagree" responses were reported in this study because they offered little insight into the participants' unclear position and the item responses were primarily concerned with whether participants agreed or disagreed with Group 1 (expressions of belief or opinion) and Group 2 about reasons about using L1 in L2 learning.

RESULTS AND DISCUSSION

Based on the opinions of teachers and students at an EFL Indonesia University using the five-point Likert scale tool, this study investigates three primary questions: teachers' and students' beliefs about the use of L1 in L2 classroom, the extent to which the students' perception is shaped by proficiency levels, and the purpose or reasons for utilizing L1 in L2 classes. There are two sections to the questionnaire: the first section explores the rationale for teachers' and students' use of L1 in L2 instruction, while the second section probes their opinions on L1's use in L2 instruction. The test's Chronbach alpha of 0.70 shows that it is very reliable for gathering information from participants about the

function of L1 in class L2. More detail findings are presented below.

Perceptions of teachers and students on the use of L1 in L2 classes in Indonesia

The results are presented as frequency-indexed percentages and the mean (mean) of the questionnaire with a 5-point Likert scale (strongly agree, agree, disagree or disagree,

disagree, strongly disagree), in order to show what L2 English teachers and students believe about the use of L1 in L2 teaching and learning. 30 teachers and a total of 115 students took part in the survey. The survey asks respondents about their beliefs and perceptions regarding the use of L1 in teaching English as a monolingual L2 (English only) or bilingually (English and Indonesian), as well as the degree to which L1 can be used for educational purposes at specific points and the reasons why they choose to use L1.

Students' beliefs or perceptions of using L1 in L2 learning

Examining students' and teachers' opinions or perceptions regarding the usage of L1 in L2 classes was the first issue this study looked into. This section primarily focuses on the students' perceptions about utilizing L1 or first language.

This study reveals that while 30% of students support the bilingual approach or bilingual access, only 28% of students in class L2 support the monolingual method (English only), suggesting that teachers in class L2 should utilize the L1 approach as evidenced by those who failed in the L2 classroom, the students (42%) did not express their disagreement or agreement in a clear manner, which was evident in the "disagree" or "disagree" response options. This demonstrates that a higher percentage of students are aware of the usage of L1 in L2 learning. When asked if they agreed with the idea of making English the only language used in the L2 classes (English only classes), 82% disagree with English only classroom; this shows that they reject the idea that English should be the primary language. There are many additional reasons to utilize L1, as evidenced by the fact that 66% of students need use L1 in L2 class to express linguistic and cultural identity (see [Figure 1](#)). The fact that 82% of students agreed with monolingual or bilingual instruction shows that they disagree with the idea that English should be the primary language used in English instruction, and it also reveals that English teachers still favor using L1 instruction in L2 instruction.

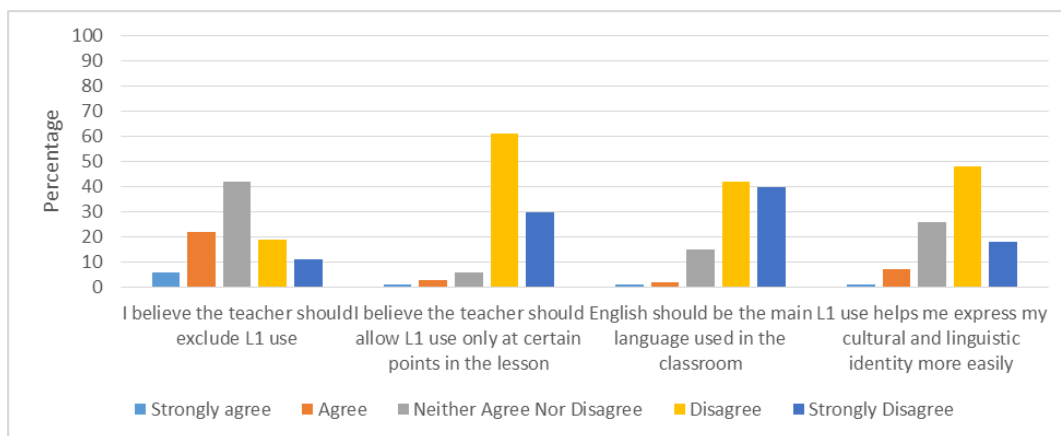


FIGURE 1 | Students' perceptions of using L1 in L2 classes

However, this study found that while some participants were somewhat in agreement with the idea that English teachers permit students to use L1 in their L2 classes for a variety of reasons, 91% of students preferred that the teacher use English most of the time in L2 classes (implicitly advised to use only English). This data suggests that students anticipate that teachers will give them more information regarding studying English as a second language. It is challenging to pinpoint and provide an explanation for why students responded the way they did because no data gathering interviews were carried out for this study.

Teacher's perception of the use of L1 in L2 learning

This study looked at teachers' opinions on the usage of L1 in

secondary teaching and learning as well as students' perspectives of the role of L1 in their L2 classes (see [Figure 2](#)). Finding out whether teachers and students have similar or divergent opinions regarding the use of L1 in L2 learning is the goal of this study. This survey demonstrates that teachers favor a monolingual method over using L1 in L2 classrooms (50%). A monolingual approach or English-only classes should be formed, according to the majority of teachers (73%), who also agree that English should be the primary language of L2 learning. Only did 7% of educators disagree with this assertion. Nevertheless, teachers also accept the use of L1 to some extent (80%), while 14% of teachers believe that L1 should not be used in L2 classes for a variety of reasons. Finally, although other reasons are obviously

significant, the majority of instructors (67%) feel that cultural and linguistic factors inspire their use of L1 in the L2 classroom.

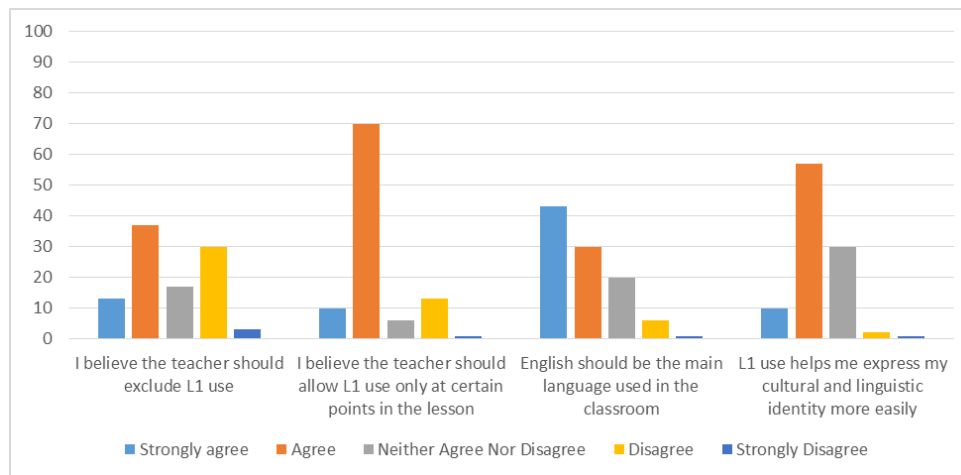


FIGURE 2 | Students' perceptions of using L1 in L2 class

This study concluded that there were significant differences in student and teacher perceptions of the nature of L1 use in L2 classes. For L2 teaching and learning, the instructor in this instance intends to implement a one-language or solely English policy. Although they believe that adopting L1 when teaching L2 classes has greater benefits, pupils prefer a colingual or bilingual approach in L2 classes. Furthermore, L1 should be utilized for teaching purposes in specific circumstances, according to both teachers and students. The study also found that professors were more likely to use L1 for purposes other than cultural and linguistic identity (67%), while students were more likely to use L1 for purposes other than cultural and linguistic identity (66%).

Students' perceptions of L1 use in L2 classes based on L2 proficiency level

Along with the first finding, this study was also interested in determining how students' responses to the importance of L1 use in the classroom were shaped by their proficiency level. Because prior studies have not yet examined the significance of student proficiency in L1 perceptions in the L2 instruction, this research is crucial. The self-assessment proficiency report for L2 performance data set of students or research participants, which included a 1–5 general English competence scale, was used to group the students' language proficiency (see [Figure 4](#)).

The study discovered that the group with greater language proficiency chose a bilingual or dual-language approach over a monolingual one in L2 classes, demonstrating the necessity of L1 use in L2 acquisition (38% in L1 usage and 16% in English exclusively). It's interesting to note that the group with lower performance anticipated a monolingual approach because English was

only taught in L2 classroom (36% for English exclusively and 27% for L1 use). Both high and low ability groups agreed on a monolingual or bilingual approach when it came to the idea of making English the primary language of instruction, starting with 86% of the high ability group and 72% of the low ability group. This indicates that the use of L1 in the L2 class is still preferred in the Indonesian setting. This study indicates that, although all participants' prior findings were confirmed, cultural and linguistic identity are not the primary drivers of L1 in L2 instruction (see [Figures 3](#) and 4). The utilization of L1 in L2 learning is influenced by still another variable. Therefore, the colingual or bilingual method was favoured by the higher proficiency group, while the monolingual L2 approach was preferred by the lower proficiency group. As for whether a monolingual or bilingual strategy is preferable in the Indonesian context, both the high and low ability groups share the same attitudes and perceptions. In short, the higher ability group favored the bilingual or combined method, whereas the lower ability group favored the monolingual approach. In addition, both the high ability and low ability groups believe that a monolingual or bilingual approach is preferable in the Indonesian environment.

The function or purpose of using L1 in teaching and learning L2

The main objective of this study was also to examine how Indonesian higher education students and teachers used their native language (L1) in the L2 teaching and learning context. A five-point Likert scale survey with answer options ranging from "often," "often," "sometimes," "rarely," and "never" was used to collect the data (1-5). Five statements about the main task of using L1 in L2 learning are projected onto the students.

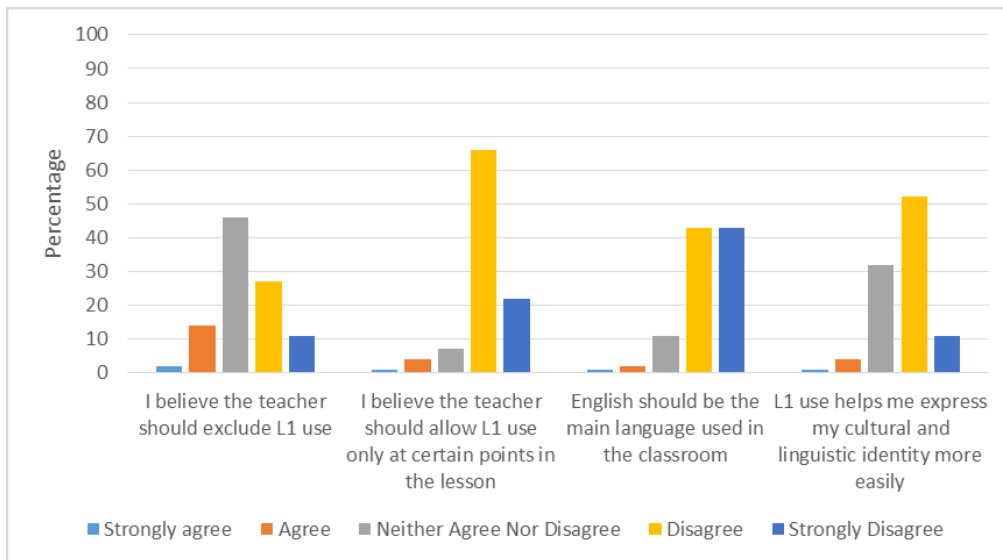


FIGURE 3 | Students' perceptions of L1 use in L2 classes by the higher ability group

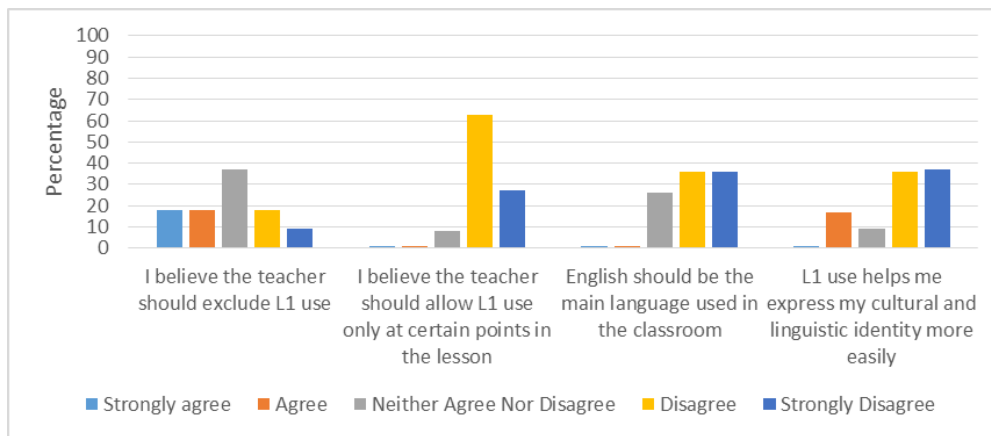


FIGURE 4 | Students' perceptions of the use of L1 in L2 classes by the low ability group

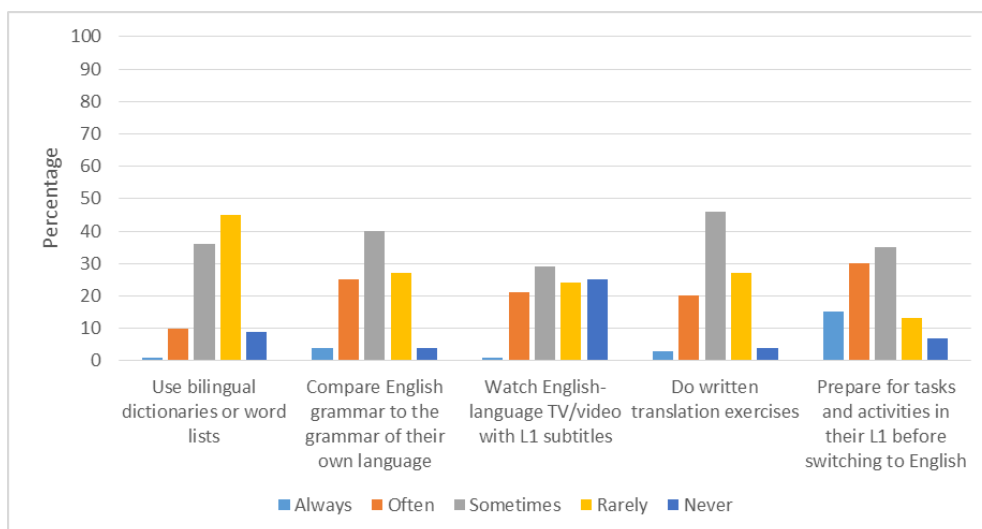


FIGURE 5 | L1 use function in L2 class by students

The use of L1 by Indonesian students in teaching L2 has a number of activities or aims for example, to use a bilingual dictionary or word list, compare English grammar with L1

grammar, watch English television or movies with L1 subtitles, carry out translation or writing exercises. Before moving to English, complete translation exercises,

assignments, and assignments in your first language. Figure 5 displays the responses of the students to the integration of L1 in L2 learning. This study demonstrates that, in general, students frequently use L1 to prepare assignments and activities during the learning process before moving on to L2 learning (45%), watch TV or movies in English with L1 subtitles (22%), perform the translation assignment (23%), compare L2 grammar to L1 grammar (29%), and utilize a bilingual dictionary or word list (11%).

The majority of students used L1 to complete the translation activity (46%), followed by L2-L1 grammar comparisons (40%) and opening bilingual dictionaries (36%), prepare for L1 assignment before moving on to subsection L2 (35%), and finally watch TV or videos with L1 subtitles, according to students who answered "sometimes" for each L1 usage activity. As a result, employing L1 will probably aid pupils in getting ready for L2 instruction and lastly, viewing television or movies with L1 subtitles. As a result, employing L1 will probably aid pupils in getting ready for L2 instruction, and lastly, viewing television or movies with L1 subtitles.

Therefore, Teachers employ L1 for a variety of tasks and goals at the same time. According to the percentage of teacher responses, the function of L1 use in the L2 classroom is for maintaining discipline (50%), elucidating the meaning of ambiguous English words (40%) and elucidating new L2 vocabulary (27%), as well as creating a pleasant environment (24%), describing L2 grammar (23%), giving instructions (17%), correcting verbal errors (17%), giving feedback on written work (17%), and having students give 13% (see [Figure 5](#)). The description also demonstrates that giving comments on written work and evaluating pupils are two objectives or functions that are less typically used when utilizing L1 in L2 learning. Students functionally use L1 to prepare assignments and activities before moving on to L2 grammar, then they compare L2 grammar to L1 grammar and finish the translation assignment for teachers who "sometimes" supply answers to each function of using L1. The goal of employing L1 for teachers is to maintain discipline, decipher difficult English words, introduce new L2 vocabulary, and create a welcoming environment.

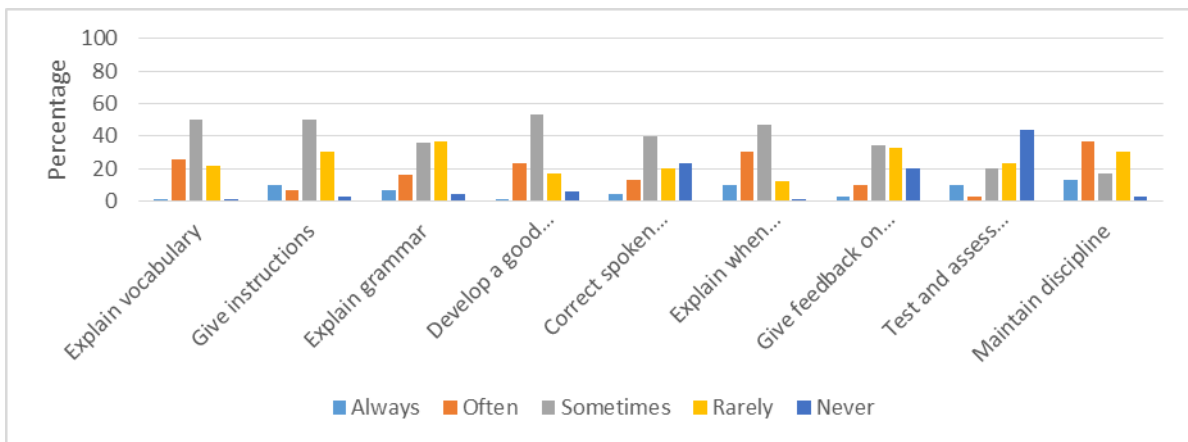


FIGURE 6 | L1 use function in L2 class by teachers

[Figure 6](#), Students support more of bilingual approaches (or translanguaging practice) to L2 teaching and learning, according to the study's major finding. Students find that using L1 helps them learn L2 more easily. Because they perceive exposure to L2 to be more beneficial for improving their L2 skills, the use of L1 should be permitted in some settings for pedagogical reasons. Students' incentive to use L1 is derived from cultural identification and non-linguistic elements. These findings support prior research on the beneficial effects of using L1 in facilitating the acquisition of L2 knowledge for less advanced learners ([Graham & Eslami, 2020](#); [Islam, 2013](#); [Nation, 2003](#)) and for students who lack meta language in a second language, such as word meanings, grammar points, and comprehensive task explanations ([Storch & Wiggleworth, 2003](#)). For instance,

[Fang & Liu \(2020\)](#) claimed that the use of English in teaching L2 does not necessarily have meaning in the Chinese context. [Kim & Petraki \(2009\)](#) also discovered the role of L1 in supporting L2 learning in the Korean context. In general, this study supports the value of colingual or bilingual approach in the L2 classroom. This situation is situated with the framework of translanguaging as proclaimed by [Garcia et.al, \(2009\)](#), [Garcia et.al, \(2017\)](#), presenting the value of incorporating other linguistic repertoires beside English in the L2 classroom.

This study examines attitudes or perceptions regarding utilizing L2 in connection to students' skills. It reveals that both the high and low proficiency groups favor a monolingual or bilingual approach in L2 classrooms, which is substantiated by evidence that both groups use L2. The

results of this study revealed that the groups with higher language proficiency preferred a bilingual approach, while the groups with lower proficiency preferred a monolingual approach (English classes only). This suggests that students with lower proficiency are motivated to use language skills, which is also expected primarily in class for increasing your exposure to English. Positive perceptions around the idea that instructors' collective discoveries serve as the foundation upon which the lower groups build their L2 learning. This may be interpreted in the sense that lower proficient learners require more English exposures to develop their L2 proficiency. Further research is in need to explore the issue of English only preference by lower proficiency learners. However, prior studies by [Storch and Aldosari \(2010\)](#) indicated that low ability groups used L1 more frequently in L2 pair work talks, with 17% of low ability group contacts using L1 compared to 5% in high proficient groups. These findings back with the claims made by [Dafouz and Smith \(2020\)](#) in their discussion of the nature of translation in L2 classes and the acceptability of contemporary multilingual norms in universities and schools ([Gracia, 2009](#); [Garcia et al., 2017](#); [Jing and Kitis, 2023](#)).

The findings above support students for a monolingual or bilingual approach ([Yu, 2000](#); [Turnbull, 2001](#); [Wong, 2010](#)). Iranian professor, [Nazary \(2008\)](#) reported the reason why students of all grade levels are averse to using L1 (Persian) in L2 classrooms due to less exposure to L2. However, increasing evidence from recent studies on the function of secondary education in secondary school supports the requirement for L1 instruction in secondary classes for pedagogical reasons ([Fang & Liu, 2020](#); [Graham et al., 2021](#); [Hillman et al., 2019](#); [Rivera, 2019](#)). [Wang and Curdt-Christiansen, 2019](#); [Rivera, 2019](#))

Teachers, in comparison, had a marginally different opinion, favoring a monolingual approach in their L2 instruction (50%). This finding is consistent with other research that demonstrates that L2 teachers are the only source of L2 knowledge for L2 pupils, and as a result, teachers are expected to be as proficient in English as possible ([Gallagher, 2020](#); [Wong, 2010](#)). According to [Gallagher's \(2020\)](#) research of 24 teachers in Dublin, Ireland, instructors believed they should use English or a second language as often as possible in class, but they also recognized that L1 will inevitably be used in situations involving several languages. Only the English method garnered favorable feedback from Hong Kong students, according to Wong's study from 2010.

Thus, by proving the necessity or utility of utilizing L1 in L2 education, which eventually facilitates the use of L1 in L2 teaching, both teachers and students clearly favor colingual or bilingual techniques. This has to be further investigated in future research by expanding data collecting

through narrative research in relation to the minor discrepancies in viewpoints in teacher and student preferences for classroom practice. The patterns and situations where monolingual, bilingual, or bilingual techniques are favored in L2 teaching and learning may be seen in different ways as a result.

It is also intriguing to consider how the use of L1 functions in teaching L2 based on the opinions of students and teachers in this study. This study demonstrates how students typically use their first language (L1) to prepare assignments and activities before moving on to their second language (L2), compare L2 grammar with L2, complete translation tasks, watch English television or videos with L1 text, and use a bilingual dictionary or word list. Some of the findings, such as those related to vocabulary, meaning, and grammar, are in line with earlier research. For instance, pair work was observed by [Storch and Wiggleworth \(2003\)](#) to include task management (discussing how tasks should be completed), vocabulary and meaning, and grammar. [Manara's \(2007\)](#) earlier work in Indonesia likewise looked at students' opinions of L1 use. Without looking at students' own motivations or activities for using L1, this research focuses on students' expectations regarding the necessity for instructors to use L1 in particular activities, such as the expectations that L2 teachers use L1 to explain new vocabulary and grammar. [Storch & Aldosari \(2010\)](#) discovered that Saudi students' perspectives of utilizing L1 in Arabic revealed five key roles, including task management, conversation and idea development, grammar and vocabulary elements, mechanical aspects, and grammatical features. Recent research by [Graham et al. \(2021\)](#) identified a number of variables that affect the utilization of L1, including: L1 as a source of identity and students' rights to utilize L1 in the L2 classroom.

This study also exposes a variety of instructor activities or objectives while teaching in a second language, including: correcting oral faults, providing comments on written assignments, and teaching graduate students. It has been shown in earlier studies, including as [Manara's \(2007\)](#), that 21% of teachers utilize L1 to explain new words or terminology more frequently. According to [Mohebbi and Alavi \(2014\)](#), the role of the L1 (Persian) teacher in L2 learning is that the main learning enhancement functions of using L1 are to give feedback, teach new vocabulary, clarify grammar, build relationships, lead the class, provide one-on-one assistance for students, and save time with detailed assignment explanations. [De la Campa and Nassaji \(2009\)](#) also report that L1 should be utilized in L2 teaching since it helps L2 learning. The majority of the research included here generally demonstrates that using L1 helps to foster a positive learning environment, clarify new terminology, and give orientation.

The use of L1 is advocated as a helpful method for improving language learning, with various levels of usage suggested depending on the demands of the classroom. This supports other studies that emphasized the need of fostering multilingual viewpoints in EMI situations (Graham & Eslami, 2020). According to numerous researches, instructors' poor L2 proficiency is strongly connected with their use of L1 (Hu & Lei, 2014). A professional development opportunity is also recommended by Macaro, Akincioglu, and Han (2020) in order to improve the delivery of EMI. In the past, Macaro (2018) put forth four models for language support in the EMI program, including a multilingual model (students are supported when using L1 with EMI), a simultaneous support model (students are supported with additional courses like EAP or ESP courses), the preparatory year model (students are enrolled in an intensive program before the EMI course), and the elective model (students must meet the minimum English language requirement before EMI). Using L1 aids pupils in understanding L2 concepts and themes, according to this study. Students may not grasp or misunderstand the teacher's instructions or explanations if using a monolingual (English only) approach particularly for those with limited L2 proficiency. For the sake of Indonesian education, the decision to remove L1 from L2 classes needs to be revisited. This study demonstrates how English teaching using L1 improves students' understanding of L2 concepts and subjects.

CONCLUSION

This study demonstrates that, in order to facilitate learning in the second classroom, teachers and students favor the use of a second language (bilingual approach). To accomplish instructional objectives and numerous other academic aspects, L1 use is required. Teachers do, however, expect that there will be instances where a monolingual strategy is implemented using L1. For L2 learners to build their L2 skills, they need to be exposed to as much L2 input as possible. This viewpoint is also in line with the opinions of students, particularly those with low abilities, who understand the necessity of L2 instruction in order to increase their exposure to L2. High ability groups, who still need to utilize a little L1 to learn L2, favor the same-language method as well. This implies that a multilingual or bilingual approach to second-level teaching and learning should be considered as a prerequisite for enabling and accelerating second-level learning and second-level growth rather than as a barrier to second-level development. The findings demonstrate that the study's participants have a favorable opinion of the usage of L1 in EFL instruction at Indonesian tertiary institutions. It has been demonstrated that L1 can be used by both instructors and learners to use or get familiar with new words and their definitions, grammatical and conceptual frameworks, or other rules for

efficient instruction and learning. L2 learning and development heavily rely on the use of L1 to connect L1 and L2 information.

In order to maximize the L2 learning process, Indonesian EFL classes can adopt the bilingual to monolingual EMI transition paradigm as referring to students proficiency levels. The practice of translanguaging or bilingual education may bring a great impact toward English language learning development. It is necessary to reformulate the pedagogical framework with an integrated approach to L2 learning to account for the realities of English teaching and learning, the variety of skills that students bring to the classroom, and the factors contributing to the success of L2 learning. This study is limited to a small number of students and teachers, and in turn the results of this study cannot be generalized to a larger population in Indonesian. Further study with involving many universities will add more comprehensive data regarding the practice of bilingual practice in the L2 learning in an Indonesian higher education. Other design like narrative inquiry and case study can be also employed for further research. In addition, studies that use the longitudinal technique in various contexts and take into account the learner's L2 level are still required.

ACKNOWLEDGEMENTS

The authors would like to thank all of the reviewers who provided us with valuable suggestions, as well as all of the participants who voluntarily participated in this research.

REFERENCES

- Auerbach, E., & Ziolkowski, J. M. (1993). *Literary Language & Its Public in Late Latin Antiquity and in the Middle Ages (No. 74)*. Princeton University Press. <https://press.princeton.edu/books/paperback/9780691024684/literary-language-and-its-public-in-late-latin-antiquity-and-in-the>
- Bruen, J., & Kelly, N. (2014). Using L1 together to reduce cognitive load and anxiety levels in L2 classes. *Journal of Language Learning*, 1, 1-14. doi: <https://doi.org/10.1080/09571736.2014.908405>
- Cenoz, J., & Santos, A. (2020). Implementing pedagogical translanguaging in trilingual schools. *System*, 92, 1-9. doi: [10.1016/j.system.2020.102273](https://doi.org/10.1016/j.system.2020.102273)
- Cook, V. (2001). Use the first language in class. *Canadian Review of Modern Languages*, 57(3), 402-423. <http://www.viviancook.uk/Writings/Papers/L1inClass.htm>
- Creswell, JW (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches (4th ed.)*. Thousand Oaks, CA: Sage. <https://us.sagepub.com/en-us/nam/research-design/book255675>
- Critchley, M.(1999). Bilingual support in English classes in Japan: a survey of students' opinions on foreign

- teachers' use of L1. *Language Teacher*, 23(9), 10-13. <https://jalt-publications.org/articles/24543-bilingual-support-english-classes-japan-survey-student-opinions-l1-use-foreign>
- Cummins, J. (2007). Language interactions in the classroom: From coercive to collaborative relations of power. *Bilingual education and bilingualism*, 61, 108. <https://doi.org/10.21832/9781853596773-003>
- Brown, H. D. (2000). *Principles of language learning and teaching* (Vol. 4). New York: Longman. <https://www.amazon.com/Principles-Language-Learning-Teaching-Fourth/dp/0130178160>
- Dafouz, E., & Smit, U. (2020). ROAD MAPPING Secondary education in English at an international university. Palgrave Macmillan. <https://doi.org/10.1007/978-3-030-23463-8>.
- De la Campa, J., & Nassaji, H. (2009). Number, purpose, and reasons for using L1 in L2 classes. *History of Foreign Languages*, 42(4), 742-759. <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1944-9720.2009.01052.x>
- Fang, F., & Liu, Y. (2020). 'Using all English is not always meaningful': Stakeholder perspectives on use of and attitudes towards language translation in Chinese universities. *Lingua*, 247, 1-18. <https://doi.org/10.1016/j.lingua.2020.102959>. Article 102959.
- Gallagher, F. (2020). Considered in context: the EFL teacher's view of the classroom as a bilingual space and code-switching in a shared L1 and in a multilingual context. *System*, 91, 1-13. <https://doi.org/10.1016/j.system.2020.102262>
- Garcia, O. (2009). *Bilingual education in the 21st century: A global perspective*. Wiley-Blackwell. <https://www.wiley.com/en-gb/Bilingual+Education+in+the+21st+Century:+A+Global+Perspective-p-9781405119948>
- García, O., Johnson, SI, & Seltzer, K. (2017). *Translation classrooms: Harnessing student bilingualism for learning*. Philadelphia: Caslon. <https://onlinelibrary.wiley.com/doi/10.1002/tesq.401>
- Graham, K.M, & Eslami, Z.R (2019). Attitudes to EMI in East Asia and the Gulf: A systematic review. *Language Problems and Language Planning*, 43(1), 8-31. <https://doi.org/10.1075/lplp.00030.gra>
- Graham, K.M, & Eslami, Z.R (2020). Translation as an act of ethical concern in the English Medium Instruction class. In CC Lin, & C. Zaccarini (Eds.), *Internationalization in action: Harnessing diversity and inclusion in the global classroom* (pp. 9-27). Peter Lang Publishers. <https://www.amazon.com/Internationalization-Action-Leveraging-Globalized-Classrooms-ebook/dp/B0893GSWHJ>
- Graham, K.M, Eslami, Z. R & Hillman, S. (2021) From English as the medium to English as a medium: Perspectives of EMI students in Qatar. *System*, 99, 1-13., <https://doi.org/10.1016/j.system.2021.102508>. Article 102508.
- Hall, G., & Cook, G. (2013). Own language use in ELT: exploring global practices and attitudes. *ELT Research Papers*, 1-49. British Council, London. <https://www.teachingenglish.org.uk/sites/teacheng/files/C448%20Own%20Language%20use%20in%20E%20LT%20A4%20FINAL%20WEB%20ONLY%20.pdf>
- Hillman, SK, Graham, KM, & Eslami, ZR (2019). Teacher translation practice at international branch campus in Qatar. *Teaching & Learning English*, 43(1), 41-63. <https://doi.org/10.1007/s42321-018-0015-3>
- Hu, G., & Lei, J. (2014). English-secondary teaching in Chinese higher education: A case study. *Higher Education*, 67, 551-567. <https://doi.org/10.1007/s10734-013-9661-5>
- Islam, MM (2013). Secondary teaching of English at a private university in Bangladesh. *Indonesian Journal of Applied Linguistics*, 3(1), p. 126-137. <https://doi.org/10.17509/ijal.v3i1.195>
- Jing, Y. & Kitis., E.D. (2023). Pedagogical translanguaging in the primary-school English-L2 class: a case-study in the Chinese context. *Journal of Multilingual and Multicultural Development*, 1(1), pp.1-8. <https://doi.org/10.1080/01434632.2023.2173213>
- Johnson, RK, & Swain, M. (1994). From core to content: Bridging the L2 proficiency gap at the end of immersion. *Language and Education*, 8(4), 211-229. <https://doi.org/10.1080/09500789409541392>
- Kim, Y., & Petraki, E. (2009). Student and teacher use and attitudes toward L1 in EFL classrooms. *Asian EFL Journal*, 11(4), 58-89. <https://www.asian-efl-journal.com/main-editions-new/students-and-teachers-use-of-and-attitudes-to-l1-in-the-efl-classroom/index.htm>
- Larsen-Freeman, D. (2000). *Techniques and principles in language teaching*. Oxford: Oxford University Press. <https://www.amazon.com/Techniques-Principles-Language-Teaching-Larsen-Freeman/dp/0194423603>
- Lightbown, P., & Spada, N. (2013). *How language is learned* (Fourth ed.). Oxford: Oxford University Press. <https://www.amazon.com/How-Languages-are-Learned-4th-ebook/dp/B00BH1YBC>
- Macaro, E. (2001). Analyzing teacher-student code-switching in foreign language classes: Theory and decision-making. *Journal of Modern Languages*, 85(4), 531-548. <https://www.jstor.org/stable/1193074>
- Macaro, E. (2018). *English media instructions: Content and language in policy and practice*. Oxford: Oxford University Press. <https://www.amazon.co.uk/English-Medium-Instruction-language-Linguistics/dp/0194403963>
- Macaro, E. (2020). Exploring the role of language in teaching English media. *International Journal of Bilingual Education and Bilingualism*, 23(3), 263-276. <https://doi.org/10.1080/13670050.2019.1620678>
- Macaro, E., Akincioglu, M., & Han, S. (2020). Secondary teaching of English in higher education: Teacher perspectives on professional development and certification. *International Journal of Applied Linguistics*, 30(1), 144-157.

- <https://doi.org/10.1111/ijal.12272>
- Macaro, E., Curle, S., Pun, J., An, J., & Dearden, J. (2017). A systematic review of English media teaching in higher education. *Language Teaching*, 51(1), 36-76. <https://doi.org/10.1017/s0261444817000350>
- Manara, C. (2007). The use of L1 support: Teachers' and students' opinions and practices in an Indonesian context. *The Journal of Asia TEFL*, 4(1), 145-178. <http://journal.asiatefl.org/>
- Mohebbi, H., & Alavi, SM (2014). Teacher's use of the first language in the context of a second language learning classroom: A questionnaire-based study. *Bellaterra Journal of Teaching & Learning Language & Literature*, 7(4), 57-73. <https://doi.org/10.5565/rev/jtl3.539>
- Moody, S., Chowdhury, M., & Eslami, ZR (2019). Postgraduate students' perceptions of translation. *Teaching & Learning English*, 43(1), 85-103. <https://doi.org/10.1007/s42321-018-0019-z>
- Nation, P. (2003). The role of the first language in foreign language learning. *Asian EFL Journal*, 5(2), 1-8. https://www.asian-efl-journal.com/june_2003_pn.pdf
- Nazary, M. (2008). Role of L1 in L2 acquisition: Attitudes of Iranian university students. *ROYAL*, 2(2), 138-153. https://www.researchgate.net/publication/26544308_The_Role_of_L1_in_L2_Acquisition_Attitudes_of_Iranian_University_Students
- Richards, J., & Rodgers, T. (2014). *Approaches and methods in language teaching*. Cambridge, England: Cambridge university press. <https://www.cambridge.org/core/books/approaches-and-methods-in-language-teaching/3036F7DA0057D0681000454A580967FF>
- Rivera, AJ, & Mazak, C. (2019). Pedagogical translation in a Puerto Rican university classroom: An exploratory case study of student beliefs and practices. *Journal of Hispanic Higher Education*, 18(3), 225-239. <https://doi.org/10.1177/1538192717734288>
- Rolin-Ianziti, J., & Brownlie, S. (2002). The teacher uses the learner's mother tongue in a foreign language class. *A Review of Modern Canadian Languages*, 58(3), 402-426. <https://www.utpjournals.press/toc/cmlr/58/3>
- Sahan, K. Rose, H., & Macaro, E. (2021). The EMI pedagogical model: At the interface of language use and interaction. *System* 101, 1-13. <https://doi.org/10.1016/j.system.2021.102616>. Article 102616.
- Saville-Troike, M. & Barto, K. (2017). *Introducing second language acquisition (3rd edition)*. Cambridge: Cambridge University Press. <https://www.cambridge.org/id/academic/subjects/languages-linguistics/applied-linguistics-and-second-language-acquisition/introducing-second-language-acquisition?format=PB>
- Sharma, K. (2006). Use of mother tongue in English class. *NELTA Journal*, 11(1-2), 80-87. <https://www.nepjol.info/index.php/NELTA/issue/view/214>
- Storch, N., & Aldosari, A. (2010). The use of the first language (Arabic) by students working in pairs in EFL classes. *Language Teaching Research*, 14(4), 355-375. <https://doi.org/10.1177/1362168810375>
- Storch, N., & Wigglesworth, G. (2003). Is there a role for using L1 in the L2 setting?. *TESOL Quarterly*, 37(4), 760-770. <https://doi.org/10.2307/3588224>
- Swain, M., & Lapkin, S. (2000). Task-based second language learning: First language use. *Language Teaching Research*, 4, 251-274. <https://doi.org/10.1177/13621688000400304>
- Turnbull, M. (2001). There is a role for the L1 in second and foreign language teaching, but... A Review of *Modern Canadian Languages*, 57(4), 531-540. <https://doi.org/10.3138/cmlr.57.4.531>
- Turnbull, M., & Arnett, K. (2002). Teacher use of the target and first languages in second and foreign language classes. *Applied Linguistics Annual Review*, 22, 204-218. <https://doi.org/10.1017/S0267190502000119>
- Wang, D. (2019). Translating in Chinese foreign language classes: Attitudes and practices of students and teachers. *International Journal of Bilingual Education and Bilingualism*, 22(2), 138-149. <https://doi.org/10.1080/13670050.2016.1231773>
- Wang, W., & Curdt-Christiansen, XL (2019). Translating in Chinese English bilingual educational programs: A university-class ethnography. *International Journal of Bilingual Education and Bilingualism*, 22(3), 322-337. <https://doi.org/10.1080/13670050.2018.1526254>
- Wong, MHR (2010). The effectiveness of using English as the only teaching medium in English classes: Student responses and improvement in English proficiency. *Porta Linguarum*, 13, 119-130. <https://doi.org/10.30827/Digibug.31927>
- Yu, W. (2000). Direct method. In M. Byram (Ed.), *Routledge's Encyclopedia of Language Teaching and Learning* (pp. 176-178). New York: Route. <https://www.routledge.com/Routledge-Encyclopedia-of-Language-Teaching-and-Learning/Byram-Hu/p/book/9781138709805>

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright © 2023 Abdul Muqit, Sahiruddin Sahiruddin, Aly Imron, Nurhayati Nurhayati, Intama Jemy Polii. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.