Primary-School EFL Students' Perceptions of Technology-Enhanced Differentiated Instruction: A Small-Scale Exploratory Study

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Abstract

Recent years have seen growing interest in the notion of technology-enhanced differentiated instruction (TEDI) and its implementation in teaching English as a foreign language (EFL). How EFL students perceive TEDI, however, is relatively under-explored. The aim of this small-scale study was to investigate students' perceptions of TEDI, i.e., the extent to which students perceive that the use of technology in the EFL lessons responds to their readiness, interests and learning profiles. Relations between these perceptions and students' motivation, language learning experience and self-efficacy beliefs were also investigated. A questionnaire was administered to 37 students at a primary school in Hungary. The questionnaire constructs proved to be reliable, each having a Cronbach's alpha value above 0.60. Results suggest that students perceive TEDI as responsive to their individual needs, particularly in the dimensions of learning profile-based and readiness-based differentiation. Furthermore, it was observed that perceptions of learning profile-based TEDI had a weak positive correlation with students' language learning experience and motivated learning behavior, while perceptions of readiness-based TEDI seemed to have a moderate positive impact on self-efficacy beliefs. Administering the instrument to a larger sample and triangulating findings will be important in validating the results of this study and in further exploring how technology may foster meaningful language learning opportunities for all.

Introduction

Responsiveness to students' individual needs and preferences is integral to a learner-centered approach to language teaching (Benson, 2012). Accordingly, differentiated instructional (DI) strategies that cater to an array of interests, learning styles and levels of target language proficiency have been gaining increased interest in educational circles (e.g., Blaz, 2016; Theisen, 2002). One aspect that has received particular attention is the affordances of Information and Communications Technology (ICT) for differentiated teaching and learning. The term 'technology-enhanced differentiated instruction' (TEDI) has already become part of the professional discourse (e.g., Haymon & Wilson, 2020; Maeng, 2016; Ritter, 2018) and there is a growing body of empirical research on how technology may be used for DI in different subjects (e.g., Alshareef et al., 2022; Cannon, 2017; Karatza, 2019; Valiande & Tarman, 2011).

Regarding the context of teaching English as a foreign language (TEFL), research on TEDI has mainly followed an experimental or action research design (e.g., Rapti, 2018; Vargas-Parra et

al., 2018) or collected interview data from EFL teachers with the aim of identifying good TEDI practices (e.g., Hustinx et al., 2019; Kótay-Nagy, 2022). These studies revealed that certain applications have the capacity to cater to individual differences such as readiness levels, interests and learning styles, and that in many cases their use can increase students' motivation, language learning experience and self-efficacy beliefs (Hustinx et al., 2019; Kótay-Nagy, 2022; Vargas-Parra et al., 2018).

To date, however, EFL students' perceptions of this relatively novel approach have rarely been examined. Gaining insight into their perspectives is of crucial importance to understand how TEDI is perceived by students and to explore how these perceptions may be related to other cognitive and affective variables that have been found to be positively linked with technology-enhanced differentiated learning contexts (e.g., Hustinx et al., 2019; Kótay-Nagy, 2022; Vargas-Parra et al., 2018). This exploratory study sought to begin to address this research gap by administering a questionnaire suitable for measuring EFL students' perceptions of TEDI and the relation of these perceptions to their language learning experience, motivated learning behavior and self-efficacy beliefs. It is hoped that the initial insights gained by the present small-scale study could add to our understanding of EFL students' perspectives of TEDI and the questionnaire instrument may be of assistance to those aiming to investigate students' perceptions of TEDI in the EFL class.

Differentiated Instruction

The concept of differentiation is rooted in the constructivist learning theories, which gained prominence in the last decades of the 20th century (Marks et al., 2021). Constructivism holds that learning is most meaningful when topics are connected to students' needs and preferences and when students are actively engaged in constructing their knowledge by building on previous learning (Smith & Throne, 2007). DI as a principled teaching approach aims to create such meaningful learning opportunities by "'shaking up' what goes on in the classroom so that students have multiple options for taking in information, making sense of ideas, and expressing what they learn" (Tomlinson, 2017, p. 1). In differentiated classrooms, students are often given options and are included in decision-making so that they "have a real share in their own learning" (Smith & Throne, 2007, p. 7).

Tomlinson's model of DI (1999) is regarded as one of the most widely known conceptualizations of the approach (Erickson, 2010). It operates with two dimensions: the curricular elements to be differentiated (the *what* aspect of DI, including the content, the process, the product and the learning environment) and the learner differences along which differentiation may be applied (the *how* aspect of DI, referring to students' interests, readiness and learning profile) (Tomlinson, 1999). Students' interests refer to their passions and affinities that motivate their learning, whereas their learning profile describes their preferred approaches to learning, including their learning styles and intelligence preferences (Tomlinson & Moon, 2013). The concept of readiness describes students' proximity to specified learning goals, and, as Tomlinson and Imbeau (2010) point out, is not to be equated with the concept of ability; while the latter denotes a "more or less fixed and inborn trait," the former refers to "a temporary condition that should change regularly as a result of high-quality teaching" (p. 16). Tomlinson's

model (1999) has served both as a practical guide on how to implement DI in day-to-day teaching as well as a theoretical framework used in empirical studies for operationalizing the complex concept of DI into measurable constructs (e.g., Hustinx et al., 2019; Tzanni, 2018). Accordingly, the DI-related constructs investigated in the present study were also based on Tomlinson's model of DI (1999), more specifically, on the *how* dimension of DI, focusing on learners' interests, learning profiles and readiness levels. The operational definition of each construct is presented in the Method section.

Technology-Enhanced Differentiated Instruction

The potential of ICT for differentiated teaching and learning has been gaining increased attention lately, with growing empirical research on TEDI (e.g., Haymon & Wilson, 2020; Maeng, 2016; Ritter, 2018) and teacher training on TEDI (e.g., National Institute of Education, Singapore, n.d.) alike. Teachers are increasingly encouraged to think about "hardware, software and web resources that support […] teaching and learning while meeting the learning needs and styles of individual students" and to use these resources to foster differentiated learning environments (Primary Professional Development Service, n.d., p. 19).

There are various reasons why ICT tools are thought to be suitable for supporting differentiation endeavors. Firstly, they can tap into different learning styles by providing opportunities for students to engage in visual, auditory and social learning (Benjamin, 2005; Primary Professional Development Service, n.d.). As Benjamin (2005) put it, "the interplay and possibilities of learning through words, images and sounds … make computers extremely effective as learning tools" (p. 6). Secondly, there are several ICT tools which adapt to the individual readiness levels of learners by analyzing their input and providing customized feedback and practice tailored to their proficiency (Larsen-Freeman & Anderson, 2011; Zeng, 2020). Besides, technology facilitates self-paced learning, as it often lets students "make choices of when, what, and how to learn based on their own proficiency levels, goals and learning styles" with the "affordance of the time to think and the possibility for feedback" (Zeng, 2020, p. 26). As student choice is a central aspect of DI, the support ICT tools can provide in this respect seems to be especially important.

In regard to the Hungarian context, the National Core Curriculum underlines both the significance of DI in teaching FLs in general as well as the affordances of technology for DI in particular. The document recommends that the content of foreign language learning be planned "in line with students' needs, bearing in mind 21st century opportunities with special regard to ICT tools and modern language teaching technologies" (Government of Hungary, 2020, p. 316). It points out that the primary, and especially the upper-primary, grades are critical in terms of DI as this is the time when significant individual differences between students start to intensify. The text recommends that teachers explore the differences in mixed-level primary classes and take these into account when planning the content of FL teaching (p. 316).

Studies conducted about TEDI in TEFL include experiments (Rapti, 2018), action research (Vargas-Parra et al., 2018) and interview studies (Hustinx et al., 2019; Kótay-Nagy, 2022) that examined how the potential of technology for DI may be harnessed with the use of certain applications (e.g., Quizlet, Audacity, EdPuzzle, Prezi, Moodle, BOOKR). While these

studies differed in their research methodology and research contexts, they agreed in their conclusion that the applications under investigation had the capacity to cater to individual differences such as learners' readiness levels, interests, and learning styles. Besides, they reported either on improved learning outcomes (Rapti, 2018) or an increase in students' motivation, language learning experience, and self-efficacy beliefs (Hustinx et al., 2019; Vargas-Parra et al., 2018).

Motivated Learning Behavior, Language Learning Experience, and Self-Efficacy Beliefs

In the past few decades, a rich body of literature has emerged around the concepts of foreign language learning motivation (Csizér, 2020; Ushioda, 2019) and self-efficacy beliefs (Mills, 2014), as well as the possible interplay between these variables (e.g., Csizér et al., 2021; Khoadad & Kaur, 2016; Linnenbrink & Pintrich, 2002; Piniel & Csizér, 2013).

Students' motivated learning behavior is regarded as one of the most important individual difference variables leading to the success of foreign language learning (Piniel & Csizér, 2013), and one that has been generally understood as "students' effort that they are willing to invest into foreign language learning" (Csizér et al., 2021, p. 4). Out of the variables traditionally investigated in relation to motivated learning behavior, the present study focused on one specific variable, language learning experience, which may be defined as "the perceived quality of the learners' engagement with various aspects of the language learning process," encompassing behavioral, cognitive, and affective dimensions (Dörnyei, 2019, p. 19). As research on the effects of TEDI has mainly discussed the latter, affective aspect of learning experience (e.g., Hustinx et al., 2019; Vargas-Parra et al., 2018), the present study focused on this dimension, and, adopting Piniel & Csizér's (2013) definition, operationalized the construct by measuring "how positively students relate" to their learning experiences (p. 533).

The concept of self-efficacy originates from Bandura's social cognitive theory (1986), and in the context of FL learning it refers to learners' beliefs about their capabilities "to successfully learn a foreign language in the school context and to complete particular language-learning tasks" (Csizér et al., 2021, p. 5). According to Bandura (1997), learners' self-efficacy beliefs are influenced by their experiences of success (mastery experiences), the comparison of their achievements to those of their peers (vicarious experiences), the feedback they receive from their teachers (verbal persuasion), and the emotions experienced while learning (emotional indicators). Since the goal of readiness-based DI is to provide students with an appropriate level of challenge, which in turn is to generate feelings of genuine success (Tomlinson, 2017), the concept of differentiation seems to be closely linked with self-efficacy, and more specifically, with mastery experiences, which, according to Bandura (1997), are the most influential sources of self-efficacy. This link has been addressed in theory (e.g., Tomlinson, 2017) as well as in some studies on the differentiated teaching of various subjects (e.g., Hood, 2012; Lai et al., 2020); however, to the best of the author's knowledge, in the context of TEFL the relationship between readiness-based DI and self-efficacy beliefs has yet to be confirmed statistically.

Research Questions

Recent empirical research has provided valuable insights into possible uses of ICT for DI in the EFL class as well as teachers' lived experiences of this approach, which all have led to a deeper understanding of TEDI in TEFL. However, no study has to date examined EFL students' perceptions of TEDI practices. As students are the ones directly involved in and affected by TEDI, gaining insight into their perspectives is essential to better understand how this approach is perceived on their end and how these perceptions may be related to other cognitive and affective variables that have been found to be positively related with technology-enhanced differentiated learning contexts (e.g., Hustinx et al., 2019; Kótay-Nagy, 2022; Vargas-Parra et al., 2018).

In line with the above considerations, the aim of this exploratory study was to measure primary school students' perceptions of TEDI in the EFL lessons and the relation of these perceptions to their language learning experience, motivated learning behavior and self-efficacy beliefs. Correspondingly, the study examined two main research questions (RQs):

1. To what extent do primary school students perceive TEDI as responsive to their individual needs?
   1.a To what extent do primary school students perceive that the use of ICT tools in the EFL lessons responds to their interests?
   1.b To what extent do primary school students perceive that the use of ICT tools in the EFL lessons responds to their learning profiles?
   1.c To what extent do primary school students perceive that the use of ICT tools in the EFL lessons responds to their readiness levels?
2. What are the relationships between primary school students' perceptions of TEDI and the variables of motivated learning behavior, language learning experience and self-efficacy beliefs?

Method

Instrument

The questionnaire sought to examine the following two topics: (a) perceptions of TEDI, i.e., the extent to which students perceive that the use of ICT tools in the EFL lessons responds to their interests, learning profiles and readiness levels; (b) students' motivated learning behavior, language learning experience and self-efficacy beliefs with regard to learning English.

The multi-item scales measuring students' perceptions of TEDI were developed and validated for the purpose of this study based on the learner differences dimension of Tomlinson's model of DI (1999). The scales measuring students' language learning experience, motivated learning behavior and self-efficacy beliefs were adapted from earlier studies (Illés & Csizér, 2010; Kormos & Csizér, 2008; Piniel & Csizér, 2013). A multi-item scale measuring students' acceptance of ICT tools, adapted from a study by Fekete (2021), was also added to the questionnaire to examine students' general attitude towards the use of ICT tools in the EFL lessons. The questionnaire was written in Hungarian, the mother tongue of the participants.

Prior to piloting, a think-aloud protocol was administered to a volunteer, and then the instrument was peer reviewed by colleagues and given expert judgment, which resulted in the rewording of some problematic items.

The final questionnaire consisted of 33 items, which measured the following seven constructs:

1. *Acceptance of ICT tools* (4 items): The extent to which students accept the use of ICT tools in the EFL lessons. Example: I like using ICT tools in the English lessons.
2. *Interest-based TEDI perceptions* (4 items): The extent to which students perceive that the use of ICT tools in the EFL lessons responds to their interests. Example: The tasks that I complete with the help of ICT tools are close to my interests.
3. *Readiness-based TEDI perceptions* (5 items): The extent to which students perceive that the use of ICT tools in the EFL lessons responds to their readiness levels. Example: When I use an ICT tool to complete a task in the English lesson, I can do the task without major difficulties.
4. *Learning profile-based TEDI perceptions* (5 items): The extent to which students perceive that the use of ICT tools in the EFL lessons responds to how they learn best. Example: When I use an ICT tool to complete a task in the English lesson, I have every opportunity to do it in a way that I find most convenient.
5. *Language learning experience* (4 items): How positively students relate to their EFL learning experiences. Example: I really enjoy learning English.
6. *Motivated learning behavior* (5 items): Students' efforts and persistence in learning English. Example: I am willing to make a lot of effort in order to learn to speak English very well.
7. *Self-efficacy beliefs* (6 items): The extent to which students feel they have the ability to successfully perform foreign language related tasks. Example: I am confident that I can do the speaking tasks in the English lessons.

Participants were asked to respond to the items on a 5-point Likert-scale. The items were worded as statements, and respondents rated them depending on the extent to which they felt that the items were true for them (1 meaning 'not true at all,' 5 meaning 'perfectly true'). Besides the 33 items aiming to measure the above seven constructs, the first introductory section of the questionnaire invited students to indicate what ICT devices they use in the EFL lessons, how often, and for what purposes. This section had two objectives: to clarify the meaning of the term 'ICT tools' for the students and to identify the specific devices used by the students in the EFL lessons, along with their associated activities. The final section of the questionnaire included questions about the participants' background, such as their age, the grade when they started learning English and their self-reported English proficiency. The English translation of the final version of the questionnaire is attached in the Appendix.

Setting, Participants and Procedure
The study sought to investigate the TEDI-related perceptions of upper-primary school students of English (aged 10-14) who study at institutions where both ICT and DI are used in the teaching of EFL. The non-probability convenience sample consisted of 37 participants who study at a

private bilingual primary school in Budapest, Hungary. As stated in the school's pedagogical program, both DI and ICT form an integral part of daily teaching.

Based on the answers provided by the participants in the introductory section of the questionnaire and on information obtained from their teachers, all classrooms are equipped with a smart board and are used by the students in every EFL lesson. The school has 30 tablets which are booked for each English group once or twice a week, so these devices are also used on a frequent basis. Besides, each English group has their lesson in the ICT room once a week, where students can work on PCs individually. ICT tools are mostly used for presentations, listening exercises, the learning of new vocabulary, grammar practice and reading tasks.

In total, 20 girls and 17 boys from Grade 5 ($n = 19$), Grade 6 ($n = 4$), Grade 7 ($n = 7$) and Grade 8 ($n = 7$) participated in the study. 41% of the students started to learn English before primary school ($n = 15$), while the rest of them commenced their English studies in Grade 1 ($n = 11$), Grade 2 ($n = 3$), Grade 3 ($n = 5$) and Grade 4 ($n = 3$). According to the participants' self-reports and information obtained from their teachers, at the time of the data collection the students' English proficiency was between A2 and B2+ on the scale of the Common European Framework of Reference (CEFR) (Council of Europe, 2001).

The online, Google Forms-based questionnaire was administered to the participants in the ICT room during one of their EFL lessons. Upon completion, the data were imported into and analyzed with SPSS 25.0. To check construct validity and to obtain preliminary results, reliability analysis as well as descriptive and inferential statistical procedures were run.

Reliability Analysis

Table 1

Reliability Coefficients of the Scales

Scale (number of items)	Cronbach's alpha
Acceptance of ICT tools (4)	.88
Interest-based TEDI perceptions (4)	.87
Readiness-based TEDI perceptions (3)	.74
Learning profile-based TEDI perceptions (5)	.76
Language learning experience (2)	.69
Motivated learning behavior (5)	.83
Self-efficacy beliefs (6)	.85

To see if the questionnaire constructs produce reliable results, the internal consistency of the multi-item scales was checked by computing the Cronbach's alpha reliability coefficients. These coefficients were all above the acceptability level of .6 (Dörnyei & Csizér, 2012) except for *readiness-based TEDI perceptions* and *language learning experience*. Following the deletion of two items from both scales, a second round of analysis found these constructs to be reliable. (The deleted

items are shown in italics in the Appendix; for the Cronbach's alpha values, see Table 1). However, it is important to emphasize that because of item deletion, these two scales are comprised of only three and two items, respectively, as opposed to the recommended four (Dörnyei, 2007). While the analysis in the present study was based on this reduced item count, it is advisable in future research to expand these scales by introducing more items to meet the recommended item count.

Results and Discussion

Perceptions of TEDI

The calculation of descriptive statistics helped to answer RQ1 and its sub-questions. These questions examined the extent to which students perceive TEDI as responsive to their individual needs, more specifically, the extent to which students perceive that the use of ICT tools in the EFL lessons responds to their interests, learning profiles and readiness levels. Results indicate that students perceived TEDI to align with their individual needs, with *readiness-based TEDI perceptions* (M = 4.11, SD = .77), *learning profile-based TEDI perceptions* (M = 3.91, SD = .83) and *interest-based TEDI perceptions* (M = 3.65, SD = 1.01) all having a mean value higher than moderate. The acceptance of ICT tools among students was also relatively high (M = 4.12, SD = .94). Table 2 presents the descriptive statistics of the scales.

Table 2

Descriptive Statistics of the Scales

Scale	Mean	Standard deviation
Self-efficacy beliefs	4.27	.66
Acceptance of ICT tools	4.12	.94
Readiness-based TEDI perceptions	*4.11*	*.77*
Language learning experience	3.97	1.05
Learning profile-based TEDI perceptions	*3.91*	*.83*
Motivated learning behavior	3.89	.82
Interest-based TEDI perceptions	*3.65*	*1.01*

Note. Italics indicate the three dimensions of TEDI perceptions.

Paired sample t-tests were run to examine whether there were any statistically significant differences between the mean values of the scales measuring the three dimensions of TEDI perceptions. The results showed that the mean values of *readiness-based TEDI perceptions* and *learning profile-based TEDI perceptions were both higher than* the mean value of *interest-based TEDI perceptions* ($t(36)$ = 2.57, p = .014 and $t(36)$ = 3.05, p = .004, respectively), which suggests that students perceive TEDI to align more with their learning profiles and readiness levels than with their interests. This is in contrast with previous findings on differentiation practices in the EFL

classroom, which identified interest for enhanced clarity as the most prevalent learner difference along which EFL teachers are inclined to differentiate (Sougari & Mavroudi, 2019; Tzanni, 2018). These studies, however, did not focus specifically on technology-enhanced DI but discussed differentiation practices in general, which might imply that readiness-based and learning profile-based differentiation are areas of DI where the use of technology can especially be of assistance in making the learning process personally meaningful for students. This accords with the conclusion of Zeng (2020), who saw one of the major benefits of using ICT in language teaching as letting students make decisions in terms of "when, what, and how to learn based on their own proficiency levels, goals and learning styles" (p. 26).

Relationships between Perceptions of TEDI, Motivated Learning Behavior, Language Learning Experience and Self-Efficacy Beliefs
Bivariate Pearson correlation analyses were conducted to answer RQ2, i.e., to find out if there were any statistically significant relationships between the scales measuring the three dimensions of TEDI perceptions and the variables of motivated learning behavior, language learning experience and self-efficacy beliefs. Table 3 presents the significant correlations among these scales.

Table 3
Significant Correlations (p < .05) among the Scales

Scale	1	2	3	4	5	6
1. Interest-based TEDI perceptions	--					
2. Readiness-based TEDI perceptions		--				
3.Learning profile-based TEDI perceptions	.86	.41	--			
4. Language learning experience			*.39*	*--*		
5. Motivated learning behavior			*.36*	.55	--	
6. Self-efficacy beliefs		*.51*				--

Note. Italics indicate the relationships examined by RQ2.

Results show that the variable of *learning profile-based TEDI perceptions* has a weak positive relationship both with *language learning experience* (*r* = .39, *p* = .018) and *motivated learning behavior* (*r* = .36, *p* = .028). To check whether any of the three dimensions of TEDI perceptions acts as a predictor variable of either students' language learning experience or motivated learning behavior, multiple linear regression analyses with a stepwise approach were carried out; however, no statistically significant causal relationships were found. It may be concluded, therefore, that while students who perceive TEDI to align with their learning profiles tend to report on better learning experiences and higher levels of motivated learning behavior, a direct causal link cannot be established, and further exploratory studies are needed to reveal the interrelationships of these variables as well as additional variables that might be at play.

It is worth noting that while the variable of *learning profile-based TEDI perceptions* seems to significantly correlate with language learning experience and motivated learning behavior, *interest-based* and *readiness-based TEDI perceptions* do not appear to be related to these motivation-related variables at all. This seems to contradict earlier results which showed that the use of interest- and readiness-based TEDI is characterized by high levels of student engagement and motivation (Hustinx et al., 2019; Kótay-Nagy, 2022; Vargas-Parra et al., 2018). At this point, the question arises whether the lack of relationships between the investigated variables is in fact the case and perceptions of learning profile-based TEDI prove to be more strongly connected to the motivation-related variables than the other two dimensions of TEDI, or if these findings stem from the small sample size which at times may lead to insignificant coefficients and the loss of potentially important results (Dörnyei & Csizér, 2012). Administering the questionnaire to a larger sample will be important in providing further explanation to this question.

As can be seen in Table 3, a significant moderate positive relationship was also found between the scales of *readiness-based TEDI perceptions* and *self-efficacy beliefs* ($r = .51$, $p = .001$). To test if any of the three dimensions of TEDI perceptions may act as an antecedent variable of students' self-efficacy beliefs, multiple linear regression analyses were carried out. The stepwise analysis yielded a simple linear model with *readiness-based TEDI perceptions* having a significant and medium impact on *self-efficacy beliefs* ($\beta = .51$, $p = .001$). It must be noted, however, that the explanatory power of the model is relatively low ($R^2 = .26$), which may be explained by the exclusion of other predictor variables from the investigation, such as vicarious experiences and verbal persuasion, which are traditionally considered to influence students' self-efficacy beliefs (Bandura, 1997). Notwithstanding the moderate explanatory power of the model, the results seem to confirm previous findings which showed that some ICT tools have the capacity to support readiness-based differentiation by providing an appropriate level of challenge for each student, which in turn can increase students' beliefs in their abilities to complete tasks successfully (e.g., Vargas-Parra et al., 2018).

Conclusion

The analysis of the collected data has revealed a number of results. Firstly, it was found that students of this sample perceive TEDI as responsive to their individual needs, especially in the dimensions of readiness-based and learning profile-based differentiation. Since some previous studies found interest-based DI to be EFL teachers' most favored form of differentiation due to the ease of its implementation compared to readiness-based and learning profile-based DI (Sougari & Mavroudi, 2019; Tzanni, 2018), the potential that ICT tools hold for DI in catering to students' readiness levels and learning profiles may be an area that is worthy of further exploration.

In addition, correlation and regression analyses have revealed that learning profile-based and readiness-based TEDI seem to be positively linked with some cognitive and affective variables. Students' perceptions of learning profile-based TEDI were found to be weakly positively correlating with their language learning experience and motivated learning behavior. This may suggest that when students use ICT tools that they feel match their preferred ways of learning, they tend to have more positive language learning experiences and are also more willing to make an effort to learn the language. However, as regression analyses have revealed no

direct causal relationship between these variables, further studies are needed to explore the processes underlying this phenomenon.

Besides, a medium positive impact of readiness-based TEDI perceptions on self-efficacy beliefs was also identified, indicating that using ICT tools that cater to students' readiness levels has the potential to strengthen students' beliefs of their ability to perform EFL related tasks successfully. These findings are consistent with previous research on TEDI in TEFL (e.g., Hustinx et al., 2019; Rapti, 2018; Vargas-Parra et al., 2018) and suggest that the use of certain ICT tools in the EFL class may indeed provide support in making the language learning process personally rewarding for students.

In conclusion, notwithstanding the limitations of the findings which stem from the small sample size and the fact that all participants study at the same institution, the questionnaire instrument was found to be suitable for measuring students' perceptions of TEDI. However, it is important to highlight that, as part of the reliability analysis, two items were excluded from both the readiness-based TEDI perceptions and language learning experience scales to meet the established acceptability threshold of 0.6 for reliability coefficients, as suggested by Dörnyei and Csizér (2012). Consequently, in the current study's data analysis, these scales consisted of only three and two items, respectively, instead of the recommended four (Dörnyei, 2007). In future research, it is advisable to revise the questionnaire by introducing one or two new items into these scales to ensure a sufficient item count. The revised instrument can then be administered to a larger sample, the results of which will be important in validating the kinds of conclusions that can be drawn from this study. A larger sample size will also allow room for running more complex statistical procedures such as structural equation modelling (SEM) to test the interrelationships among the different variables (Pallant, 2010). Besides, quantitative results may be triangulated in the future through qualitative inquiries such as student and teacher interviews and lesson observations to gain deeper insights into the TEDI practices under investigation and to further explore how technology may promote meaningful language learning opportunities for all.

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Appendix

English translation of the questionnaire

Dear Student,

This survey collects information about your experiences of using ICT tools in the English lessons. This is not a test; there are no right or wrong answers. I am interested in your ideas. It takes around 15 minutes to fill out the questionnaire. It is anonymous, so you do not have to indicate your name, and none of the questions require answers that would reveal your identity or the school you study at. I will not disclose your answers to anyone else. I will summarize all the results and write a study about it. The information you provide can help language teachers to better understand what students think of using ICT tools in the English lessons.
If you have any questions about this study, feel free to contact me at the following email address: [author's email address].

Your help is greatly appreciated.
Best regards,
[author's name]

I. First I would like you to answer a few questions about the ICT devices available in your school.

1. Is there a smart board in the classroom where you usually have your English lessons?

      Yes   No

(1+, if the answer is 'Yes'): How often do you use the smartboard in the English lessons?

In every English lesson or in almost every English lesson	Once a week	A few times per month	A few times per school year	Never or almost never

2. Is there a desktop computer in the classroom where you usually have your English lessons?

      Yes   No

(2+, if the answer is 'Yes'): How often do you use the desktop computer in the English lessons?

In every English lesson or in almost every English lesson	Once a week	A few times per month	A few times per school year	Never or almost never

3. Are there laptops in the classroom where you usually have your English lessons?

      Yes   No

(3+, if the answer is 'Yes'): How often do you use a laptop in the English lessons?

In every English lesson or in almost every English lesson	Once a week	A few times per month	A few times per school year	Never or almost never

4. Do you use a smartphone for learning in the English lessons?

      Yes   No

(4+, if the answer is 'Yes'): How often do you use a smartphone in the English lessons?

In every English lesson or in almost every English lesson	Once a week	A few times per month	A few times per school year	Never or almost never

5. Are there tablets in the classroom where you usually have your English lessons?

     Yes   No

    (5+, if the answer is 'Yes'): How often do you use a tablet in the English lessons?

In every English lesson or in almost every English lesson	Once a week	A few times per month	A few times per school year	Never or almost never

Now choose a number between 1-5 depending on how true the following statements are for you.
5 = very much   4 = quite   3 = more or less   2 = not really   1 = not at all

6. I use ICT tools in the English lessons to complete reading tasks.	5	4	3	2	1
7. I use ICT tools in the English lessons to complete writing tasks.	5	4	3	2	1
8. I use ICT tools in the English lessons to complete listening tasks.	5	4	3	2	1
9. I use ICT tools in the English lessons to complete speaking tasks.	5	4	3	2	1
10. I use ICT tools in the English lessons for learning new vocabulary.	5	4	3	2	1
11. I use ICT tools in the English lessons for practicing grammar.	5	4	3	2	1
12. I use ICT tools in the English lessons to do research.	5	4	3	2	1
13. I use ICT tools in the English lessons to create presentations.	5	4	3	2	1

14. Do you use ICT tools in the English lessons for activities other than the ones mentioned above?

     Yes   No

(14+, if the answer is 'Yes'): What other activities do you use ICT tools for in the English lessons?

    ....

II. Please choose the number that reflects most truthfully what you think of the statements below. There are no right or wrong answers; I am interested in your opinion.

5 = perfectly true   4 = quite true   3 = partly true, partly not
2 = not really true   1 = not true at all

15. I like using ICT tools in the English lessons.	5	4	3	2	1
16. I think it is a good thing to use ICT tools in the English lessons.	5	4	3	2	1
17. Whenever I can choose to work either with or without an ICT device in the English lessons, I choose to work with an ICT device.	5	4	3	2	1
18. I think that using ICT tools in the English lessons has a lot of benefits.	5	4	3	2	1
19. I find the tasks that I complete with the help of ICT tools interesting.	5	4	3	2	1
20. The tasks that I complete with the help of ICT tools always spark my curiosity.	5	4	3	2	1
21. The tasks that I complete with the help of ICT tools are close to my interests.	5	4	3	2	1
22. The topics of the tasks that I complete with the help of ICT tools are close to me.	5	4	3	2	1
23. When I use an ICT tool to complete a task in the English lesson, it is always clear to me what I have to do.	5	4	3	2	1
24. When I use an ICT tool to complete a task in the English lesson, I am sure that I am doing exactly what I am supposed to do.	5	4	3	2	1
25. When I use an ICT tool to complete a task in the English lesson, I can do the task without major difficulties.	5	4	3	2	1
26. I am proud of myself when I complete a task in the English lesson with the help of an ICT tool.	5	4	3	2	1
27. The tasks that I complete with ICT tools pose an exciting challenge for me.	5	4	3	2	1
28. It feels good to complete a task in the English lesson with the help of an ICT tool.	5	4	3	2	1
29. I like the types of tasks that I have to complete with the help of ICT tools.	5	4	3	2	1
30. When I use an ICT tool to complete a task in the English lesson, learning feels easy.	5	4	3	2	1
31. When I use an ICT tool to complete a task in the English lesson, I have every opportunity to do it in a way that I find most convenient.	5	4	3	2	1
32. When I use an ICT tool to complete a task in the English lesson, I can do it in a way that feels best for me.	5	4	3	2	1
33. Learning English is great.	5	4	3	2	1
34. I really enjoy learning English.	5	4	3	2	1
35. I am interested in the English language.	5	4	3	2	1
36. I like the English lessons.	5	4	3	2	1
37. I am willing to make a lot of effort in order to learn to speak English very well.	5	4	3	2	1
38. It is very important for me to learn English.	5	4	3	2	1
39. I can honestly say that I am really doing my best to learn English.	5	4	3	2	1
40. I am determined to learn English.	5	4	3	2	1
41. Learning English is one of the most important things in my life.	5	4	3	2	1
42. I am confident that I can do the speaking tasks in the English lessons.	5	4	3	2	1
43. I am confident that I can do the reading tasks in the English lessons.	5	4	3	2	1
44. I am confident that I can do the writing tasks in the English lessons.	5	4	3	2	1
45. I am confident that I can do the listening tasks in the English lessons.	5	4	3	2	1
46. I am confident that I can understand what is said in English in the English lessons.	5	4	3	2	1
47. I am confident that I can answer questions in English in the English lessons.	5	4	3	2	1

III. Finally, please provide a few personal details.

48. Your gender: boy   girl

49. Which grade are you in?   5   6   7   8

50. In which grade did you start learning English?

      1   2   3   4

      5   6   7   8

None of these, I started learning English before primary school.

51. What is your level of English?

beginner   intermediate   advanced

About the Author
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