

Challenges of Online Teaching During the COVID-19 Pandemic in an English as a Foreign Language Context: A Process Tracing Approach

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Original article

Keywords: technology-driven challenges, content-based challenges, online education, English a foreign Language (EFL), teacher, process tracing, Iran

Posted Date: January 11th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-141388/v1>

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Abstract

The prevalence of COVID-19 pandemic worldwide has affected educational systems around the world and has forced education systems to shift to online learning. The present study was motivated to explore the challenges (common technology-driven and content-specific challenges) facing an English as a foreign language teacher throughout an online English course in Iran. The main participant of this study was a female teacher, with 17 years of experience in teaching English to children, teenagers, and adults. To this aim, a process-tracing approach was employed in an online English class with 10 female students, all teenagers, to unravel the causal mechanisms involved in the beginning, middle and end of the English course. The results showed that the greatest challenges throughout the course especially in initial and mid sessions were caused by deficient technological resources. The two other causal categories, human and content resources, were at their peak early in the course and then reduced significantly by the end. The most troublesome challenges the teacher faced were platform limitations, internet connection and human resources' unpreparedness for online education. Though the teacher's as well as most students' technological knowledge and media literacy showed an increase by the end of the course, some students' slow adaptation challenged the teacher until the end. As for the content-based challenges, teaching vocabulary and speaking was considered the most challenging one due to lack of teacher's physical contact with students.

Introduction

The global demand for effective distance and online learning inevitably prompts language teaching/learning domain to provide this learning modality in empirically supported modes using known and best practices (Gleason & Greenhow, 2017). Though online learning was around since 2000 (Tallent-Runnels et al., 2006), within the past few months after the global COVID-19 pandemic, it has been embraced worldwide more than before, with many learners and teachers not yet adequately prepared for it (Tesar, 2020). The new conditions are so perplexing that more and more questions emerge about why things are happening as they are, and there seems to be no policy or persuasive answer to the conditions at hand (Peters, Arndt, & Marek, 2020). Online learning, which played a complementary role in traditional mainstream education in the pre-COVID-19 era, has now dominated global education (Tsar, 2020). This sudden growth may be at the expense of quality if adequate pedagogical practices are lacking (Sithole, Mupinga, Kibirige, Manyanga, & Bucklein, 2019). This sudden shift from the traditional to online method of instruction may affect the quality of teaching and learning especially in countries in which their educational systems suffer from technological infrastructure limitations. These infrastructures are in fact the preliminary requirement for entering the online learning environment. The educational systems of some low to middle-income countries like the ones in Africa may be disorganized due to these limitations (e.g., internet access, connection problems, costly equipment, etc.) (AlfatihAlzainAlsheikhidris, 2020). In some developing countries like Iran, the educational system, especially the higher education, has been equipped with virtual learning since 2004 (Tavakol, 2012). However, K-12 education and most of private language institutions have faced challenges due to not being familiar and equipped with online

education framework. Needless to say, teachers play a crucial role in an educational system. The reason is that these are teachers that are mainly involved in selecting, developing, and teaching the curriculum in the classroom (Jahanban-Isfahlan, Hadidi-Tamjid, & Seifoori, 2017).

As claimed by Hodges, Moore, Lockee, Trust, and Bond (2020), there exists a huge difference between well-planned online courses and the ones developed following a crisis or disaster. In these cases, the most challenging situation for teachers would probably be the issue of replacing the curriculum which used to be taught in a traditional way of instruction with a more practical one, compatible with the online environment. Besides, the present shift to online education requires a more inclusive pedagogical approach to embrace different learning styles. As Rapanta, Botturi, Goodyear, Guàrdia, and Koole (2020) contended, teachers lacked pedagogical content knowledge (PCK) for teaching online classes which mainly consists of technical and administrative features of online teaching instruction. Other challenges in teaching online classes may for instance, include student readiness, self-discipline, computer technology requirements, time zone differences (Sithole et al., 2019). Beside knowledge about developing an appropriate curriculum, knowledge of different challenges (technology-driven or content-specific) in online language education can contribute to the efficiency and effectiveness of the online course.

In a dominantly web-based environment, all the materials (assessments, feedback, etc.) are delivered via a Learning Management System (LMS) (Franks, 2002; Hiltz & Turoff, 2005; Parsad & Lewis, 2008). Thus, there is a growing dependence on using various platforms to facilitate student learning (Alstede & Beutell, 2004; Franks, 2002). It is noteworthy that this trend is driven by ever-increasing demands for flexibility and the need for an education suiting student lifestyles. Still, concerning the requirements of online education and more specifically language courses, teachers' expectations and challenges remain vague and inconsistent (Sithole et al., 2019). In English online language setting, apart from common technology-related issues, teachers may face challenges regarding delivering the content to students which may lead to confusion while teaching different language skills and subskills. The hardest skill to teach in online classes may be the listening skill. Montiel-Chamorro (2018) reported that teachers found "listening" the most difficult skill to develop in online classes, leading to the lack of understanding and confusion among students. Montiel-Chamorro (2018) also claimed that teaching speaking might cause problems in online classes. The main reason may be due to lack of physical contact with their teachers and classmates. In online classes, students may find few opportunities to practice conversations with their classmates. Teachers and students may lack the element of body language in online classes which is helpful in understanding the content. As for writing skill, Montiel-Chamorro (2018) believed that some teachers had problems in teaching writing in their online classes whereas some were not dependent on the nature of writing task and type of correction technique presented to them. Therefore, in an online setting, teachers may face different challenges ranging from technology-driven to more specific, content-related challenges.

This study is relevant not only to the less experienced online language teachers but also the experienced, both now faced with mandatory online courses. Awareness of potential challenges facing language teachers in online courses can act preventively to ensure more productive and efficient time management,

class management, interaction and feedback. In doing so, we used process-tracing approach which is an innovative methodology in qualitative research, best fitted for case studies to trace the steps of a phenomenon, unravel the causal mechanisms of the case, its dynamic behaviors and emergent outcomes (Mahoney, 2012, 2015). As mentioned by Beach and Pedersen (2013), process-tracing can develop toward four directions, one of which is “forward into the dynamic mechanisms of change” (Hiver & Al-Hoorie, 2020, p 97). Also, we applied process-tracing approach because we were interested in revealing the changes that could happen to the teacher’s view and the method of instruction throughout the course. In doing so, we also followed the dynamic system theory to investigate the process of change and development throughout the course within the online language learning system.

Literature review

Many empirical studies have been conducted to examine the quality of online courses from different aspects. They have explored and identified critical issues affecting the quality of online education such as communication, technology, time management, pedagogy, and assessment (Bassoppo-Moyo, 2006; Conaway, Eston, & Schmit, 2005; Ko & Rossen, 2010; Limperos, Buckner, Kaufmann, & Frisby, 2015). There have been many reports of high dropout rates and underachievement associated with online courses (Luyt, 2013; Morris, Xu, & Finnegan, 2005; Tyler-Smith, 2006) before the emergence of COVID-19. Early works of research on online education issues (2000–2015) had not comprehensively classified the challenges and issues concerning online educators (Mayes, Luebeck, Yu Ku, Akarasriworn, & Korkmaz, 2011). As an instance, Brooks (2003) referred to teachers’ attitudes as a main factor affecting the quality of online courses. Arbaugh (2005) mentioned technology, students’ behavioral characteristics and teachers’ teaching style as the main challenges. Jacobs (2014) pinpointed that student assessment is a major problem in online courses. Yueng (2001) referred to teacher and student support, course development, course structure, and how the institution assesses online learning as the main potential sources of problems. Later on, the body of research on relevant issues and challenges of teaching online courses became more polished and better-organized. Kebritchi, Lipschuetz and Santiago (2017) reviewed challenges in online courses in advance to the COVID-19 pandemic and categorized them as learner-related, teacher-related and content-related issues. Teacher-related challenges included changing faculty roles, transitioning from face-to-face to online, time management and teaching styles.

Trammell and LaForge (2017) explored the common challenges for teachers in large online courses (more than 70 enrollments). They found course design and instructional effectiveness as the most significant challenges facing teachers in handling high-enrollment online classes. Instances of the former were organization and planning while those of the latter were teacher presence, availability and organization. Similarly, Rasheed, Kamsin, and Abdulah (2020) explored challenges in the online component of blended learning. They viewed challenges from student, teacher and institution aspects. Students’ challenges were mainly of self-regulation type. Teachers’ challenges were mainly in using the required technology for teaching. Challenges facing institutions were in providing the required training for teachers.

During COVID-19 era, Atmojo and Nugroho (2020) explored teaching activities and challenges in EFL online classes in Indonesia and categorized them in three groups: student-related, teacher-related and parents-related. Instances of teacher-related challenges were difficulty creating materials for online setting, low technology knowledge or relevant experience, difficulty of providing personal feedback to students, motivating passive students, absence of hi-tech facilities, no preparation or training for online course, inability to strengthen emotional bonds with students due to the absence of physical contact and interaction, inadequate teacher-student interaction and absence of parents' care. In a similar vein, Alam (2020) explored challenges facing teachers and students in online education during COVID-19 pandemic in Bangladesh. The sources of challenges were :no prior experience of getting online education and, thus, unfamiliarity with the environment and requirements, limited internet coverage in distant areas, technical issues (e.g. using computer or smartphone), time management and feedback management.

In another EFL context, Khatoony and Nezhadmehr (2020) investigated the challenges of incorporating technology into their English classes during COVID-19 crisis in Iran. After reviewing the questionnaire and interview responses of 30 English teachers, they concluded that although teachers had positive attitude toward using technology in their classrooms, they mainly faced different challenges including lack of appropriate materials, learners' lack of attention and demotivation towards online classes, and lack of funding and support for language institutions.

There is still a dearth of research on the challenges, either common technology-driven challenges or more specific-content related challenges, facing language teachers in online courses during COVID-19 era especially in an EFL context. Thus, we were motivated to explore these challenges, using a process-tracing approach, when experienced by an EFL teacher within an entire online language course. The case-study design helped investigate the complexity of the experience in depth.

With the recent establishment of methods for complexity theory in applied linguistics (see Hiver & Al-Hoorie, 2020), the use of idiographic approaches like single-case studies has been welcomed as a new line of research. Thus, we aimed to trace the emergent challenges of teaching English language as it actually occurred throughout the online course. The inherent novelties of this research not only lie in the under-researched topic during COVID-19 era, but more importantly in the analytic method used. Accordingly, the following research question were addressed:

RQ1: What can the study of processes and sequences of events in an online course of language teaching reveal about the teacher's challenges in this course?

RQ2: What are the causal mechanisms of the challenges the teacher experiences in online language teaching during COVID-19 pandemic?

RQ3: How does the conjoint occurrence of certain events and factors feed into the dynamic trajectory of the teacher's challenges in the online course?

Method

Participant and Setting

As the research methodology employed in the present study was process-tracing and more specifically of the case-centric type (Bennett & George, 1997), a single-case study design was selected for a longitudinal purpose. The female participant, 42 years of age, held a bachelor's degree of Translation Studies. She had 17 years' experience of teaching English in traditional face-to-face classes for children, teenagers and adults. She had had 4 months' experience of blended English courses (online and face-to-face combined) before the COVID-19 pandemic. The English course during which she was interviewed to trace the emergent challenges in this research was entirely online, as it was held when the disease prevailed. The online English course took 13 sessions in length, began on June 25 and ended on July 23, 2020. The lower-intermediate class was held with 10 female EFL students, each session taking 90 minutes in length. The descriptive information about the students is presented in Table 1.

Table 1 *The Descriptive Information about Students*

Name	Age	Gender	Years of English learning experience	Proficiency level
Student 1	14	Female	5	Lower-intermediate
Student 2	14	5	5	Lower-intermediate
Student 3	14	5	5	Lower-intermediate
Student 4	14	4	4	Lower-intermediate
Student 5	13	4	4	Lower-intermediate
Student 6	13	4	4	Lower-intermediate
Student 7	13	4	4	Lower-intermediate
Student 8	11	3	3	Lower-intermediate
Student 9	16	6	6	Lower-intermediate
Student 10	16	5	5	Lower-intermediate

Note: The level of students' proficiency was determined via a placement used in the language institute

The material was selective based on online sources and was presented as images or slides. The tasks and activities were adopted from the American book series, Teen2Teen 2 (first part of the book/ Level A2 based on CEFR), published by Oxford University Press. Only the final exam was planned on the 13th session in a classical face-to-face mode. The information about the online English course and activities are presented in Table 2.

Table 2 *Information about the Online Course*

Session number	Teacher's (T) activity	Focus of the course	Students' (Ss) activities
4	<ul style="list-style-type: none"> • Unit 2 was going to be taught (each unit is taught in 3 sessions). • T asks Ss to make some questions or pay attention to questions in page 17, then guide them to make sentences based on the samples. • T observe and guide Ss to make question and correct their mistakes. • T asks Ss to listen to listening part for the first time (they were not being asked to listen to this part before coming to class). 	<ol style="list-style-type: none"> 1) Teaching grammar (present continuous in the form of yes/no questions). 2) Listening comprehension related to grammar focus. 	<ol style="list-style-type: none"> 1) Ss are Asked to make questions with present continuous tense. 2) Ss are supposed to ask each other questions using present continuous tense and make use of peer correction and feedback. 3).Ss are supposed to listen to listening part and find the answers and deliver their answers to teacher next session.
8	<ul style="list-style-type: none"> • T had taught Grammar previous session (session 7) and Ss had practice the grammar in that session. Therefore, for this session they were supposed to deliver their homework related to grammar part (Grammar focus of session 7 was using present continuous for progress time). • T teaches Ss about wh questions and how to make question using wh words (why, when, where...). 	<ol style="list-style-type: none"> 1) Grammar focus (present continuous for progress time). 2) Grammar focus :wh questions or information questions. 3) Reading and conversation presented after reading section (the conversation is about two girls and their routine life and the decision they make). 	<ol style="list-style-type: none"> 1) Ss must deliver the homework related to grammar part. 2) Ss practice wh questions and make sentences: they either make their own sentences or make questions based on the sample affirmative sentences. 3) Ss are asked to write 10 sentences. Then they must make use those sentences to make questions with wh words. 4) Ss must talk about themselves or a member of their family based on the samples presented in the conversation section in class.

Session number	Teacher's (T) activity	Focus of the course	Students' (Ss) activities
12	<ul style="list-style-type: none"> • Depending on the class time, this session is mainly dedicating to reviewing the whole semester. • T focus on the reading and follow-up conversation presented in unit 4. Unit 4 is about countable and uncountable nouns 	1) Reading and conversation of unit 4 (a menu of restaurant) (conversation section is about how to make a meal).	1) Ss are asked to read the menu in reading part. 2) Ss are asked the recipe of different food and which meals containing eggs do they like. 3) Ss are asked to use conversation words and talk about how to make a meal they like.

The online English course was held in a private language institute using the BigBlueButton open-source web conferencing system as the platform. In this system, as described by Kiss (2012), the teacher can upload any office document or PDF file and keep everyone in synch with their current page, zoom, pan and the students can also see the teacher's mouse pointer. Users can share their webcam at the same time without limit on the number of simultaneously active webcams. The teacher can share her desktop with all students. The system supports voice over IP (VOIP) conferencing. All students need speakers and microphone to participate.

The purpose of research, its type and time requirement and the data collection procedure were explained to the participant at the outset. She consented to participate actively and honestly in the case study. She was also ensured of the confidentiality of the information she provided and, for ethical considerations, her identity has been pseudonymed all throughout the paper. She was asked to attend the online course as usual and answer the interview questions once after the 4th session, once again after the 8th session and one more time after the 12th session. The 13th session was planned for a final exam.

The interview was conducted in person in Persian language, the interviewer's and interviewees' L1. The interview was voice-recorded and the data were then transcribed, translated into English and analyzed through process-tracing. The teacher participant was ensured of the availability of the researcher in case of any inquiry.

Instrumentation

The data in this case study were collected using a semi-structured interview which delved into the challenges (in technology, content, communication, etc.) that the teacher experienced in different steps of the online course. The content was developed to meet the requirements of the dynamic systems theory as elaborated by Hiver and Al-Hoorie (2020) to approach the target challenges within a whole complex system of class and the underlying interconnections among components (teacher, students, materials).

The semi-structured format of the interview along with its open-ended questions encouraged the respondent to elaborate more on the relevant points in an exploratory manner (Dörnyei, 2007). The teacher was interviewed three times, in the beginning, middle and end of the course. The interview guide is provided in the Appendix.

Data collection and analysis

For collecting and analyzing the data, the procedures inherent to process-tracing approach were followed. Process-tracing is a within-case methodology (a special form of case-study) for explaining complex causal mechanisms at a micro level of granularity (Checkel, 2006). It aims to make inferences about causal explanations of a case, its dynamic behavior and emergent outcomes (Mahoney, 2012, 2015). The case-centric type of process-tracing, which is more interesting for qualitative researchers (Beach & Pederson, 2013) and which was used in the present research, aims to find the causes of a specific outcome in a single case (Beach & Pederson, 2013). The specific outcome in the present research was the challenges facing an EFL teacher in an emergent online course during COVID-19 era. It is subsumed under the more inductive types of process tracing, as categorized by Trampusch and Palier (2016).

Almost all inductive types of process tracing view time as a key factor in the causal explanation of an event. And they mostly rely on alternative explanations to account for the temporally step-by-step unraveled process of an event (Trampusch & Palier, 2016). Accordingly, in the present research, the challenges the teacher experienced were traced through the length of an entire course. Three steps were taken in the beginning, middle and end of the course to trace the experiential process of challenges. In order to adhere to a principled process-tracing approach, the following procedures proposed by Bennett and Checkel (2015) were followed:

1. Determining the outcome in question and potential expected causal mechanisms
2. Choosing a representative case and setting the time when to start evidence collection
3. Taking potential biases into account
4. Considering a range of alternative explanations for causal mechanisms
5. Following evidence to accept or reject alternatives
6. Eliminating some alternatives gradually
7. Extracting more detailed evidence for the rest of explanations
8. Determining when to stop the process

According to these procedures, we firstly specified challenges as the outcome of interest in the process of EFL teaching and aimed to trace the causal mechanisms involved in teaching the language in an online course. In the light of the dynamic systems theory (Hiver & Al-Hoorie, 2020), the black box explored in this research was expected to involve an interconnected network of factors. The challenges could be due to technological equipment, the people involved (teacher and students) or more importantly, the content covered that directly or indirectly made the teaching task challenging. Secondly, a representative case was selected as explained above, who was an experienced EFL teacher in traditional classes and had

only a short experience of blended courses before the pandemic. She showed interest in and commitment to this study and provided detailed answers to interview questions. The exact time and duration of data collection was scheduled to correspond to the plan of the target course.

Thirdly, to avoid confirmation bias, we took into account as many alternative explanations for challenges as we could. To avoid selection bias, we tried to consider the immediate context from which the evidence was derived, as the interviews were not delayed to the time the course ended. Instead, it was scheduled during the course to closely trace the challenges in their immediate context. To avoid cognitive bias in seeing patterns where none existed, as proposed by George and McKeown (1985), we did our best to contrive well-defined alternative causal paths in advance for the purpose of process verification.

Fourthly, the alternative explanations for teaching challenges were derived from the literature and divided into three categories: human resources, content resources and technology resources. By human resources in an EFL class, we mean the teacher or students. Examples of teacher's challenges that originate from human resources in online education are time limitation (Capra, 2011; Cavanaugh, 2005; Crawley, McKenzie, Mims, Bennett, & Waugh, 2000; Fein & Logan, 2003; Fewell & Sugar, 2009; Humphries, 2010; Li & Irby, 2008), lacking interest in online education (Berge & Collins, 1996; Fein & Logan, 2003; Osika, Johnson, & Buteau, 2009) and unreadiness for online education (Baran, Correia, & Thompson, 2011; Hung, Chou, Chen, & Own, 2010; Smith, Murphy, & Mahoney, 2003). Examples of teaching challenges stemming from content are development of new material (Koehler, Mishra, Hershey, & Peruski, 2004; Kyei-Blankson & Keengwe, 2011; Li & Irby, 2008) and use of multimedia (Almala, 2005; Hathaway, 2013; Mayer, 2014; Miller, 2014; Niess & Gillow-Wiles, 2013). Examples of teaching challenges due to technology are slow or limited internet coverage (Alam, 2020; Atmojo & Nugroho, 2020) and difficulty operating the platform system (Bower, 2015; Leo & Puzio, 2016; Lightner & Lightner-Laws, 2016).

Fifthly, the evidence was gathered from the interview content which was voice-recorded, transcribed, translated, and analyzed through qualitative content analysis. The recurrent themes showing the essence of challenges the teacher experienced were highlighted and then arranged into 11 categories. For example the inability of uploading audio files or uploading several files together were assigned to the 'platform limitations' category. The distribution of these categories and their causes were to be traced throughout the entire course. Sixthly, the distribution of causal mechanisms was also traced in the three steps of the course. Through the process-tracing, explanations that were not evidenced were eliminated and; thus, the range of alternative explanations was further narrowed down. And seventhly, as suggested by Bennett and Checkel (2015), when the process went on gradually in later steps, we tried to gather more detailed evidence for explanations that appeared to be more comprehensive than others. The three researchers in this study engaged in the process tracing analysis independently to code the data manually. An inter-coder agreement of 93.7% was reached which was above the 90% threshold level as suggested by Miles and Huberman (1994). Occasional cases of controversy were discussed together so that a consensus could be reached.

Results And Discussion

The online EFL course covering a whole semester was held in 13 sessions. Firstly, the whole content of transcripts was analyzed to find recurrent challenges; then they were attributed to the potential explanations derived from the literature labeled as causes. Next, the prevalence of the causal mechanisms of these challenges was traced from the beginning to the end of the course and a trajectory of the prevalence of these causes was drawn. This trajectory can show fluctuations in the strength of each causal mechanism. Finally, the potential interaction among these mechanisms within the dynamic system of online language learning is discussed. This procedure answers the three research questions.

The overall challenges the teacher (henceforth Mina) recurrently experienced throughout the course could be summarized in 11 categories:

1. Class attendance problem
2. Low media literacy and technological knowledge
3. Outdated devices
4. Time management problem
5. Students' slow adaptation to online class
6. Low internet speed
7. Platform limitations
8. Problem of material development/adaptation/coverage
9. Unfamiliarity of textbook
10. Concerns about evaluation
11. Communication problems

Distribution of these challenges, some induced by technology, some rooted in human resources and some dealing with content, varied across the three steps of the online course (i.e. beginning, middle and end of the course). This is represented in Table 3.

Table 3 *Distribution of Challenges in Teaching the Online Language Course*

Step of course	Beginning	Middle	End
Challenge			
Class attendance problem	Yes (to the highest degree)	No	No
Low media literacy and technological knowledge	Yes (to the highest degree)	Yes (to a less degree)	Yes (to the least degree)
Outdated devices	Yes (to the highest degree)	Yes (to a less degree)	Yes
Time management problem	Yes (to the highest degree)	Yes	No
Students' slow adaptation to online class	Yes	Yes	Yes (to a lower degree)
Low internet speed	No	Yes	Yes (to a lower degree)
Platform limitations	Yes	Yes	Yes
Problem of material development/adaptation/coverage	Yes (to the highest degree)	Yes	Yes (to the least degree)
Unfamiliarity of Textbook	Yes	Yes (to a lower degree)	No
Concerns about evaluation	No	No	Yes
Communication problems	Yes	Yes	Yes (to the highest degree)

A combination of the above-mentioned challenges was faced in each part of the course. These along with the causal mechanisms during each step are respectively addressed here.

Challenges and causes in the beginning of course

The beginning of the course hosted the majority of challenges to their highest degree, as Mina described. Regarding the response to the first question, the first challenge she faced in the first couple of sessions was 'class attendance'. Both she and many of her students found it hard logging into the system. Though there had been some training videos on this, Mina had not found them much useful, as she said "There were some videos showing how to use the system, but we had to watch them again and again and we still found it hard to log into the system".

The other problem she recurrently faced in class during the initial sessions was the 'outdated devices' that could not serve the purposes of an online class and mostly needed an update. Compare below:

Some students' mobile phones or computers needed an update. Or for example their microphone had not been operated long, and needed to be fixed. Some colleagues had the same problem too. I know a colleague of mine had to have her computer repaired and updated for a week before she could use it for the online class.

The reason for the class attendance issue was evidently the difficulty of operating the system as already admitted as a recurrent problem in online education by several researchers including Leo and Puzio (2016), Bower (2015), and Lightner and Lightner-Laws (2016). This problem is partly explained by technology resources and the extent to which they are user-friendly, as acknowledged by Arbaugh (2005), and partly by human resources' (here teacher and students) 'low media literacy and technological knowledge'. Similarly, Alam (2020) and Atmojo and Nugroho (2020), in their post-COVID-19 investigations of the challenges of online classes, found users' low media literacy as the most salient issue. The source of this challenge is within individuals. However, this deficiency is partly defensible in this study due to the unexpected emergence of the disease and, thus, the unpreparedness of human resources for this sudden change of environment and mode of education. Here is an extract from Mina's accounts showing that a great many problems associated with the use of new technology were not due to the inherent user-unfriendliness of technology, but entirely indicative of users' low media literacy, subsumed under the human resources causal mechanism:

For those who had changed their class, the institute created new hyperlinks to the new class. Though the hyperlinks were very easy to type, without any space or capital letter, in the simplest words as possible, many students did not pay enough attention to type them correctly.

The problem of 'outdated devices' was technological in origin. The new mode of education required updated technology, which was conspicuously absent in this study, and needed to be provided immediately. This problem caused many students to miss the initial sessions of the course and some teachers to miss the chance of teaching some lessons. With this regard, Mina explained "it took so long for a friend of mine to get her updated computer back that she already missed a whole lesson".

This excerpt shows that the early sessions of the course were associated with the 'time management' issue too. It could be caused by deficiencies in technological resources and human resources both. The latter is attributed by Kebritchi et al. (2017) to the teacher source (i.e. explained by the human resources causal mechanism).

The 'content-coverage' challenge was facing Mina too. She missed the chance of teaching what she wanted to during the first sessions, as many new-coming students hindered the class and the content that needed to be covered was not. So it seems that expectations on what to cover and how to cover it (as for content) need to change from traditional face-to-face classes to an online course. This is a content-resource issue. Moreover, as Mina described, especially during the initial sessions, she found it hard to draw students' attention to the page of book she was teaching. She had to teach the content slide by slide, which was not as effective as showing a whole integrated PDF file. Mina could not upload as many slides as she wanted. This challenge can be considered, from one aspect a 'platform limitation' issue and,

thus, traced partly to the technology resources causal mechanism, and partly to the content resources the teacher had. The latter was also acknowledged by several researchers including Neely and Tucker (2010), Choi and Park (2006), Li and Irby (2008), and Kyei-Blankson and Keengwe (2011) as a problematic source for many teachers in online education in the design phase of teaching, marked by losing control over the material and finding it hard to adapt it to the new mode of presentation.

Another content-related challenge was attributed to teaching different English skills and sub-skills in the online setting. Mina pointed out to different constraints in online setting which made her to put less time and effort in teaching vocabulary. One of the main constraints was lack of physical presence and contact with students. Mina said that in face-to-face classes, she had the advantage of using body language and pantomime for teaching different words and even different synonyms to students.

Despite showing her face to students and having good webcam picture quality in online classes, she could not have the type of movement and contact she had in face-to-face classes to teach vocabulary. She said the only method that came to her mind at that moment during the initial sessions was to provide different examples containing new words and to ask her students to guess the meaning of the words. Teaching vocabulary was more auditory-based than visual or kinesthetic-based in online classes. Mina also reported that in face-to-face classes, she encouraged her students to teach the “parts of speech” of different words when students did not know where and how to use different forms of the words. She would arrange the students in a row and assign the role of adjective, verb, noun, and adverb to students and by doing so, she would ask students to change their position in the row by considering the role they had in the sentence. However, this game was not possible in online classes and it was also difficult to keep students’ attentions while teaching this subject.

Mina faced similar problems when teaching grammar. She stated that in face-to-face classes, students comprehended grammatical rules more easily due to being more focused on the content because the teacher used different physical activities like role-play to keep them interested or used peer-correction to encourage interaction among students. But, in online classes, it was limited to explaining the rules by using slides. As for teaching reading skill, she also had some problems due to not having pre-course planning. The reading section had many unfamiliar words along with a difficult text to understand. She had to provide various examples for students to understand the text which most of the time led to more confusion.

Mina also kept complaining about students who had a change of class and level, one consequence of which was unfamiliarity with the new book. She thought this could be typically an issue in traditional face-to-face classes too, and in the online mode, it got even worse. This was another challenge caused by content resources, though not peculiar to online education, but one that could confuse students to a great extent. With this respect, Mina said “after I had already started teaching the page, they could be heard asking each other what I was talking about or which page I was teaching. They seemed too confused to follow the content”.

The early sessions of the course were also associated with 'communication problems' especially between students and the institute, as Mina said "The institute had to call students or they had to call the institute again and again to get help on how to work with the system or hyperlinks".

Overall, it is evident that teaching the initial sessions of the course was the most challenging to the teacher. These sessions were deemed fraught with challenges explained by deficiencies in technology, human and content resources, all seemingly at their peak. As Mina moved on describing the challenges she faced in the rest of the course, it could be observed that many of these challenges were reduced in degrees, yet some others still prevailed.

Challenges and causes in the middle of course

In the few mid sessions of the course, such challenges as 'class attendance' were eliminated. The 'platform limitations' prevailed to the end of the course. As Mina complained from the beginning of the course to the middle sessions and also in the end of the course, the most unamiable 'platform limitation' that she experienced was inability to upload audio files which in turn caused some problems in teaching listening comprehension, especially during initial sessions. She partly compensated for this problem with video-files, but on certain occasions (e.g. reading passages) it did not work. This challenge was evidently caused by the limited technological resources available to her. She noted that since she had no pre-course plans for teaching listening and reading skills, she felt frustrated and under time pressure for teaching these skills, especially during initial sessions. In face-to-face classes, she always asked students to listen to audio files before coming to class. During class time, she would ask some students to provide a summary of what they understood from the conversations. Then, the following activities were done accordingly. However, in online classes, she could not follow the same plan due to having several problems such as not being able to upload audio files, not knowing for sure if students listened to files before class and having limited time to teach listening completely. However, during the middle of the course, she came up with a plan to alleviate the audio limitation. She made some slides containing the scripts of listening with some gaps. Then she asked students to fill the gaps.

However, this method had its own limitation because it lost its nature as a listening task. In Montiel-Chamorro (2018) study, teachers also faced problems teaching the listening skill because they maintained that the content was not appropriate for online classes i.e. that listening tasks were mostly long and frustrating and hard to understand. Regarding the reading skill, after initial online sessions, she came up with a plan to teach reading effectively within limited class time. She divided the text into different sections and provided enough synonyms and explanations for each section. Then, she used individual and pair-work activities to enhance students' understanding.

Another challenge rooted in the technological resources that unexpectedly happened in the mid sessions was the sudden drop of the 'internet speed'. Compare below:

One day in the middle of the course, when I was sharing my webcam with students, suddenly the webcam window froze. First I thought that was an issue with my webcam, but I saw that my students' videos froze

too. I checked the internet quota and realized that the telecommunication company had just cut the speed down to half.

This problem was solved to a certain degree in the ending sessions of the course, but tremendously led to the 'time management' issue in the middle of the course. Mina had to type much of what she already inserted in the slides that did not open then, and typing took much of the class time.

In the mid sessions of the course, Mina perceived herself more adept at tackling the problem of 'content development' as she said "now I very well knew that I could not upload as many files as I wished. So, I prepared one office document and included slides page by page within the document to share with students". Yet the internet connection issue was truly troublesome, as she said "even in the middle of a session I realized I was disconnected and was out of the class without knowing for a couple of minutes". She only came to know when she felt suspicious of other students being silent for long. The technical supporter of online sessions was not always present to solve such problems (if she was ever able to); thus, the teacher was left high and dry. The peak of the technology-induced challenges was the 8th session, when Mina got disconnected three times and much of the class time was wasted. Levin, Whitsett and Wood (2013) emphasized the need for online course planners to ensure users' access to reliable internet connection, if they expect an appropriate space to be created for learning. Similarly, Atmojo and Nugroho (2020) reported unstable internet connections as a main challenge faced in an online EFL class during the COVID-19 pandemic in Indonesia. In this research, though the teacher had solved the internet quota problem by running the class in Google Classroom, the overall internet coverage and speed caused serious issues. It is certain that such a technologically-rooted problem, in turn, leads to the 'time management' difficulty and makes the teacher's job further demanding.

In the middle sessions of the course, Mina perceived students' 'media literacy and technological knowledge' better improved. With this respect, she commented "from the middle of the course on, students were better at using their devices. They knew how to go slide by slide, how to zoom in and out and the like". As both she and her students were more familiar with the environment, its requirements and the limitations, the overall level of challenges caused by human resources were lower than the initial sessions. Yet, she complained about a number of students' slow pace in adapting themselves to the online environment. Sometimes, they fell behind and kept asking each other which page the teacher was teaching and what she meant in the first place. About this, Mina commented "we still had the same problem with slow students. When we were busy doing an exercise at a normal speed, they fell behind and always wondered which exercise we were busy doing".

Mina perceived the adaptation issue with slow students inexorable, and she said it remained with some students to the end of the course. Alam (2020) also reported this adaptability issue as a main concern among students and teachers of online courses during the COVID-19 pandemic. This human-resource induced problem Mina complained about could be explained by the lack of self-directed learning defined by Knowles (1975), as taking responsibility of one's own learning and developing personal strategies to learn in the best way. Lin and Hsieh (2001) found that self-directed learners achieve better in online

courses. According to Knowles (1975), online courses provide more flexibility and autonomy for students, if they only know how to direct it. The slow-adapting students Mina worked with were much dependent on peers or a company at home to survive the session. They did not exercise autonomy and did not take a full responsibility of their own learning (i.e. they were not self-directed) and, thus, hindered the class. They could be also described as lacking self-discipline, a problem that has already been observed among students in online education by Sithole et al.(2019). Such students can cause 'communication problems' too, as they did in Mina's class. They did not listen carefully to Minato follow her instructions and instead interrupted the class by asking other students in L1 what she was talking about. When this challenge is approached within the complexity of a dynamic teaching/learning system (van Geert, 2019), such a misbehavior can be also related to students' lower internal motivation. According to Saade, He and Kira (2007), motivation for learning in online settings plays a key role in academic achievement. Therefore, it can be hypothesized that student motivation, self-direction/discipline and media literacy (or technological knowledge) interact to lower challenges in online education. Yet, this hypothesis needs to be tested.

Overall, it appears that the challenges induced by human resources during the middle of the course were not eliminated, as compared to the beginning of the course, but were at a lower comparative degree. The technological resources causal mechanism was still significantly accounting for many challenges in teaching the online course in mid sessions. These challenges culminated when the internet quota allocated by the telecommunication company was cut in half and the teacher could not even display her slide-shows. She finally coped with this challenge by buying extra quota at her own expense. Already, much of the class time had been wasted and several sessions had passed. The content-related challenges were reduced in this step compared to the beginning of the course because she was able to prepare some lesson plans suitable for online teaching. Yet, they did not reach a minimum level as, again heralding the dynamic nature of the causal system (Hiver & Al-Hoorie, 2020), the technology-induced challenges made content presentation hard, though Mina had already learned a lot from the early sessions about how to prepare content to make up for inextricable platform limitations. This trend can be better observed in Fig. 1.

Challenges and causes in the end of course

Mina perceived the ending sessions of the course far less troublesome, as she described below:

Overall, the majority of challenges were much reduced in the ending sessions as we were familiar with the environment. Most of the students were in class even before the class started. There was no need for calling the roll. As far as I remember, the last sessions were much more convenient.

The above-mentioned excerpt shows that no 'attendance problem' occurred. The teacher's and students' 'media literacy and technological knowledge' was improved more than before (except for those slow students whom Mina talked about before and found their problem unsolved). The issue of 'outdated devices' still remained and caused a 'communication problem' too, as will be explained soon. No complaint was made of the 'time management' issue which was a serious challenge in the beginning and middle sessions. Students' slow adaptation to online class was still there but to a lesser degree than

before. The 'low internet speed' always mattered but with no recurrence of disconnection or serious problem in the final sessions. 'Platform limitations' had not changed and were coped with (e.g. using video files instead of audio files). As for 'content development', Mina used her slide-shows effectively and students showed to be better familiar with what they were expected to do. Accordingly, no 'textbook unfamiliarity' was reported. Mina also managed to prepare some lesson plans proper to online classes. For example, for teaching vocabulary, she was somehow successful in putting more learning responsibility on students by designing guessing games. She provided different pictures related to new words and asked students to make guesses and help each other to find the correct meaning. Although students were motivated to engage in this activity, they still had problems making sentences with the new vocabulary. Mina said that this problem was mainly caused due to not having a pre-course plan.

Moreover, there were three challenges peculiar to the ending sessions as Mina described: evaluation concerns, teacher-student communication problems and finally her own boredom.

Mina found students expressing worries over the exam. She was concerned too about how best to evaluate her students' performance. She stated:

Students began to ask what the exam would be like; whether it was to be held face-to-face or else. I was conscious about the material to be included in the final exam, just to include what I had covered in the online domain and not as detailed as former experiences of the same course in a traditional class, or if the exam was to be held face-to-face. These all mattered.

Such concerns are induced by human resources. Li and Irby (2008) and Lyons (2004) also addressed students' concerns about grades in online courses and related this issue to students' expectations. To tackle this problem, the aforementioned researchers suggested that the teacher clearly state class procedure as well as evaluation prospects from the outset so as to diminish student misunderstanding and wrong expectations.

Mina also faced a problem that was induced by technological resources. During the final sessions, when she and her students got more involved in Q & As, the voice responses she received from students were not intelligible. On several occasions, the quality or settings of voice-recording devices were so defective that it blocked communication. Mina could not understand what the students pronounced and had to ask them to repeat again and again and even to type rather than speak. She went on to explain that:

The problem was not with the volume of voice or internet speed. Rather, the problem was with the quality of recording. Such mispronunciation and misunderstanding can be truly troublesome. Just imagine a teacher teaching a course other than languages, geography for instance which deals with many proper names. Low quality of voice would impede learning, then.

This problem along with all others from the very beginning of the course left Mina severely bored by the end of the course. She attributed this boredom largely to the technological requirements of the online course especially having to wear headphones all along. From a dynamic systems perspective, emergence

of such an emotional state in Mina by the end of her new experience within the complexity of concomitant challenges was not far from expectation. It can be hypothesized that the technological requirements of online education can lead to teacher boredom. This hypothesis needs to be further explored qualitatively and quantitatively.

Overall, it can be concluded that the majority of challenges Mina faced were tremendously reduced in the final sessions of the course. Technology-, human- and content-related causal mechanisms of challenges were less at work in this step, thanks to teacher's and students' better familiarity with online environment, increased media-literacy/technological-knowledge, and better adaptation/coping skills. Yet, all these happening intensively and in an unprecedented manner left the teacher (and possibly the students) bored. The nature of this boredom in online education needs more in-depth longitudinal research.

Challenges and causes in the entire course

Tracing the challenges Mina experienced during the online course using a process-tracing approach not only showed the prevailing challenges in each step of the course, but also unraveled the causal mechanisms involved. With regard to the second question, the existing literature on issues with online education helped us contrive of three sources of challenges in teaching online: technology, human and content resources. It was interesting to see which of these causes were more at work in each step of the course. To this aim, based on a detailed analysis of Mina's accounts, the challenges she experienced in the beginning, middle and end of the course along with their causes were identified and traced. A trajectory of the relative strength of these causal mechanisms was drawn for the entire course. See Fig. 1.

As it can be observed, during the initial sessions of the course, all sources of challenges were highly implicated in challenging Mina. The technological requirements of the new mode of education along with human resources' (students' and teacher's) unpreparedness and the lacking content troubled Mina with different challenges such as class attendance, time management and file and content preparation. The sudden emergence of COVID-19 and the immediate shift of face-to-face education to the online mode confronted many educators worldwide with similar problems. In their post-pandemic study, Atmojo and Nugroho (2020) also reported recurrent teacher challenges in creating materials for online setting, low technology knowledge or relevant experience and difficulty of providing personal feedback to students. Mina admitted that her colleagues faced similar challenges too, especially those relating to technological resources.

As the class moved to the mid sessions, still challenges caused by inefficient technological resources prevailed. The worst was the reduction in internet quota, which had not been an issue in the beginning of the course and was later on more or less handled in the end of the course. In a similar vein, Alam (2020) found internet connection as a main challenge facing EFL teachers in their online classes in COVID-19 pandemic. The problem was present at a national scale. Similarly, the limitation of internet quota Mina experienced was imposed by the telecommunication company and was unavoidable. A problem facing Mina from the beginning of the course so forth was inevitable platform limitations, especially the incapability of uploading audio files or several simultaneous files. Mina adapted herself and found other

ways of producing and feeding course materials. Thus, in this step (middle of the course), the content-related challenges were lower than the beginning. Mina and her students became more or less familiar with the system and at least partly managed to adapt themselves to the environment (with all existing or lacking capabilities). However, teaching some skills like speaking, vocabulary, writing, and grammar was still difficult due to lack of physical presence and eye-contact with students and the fact that teaching these skills required great amount of time, energy, and interaction with students which was limited in online classes. Montiel-Chamorro (2018) also stated that online students could not practice speaking as effectively as their face-to-face counterparts due to lack of body language.

Although teaching reading and listening skills also required physical presence and high level of interaction, she managed to tackle this challenge to high degree by developing lesson plans suitable for online classes. As for speaking, Mina believed that difficulty in teaching speaking in both online and face-to-face classes was somewhat related to the age of students. Older students can more easily talk about different subjects due to having a better range of vocabulary knowledge and being more familiar with different subject matters. But, younger students are more interested in talking about their likes and dislikes (e.g., to talk about their favorite movies) and they cannot fully express themselves due to having limited vocabulary and general knowledge about the subject matter. Regarding writing skill, Mina stated that she had less problem dealing with this skill in her online class due her students' low level of proficiency. In lower-intermediate levels, writing skill are limited to simple writing tasks like writing a simple biography to learn how to use simple past or the difference in the usage of "but", "and", and "or". However, she still argued that online writing courses were not as effective as the writing courses in face-to-face classes. For the reason, she implied that students could not have direct access to teacher due to the limitations caused by the institute. They had to deliver their writing tasks to the institute and then, the tasks were sent to teacher. Therefore, there was a delay between checking the writing tasks and providing students with feedback. The results are similar to Montiel-Chamorro's (2018) study in which teachers stated that although writing was more understandable to students due the popularity of texting among students, the online students still had difficulty in practicing writing skill due to lack of teacher's physical presence and instant feedbacks and corrections.

One of the challenges that somehow remained unsolved in this online class was the summery-telling activity which was a useful activity that the teacher used in her class for teaching more than one skill simultaneously. As Mina asserted, in face-to-face classes, all students prepared summaries of different subjects in both spoken and written forms. She asked 50% of students to present their summary orally. Then, she checked the written summaries, marked the mistakes, and asked students to correct their mistakes individually or in groups (i.e. using both self and peer-correction). She found this method highly effective in enhancing students' grammatical structures, vocabulary knowledge, writing, and interactional skills. However, she could not follow the same pattern in online classes due to time and technological limitations. This activity was time-consuming and could not be incorporated during limited class time. Moreover, Mina could not have access to written forms of summaries before class because the institute did not allow students to have direct access to the teacher before class. Therefore, this useful activity lost its effectiveness in online classes due to time and technological limitations.

Fewer challenges caused by human resources were faced in the mid sessions too. The only problem remained with a number of students slower than others in adapting themselves to the online mode. As it can be seen in Fig. 1, in the ending step of the course, the effect of all sources of challenges is reduced (but not wholly discarded). Mina emphasized the considerable difference between the prevalence of challenges in the beginning and end of the course. However, she expressed boredom which she attributed to the user-unfriendly requirements of online education, especially wearing a headset. Similarly, North, Strain and Abbott (2000) found that technological requirements in distant learning, e-learning and online education can adversely affect teaching outcomes and can also cause frustration.

What is evident from Mina's accounts is that though she, her colleagues and students went to a great length adapting themselves to the new mode of education, some of the challenges they experienced could have been prevented if a better platform had been purchased. She compared BigBlueButton (the system they used) to AdobeConnect, which has a wider range of options for teaching and which seems to better suit a language course. Mina particularly mentioned the strong need for uploading audio files for a language course (a capability missing in BigBlueButton). Besides, she admitted that many of the challenges were due to her own and the students' unpreparedness for new conditions. This is considered as a deficiency in human resources. She predicted that she would not face many of such challenges in the next online experience especially the ones related to teaching different skills in online classes because she finally found more practical ways for teaching these skills after gaining more experience in online setting. Her first attempts of teaching an entirely online course (not blended) was to her as a training course for the forthcoming works of teaching. Similarly, Baran, Correia and Thompson (2011) draw attention to the need for preparing courses for teachers to help them with a better transition from traditional face-to-face mode of teaching to the online mode.

Conclusion

The sudden occurrence of COVID-19 in early 2020 challenged the whole world from all aspects including education. Traditional face-to-face courses switched to online mode with many teachers and students still unaccustomed to and inexperienced in the new environment. The present case-study followed a process tracing approach to explore the challenges and their causal mechanisms facing an EFL teacher in her first online experience. The challenges and their causes, divided in three categories of technology, human and content resources, showed to differ in type and prevalence across the three steps of the course. Most of all, the teacher faced inexorable technological problems during the course, for which, neither she nor her students had been admittedly prepared. Though these challenges were comparably lower in the end of the course, many of them could have been prevented from the outset if a more user-friendly platform had been used. It is suggested for online education that the selected platform meet the requirements of the target course. For instance, uploading and playing audio files is integral to a language course, but was what the present teacher and her students missed in their online experience.

The challenges induced by deficient content resources prevailed too. The content issue in online education is considered a major pedagogical challenge stemming from the inability of teachers to

seamlessly transfer their face-to-face course materials to the online environment (Choi & Park, 2006). This is again related to the teacher's unpreparedness, which is partly attributed to the sudden emergent conditions which pushed many educators into a whole new instructional environment. Still, it seems that an in-service intensive preparation/training course could help tackle many issues while many others would inevitably remain.

Many concerns that might probably occur to the teacher and students in an online class are, as described by Anderson, Imdieke and Standerford (2011), due to the non-existence of institutional expectations for online courses. Without clear guidelines and expectations for teachers to follow, there is no way to assess the effectiveness of online courses (Anderson et al., 2011). Thus, more transparency is suggested for the procedures and expected outcome of online courses, which can put the teacher's and students' mind at rest and can help the teacher develop more relevant content and relieve students of much concern about the awaiting evaluation.

Throughout the process-tracing, the three causal mechanisms of the teaching challenges were revealed to interact, corresponding to the dynamicity inherent to the multifaceted teaching context. On many occasions, for instance, low internet speed and platform limitations (typical deficiencies in technological resources) and unavailability of textbook to students (a typical deficiency in content resources) hand in hand left the teacher in a predicament. She could not even present the material she had prepared in advance. Nor could she upload any audio file. Videos would for sure end up freezing! Although she finally used the text-chatting mode, it is too simplistic to think of it as a reliable compensatory strategy to work on all similar occasions. Besides the interactive effect of causal mechanisms involved in teaching challenges, it was interesting to find that some of the teacher's challenges met with those of students'. This was especially true for challenges caused by human resources. In other words, occasionally students' challenges (e.g. concerns about final exam) further challenged the teacher. This is unavoidable among the human agents acting, reacting and interacting within a complex system of class, the dynamicity of which still requires further investigation in online environment, the dominant mode of education in the post-pandemic world.

Overall, it should be admitted that online education has never been as challenging as today. In the pre-COVID-19 era, for more than two decades, academics had agreed to gradually translate their programs and courses into online offerings for the sake of a more democratic approach to education and the cost-effectiveness (Tesar, 2020). Yet, the post-COVID-19 era is marked by an inevitable and sudden substitution of conventional education with the online mode. In other words, online education no longer serves a complementary role today but is the only alternative at hand. In developed countries with a longer history of distant education and e-learning, designing and implementing an online curriculum is better conceivable than in developing countries. For an effective teaching to take place in an online language course, not only should the technological requirements be availed to human resources, but both the teacher and students need to be trained and adequately prepared for the new sphere. The present study showed how an abrupt online course using an unfitting platform and little preparation for human resources made a language teacher's job unprecedentedly challenging. This study revealed what

challenges are more probable to rise in the early sessions, which are more prevalent in mid sessions and which might continue until or rise anew in the end of the online course. Knowledge of these challenges and their causal mechanisms offers a more realistic image of the post-pandemic challenging task of EFL teaching. In doing so, it always acknowledges the dynamic and situated nature of the challenges and the essentiality of locating them within a whole system marked by inherent complexities and nuances that require much more in-depth investigations from a great many aspects. This study had some limitations. One of the limitations is that it only focused on challenges that teachers may face in online setting. In order to understand the challenges better, further studies should focus on students' challenges in online setting as well. Another limitation of this study was the length of the English language course. Since the results were analyzed using process-tracing approach, it would be better to evaluate more online sessions to reach more comprehensible results regarding the causal mechanisms of challenges in online teaching and learning. Regardless of the limitations, this study has pedagogical implications for English teachers. EFL teachers should consider some factors before selecting or developing their online lesson plans such as the age and proficiency level of their students, the difficulty level of the materials, the quality of technological tools they use in class and the time constraints in teaching some skills like listening and reading.

Declarations

Availability of data and materials

Please contact author for data requests

Funding

There is no funding for this study.

Authors' contributions

Both authors *have* participated in the data collection of the study. All authors participated in the data analysis and helped to draft the manuscript. All authors read and approved final manuscript.

Competing interest

The authors declare that they have no competing interests

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Figures

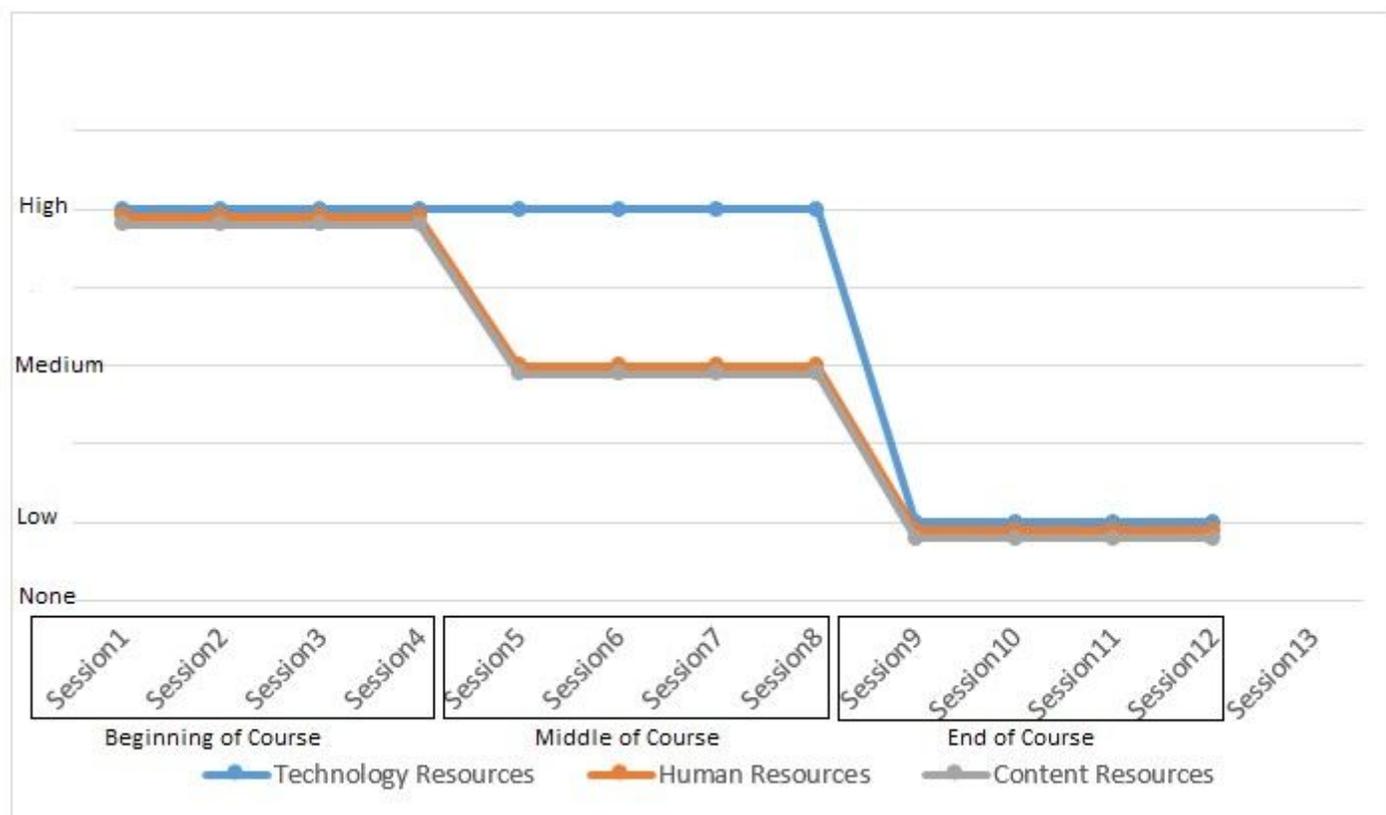


Figure 1

Changes in the strength of the causal mechanisms of challenges in teaching an online EFL course