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*Iranian Journal  
of  
Language Teaching Research*

ORIGINAL ARTICLE



Urmia University

## Discursive Change in Second Language Teachers' Online Interactions: A Microgenetic Analysis

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### ABSTRACT

Although studying teachers' online interactions has gained momentum in recent years, little is known about interactional development in online communities. The present study addressed this gap by exploring discursive change in second language teachers' interactions in an online professional development (PD) course structured around mobile phone usage. To this aim, the microgenetic analysis approach of sociocultural theory was adopted to track developments in teachers' interactions based on Goodall's (2000) skilled conversation threads. Data analysis revealed 152 skilled conversation exchanges in the online PD. Three themes were dominant among these exchanges and constituted most of the interactions: (1) Direct and indirect uses of mobile phones, (2) challenges and benefits of using mobile phones, and (3) teaching different language skills using mobile phones. Detailed analysis of the exchanges revealed that the teachers gradually changed in their perceptions about using mobile phones as well as the discourse they employed to represent their understandings. The findings are discussed in relation to teacher educators' role in facilitating online PD and the importance of developing a knowledge base that accounts for teachers' online membership.

**Keywords:** online professional development; teacher discourse; online interactions; microgenetic analysis; online communities

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### ARTICLE HISTORY

**Received:** 27 Feb. 2021

**Revised version received:** 16 Aug. 2021

**Accepted:** 1 Sept. 2021

**Available online:** 1 Oct. 2021

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10.30466/ijltr.2021.121076

## Introduction

Over the past decade, digital technologies have transformed various aspects of education. Parallel to these transformations, teaching and teacher education have been conceptualized in novel ways. In this regard, teachers can now engage in multiple technology-oriented communities that contribute to their professional learning as such communities “can be a valuable means of developing supportive and collegial professional practices” (Lantz-Andersson et al., 2018, p. 303). Moreover, engagement in online communities is likely to profoundly (re)shape teachers’ sense-making by connecting them to individuals who have shared goals and belongings (Parsons et al., 2019). Along with the growing body of knowledge on teachers’ online interactions, a concomitant line of inquiry has been examining online teachers’ belonging in characterizing their membership (e.g., Lantz-Andersson et al., 2018; Parsons et al., 2019; Robson, 2018). However, there are few studies examining developments in teachers’ engagement in online communities. Such an undertaking is significant to portray how teachers change and grow during participation in online communities. The present study aims to address this gap by tracking change in a group of English as a Foreign Language (EFL) teachers’ interactions in a professional development initiative framed around mobile phone usage.

## Literature review

### *Online teacher communities*

The advent of technological advancements has redefined multiple dimensions of human life. In education, these advancements have reconfigured the makeup of classrooms, teacher-learner relationships, and more broadly educational policy and planning (Egbert & Borysenko, 2019; Nazari & Xodabande, 2020). Such developments have reconceptualized teachers’ professional learning and membership as they can now engage in different online communities to hone their professional skills and competencies (Lantz-Andersson et al., 2018). A wide range of online professional development (PD) opportunities are now available, which render PD as a more personalized activity for the teachers and “can effectively support individual teachers’ professional learning if it allows for social educative engagement with other professionals” (Parsons et al., 2019, pp. 34-35).

In their work on online teacher communities, Lantz-Andersson et al. (2018) reviewed 52 studies that have reported on formal and informal online communities. These authors concluded that such communities contribute to teachers’ PD by providing various affordances that can be used by teachers in their personalized reflections. Such communities and the constitutive interactions are also viewed as beneficial in that “the continuous growth of teachers’ online interaction for professional use reflect[s] a growing sense amongst teachers that these are meaningful and beneficial professional activities” (Lantz-Andersson et al., 2018, p. 313). Interaction was viewed by Lantz-Andersson et al. (2018) as one of the key variables in teachers’ online engagement and sense-making. van Bommel et al. (2020) also state that interactions “can open up PD in a fairly efficient way where the benefit seems to repay the time and effort invested” (p. 8). Along these lines, studying teachers’ online interactions has risen to prominence in recent years.

There is a growing body of knowledge on teachers’ interactions in online communities (e.g., Kelly & Antonio, 2016; Liljekvist et al., 2021). One such study is Alemdag and Erdem (2017), which explored the application of an e-mentoring program for novice teachers and examined the online interactions, the mentors’ and mentees’ satisfaction, and the benefits of the program for them. Fourteen mentors, 14 mentees, and six teacher educators participated in the study. Data were collected from interviews and participants’ online messages, and analyzed through three stages of

organization, description, and interpretation. The results of the study indicated that the participants showed various levels of support for their interlocutors in the initiative and gradually enhanced their understanding of e-mentoring. Moreover, the study highlights the important role of teacher educators and mentors in facilitating mentees' socialization in online forums.

Additionally, van Bommel et al. (2020) examined six large Facebook groups of mathematics and Swedish-language teachers to explore the teachers' knowledge as embodying in their discussions and interactions. Data were collected from 553 threads of groups that had between 2000 to 15000 members. The researchers examined and analyzed the exchange types of the interactions in light of four categories: Transaction, transformation, no response, and not relevant. Data analyses showed that after discarding the irrelevant posts, 475 threads remained, which involved 51 threads of transformation, 366 threads of transaction, and 58 threads did not receive any response. While this body of knowledge has well-portrayed teachers' online interactions, little is known about the possible changes in teachers' interactions in online communities, which is the focus of the present study.

#### *The present study*

The body of knowledge on teachers' membership in online communities shows that such communities positively contribute to teachers' understanding of their own professionalization (e.g., Lantz-Andersson et al., 2018; Nazari & Xodabande, 2020), collegial relationships (e.g., Parsons et al., 2019; van Bommel et al., 2020), and professional skills and competencies (e.g., Alemdag & Erdem, 2017; Kelly & Antonio, 2016; Liljekvist et al., 2021). However, most of the extant literature has taken a holistic view toward such a contribution, with little documented studies on how change in teachers' online interactions occurs. Thus, there is a need for studies that move beyond simply describing teachers' interactions in online communities toward documenting the details of membership and the possible developmental changes that occur in interactions, a point also emphasized by Lantz-Andersson et al. (2018). Tracking such a change is the purpose of the present study in discussing developmental changes in teachers' online interactions.

The study is theoretically and methodologically framed within a sociocultural theoretic (SCT) perspective. SCT has as its tenet three major features: Mediation, social learning, and genetic analysis (Ohta, 2013; Warford, 2011; Warschauer, 2005). While the first two features involve the way individuals' participation in social activities shapes their learning, the third feature is basically analytic and aims to capture learning developmentally. In other words, genetic analysis helps "understand many aspects of mental functioning only if one understands their origins, or histories, and developmental process" (Warschauer, 2005, p. 43). This type of analysis is in close connection with the purpose of the present study in tracking the changes in the teachers' articulations (Freeman, 1993; Jocuns et al., 2020; Li, 2020). Thus, in response to the dearth of research regarding developmentally examining teachers' interactions in online communities, this study employs microgenetic analysis to document the changes in a group of Iranian EFL teachers' membership in a PD designed around mobile phone usage. The study addressed the following question:

What developmental trajectory do language teachers' online interactions follow in a professional development initiative structured around using mobile phones?

## Method

### *Context and participants*

This study was conducted in Iran. The setting was a private language school, which employed materials from international publishers and aimed to develop the students' general English proficiency across all the skills and sub-skills. The school offered general English classes across elementary, intermediate, advanced, TOEFL, and IELTS levels. The classes of the school were equipped with overhead projectors and TV sets that could be used by the teachers and learners. Before starting the study, we consulted the teachers of the language school and five teachers (T1, T2, T3, T4, and T5) agreed to participate in the study. After initial talks with the teachers, we realized that two of them were already interested in using mobile phones, but three teachers were not inclined to use mobiles. Table 1 indicates the profile of the teachers.

Table 1  
*Participating Teachers' Profile*

Age	25-33
Experience	4-8
Degree	BA, MA
Education	TEFL, Translation, Literature
Gender	Male (3), female (2)

### *The professional development course*

This study is part of a larger project that examined the impact of a PD course structured around mobile phone usage on Iranian EFL teachers' professionalism. The PD course was conceptually informed by Richards' (1989) components of a teacher education course. The course had six components: Needs analysis, approach, content, teacher role, researcher/educator role, and evaluation. For a complete discussion of the course see Nazari and Xodabande (2020). Of particular concern to the present study is the teachers' interactions. The course involved 10 weeks of joint discussions, lasting over three months and in Telegram messaging application. Each online session lasted around two hours. As the course was structured around using mobile phones, various mobile-related topics were discussed including using mobiles for novel skills and sub-skills, theoretical and practical aspects of using mobile phones, benefits and challenges of using mobiles, and the teachers' use of mobile phones in their classes. Thus, a wide range of theoretical and practical aspects were discussed in the PD to both contribute to the teachers' knowledge base and ground the discussions in practical usage of mobile phones.

### *Data collection*

Data for this study were collected from the teachers' online interactions as we aimed to track the possible changes in the interactions microgenetically. To this end, the whole interactions were fed into Nvivo software to delineate the categories emerging from the interactions. To operationalize the analysis route, we used Goodall's (2000) verbal exchange continuum, which involves five components: Phatic communication, ordinary conversation, skilled conversation, personal narratives, and dialogue. As we sought change in the teachers' interactions, skilled conversation exchanges could better suit the purpose of the study due to their higher frequency in the interactions as compared to the other components and bearing more mobile-related contents in the discussions. Goodall (2000) defines skilled conversation as "an elaborate and interlocking, mutually understood, means to arrive at a mutually organized, but not always predetermined, end"

(p. 104). This definition suits well with examining how teachers change their interactions and whether their conversations involve skilled-ness over time.

The analysis of the interactions from a skilled conversation lens yielded 152 exchanges (78% of all the interactions). The themes emerging from the interactions were: (1) direct and indirect uses of mobile phones (28%), (2) challenges and benefits of using mobile phones (21%), (3) teaching different language skills using mobile phones (18%), (4) attitudes toward MALL (16%), (5) associated language learning outside the classroom (14%), and (6) learners' and teachers' relationships as influencing and being influenced by mobile phone usage (3%). After delineating the themes via Nvivo in a cyclical and evolving process of iterative coding (Saldana, 2013), we analyzed the content of the interactions to have a clear map of the interactions. In doing so, we operationally defined interactions in light of van Bommel et al.'s (2020) definition of a thread in online interactions as: "A thread starts with a post and consists of all the further contributions that this post and any further response elicit" (p. 4). Such a conceptualization helped us track the interactions neatly and be able to seek the possible changes more effectively.

### *Data analysis*

Vygotsky's focus on learning-in-interaction primarily seeks the moment-by-moment changes that bring about higher forms of learning in which he emphasized "the very process by which higher forms are established" (Vygotsky, 1978, p. 64). To this aim, microgenetic analysis defines process in terms of "using 'units' of analysis, with a unit being a part of the whole, comprising all of the key characteristics of the whole" (Ohta, 2013, p. 649). In the literature of TESOL teacher education, microgenetic analysis has received insufficient empirical attention (e.g., Karimi & Nazari, 2021), yet by focusing on gradual change and defining units of/for change, it offers a helpful framework for tracking teachers' online reflections.

Microgenetic analysis is resonant with the skilled conversation approach the present study follows in tracking how teachers change in their interactions (Freeman, 1993; Warford, 2011). The unit of analysis in this study was a session and all the constitutive information embodying in the teachers' skilled interactions. This perspective was in line with Calais (2008) who holds that in analyzing interaction based on microgenetic analysis, the unit of analysis could be a session. This way of seeking change could also better delineate how the teachers developed/grew in their interactions over the PD course. It should be mentioned that as gradual change in interactions was the focus of the study, we only used online reflections as the major data source.

Although the first and final sessions also involved skilled conversations, we did not use the data from these two sessions as the first session could mainly be influenced by the novelty of the course and the final session by wrapping-up the course. Moreover, as not all the above six themes emerging from the interactions were present in all or most of the sessions, we present the data from interactions that had similar representations across most or all of the sessions. This process yielded three categories that constituted 67% of the whole skilled conversations: (1) Direct and indirect uses of mobile phones (28%), (2) challenges and benefits of using mobile phones (21%), and (3) teaching different language skills using mobile phones (18%). In what follows, we present extracts from the three categories as showing change in the teachers' interactions.

### **Findings**

The analysis of online interactions revealed that over the PD course, the teachers' interactions regarding different aspects of using mobile devices changed, and the changes were reflected in the

content and language of the interactions. In this regard, toward the end of the PD, the teachers articulated their views with positioning themselves differently with respect to the other teachers and the use of mobile devices in their classes; and their evolving beliefs were manifested in the arguments they employed for justifying their positions, pointing to the expanding scope of their understandings of the issues associated with mobile phone usage. Moreover, in the course of the documented skilled conversations, the teachers had agreements and disagreements in a variety of issues; however, the overall discursive pattern of their interactions gravitated toward shared views as the PD proceeded. Generally, the teachers' interactions featured change in perspectives toward mobile phone usage and adopting a more sophisticated language as well as a more elaborate understanding in representing their beliefs about mobiles. In what follows, we present the analysis of the interactions across the three themes mentioned before. It must be mentioned that the teachers chatted in Persian (their L1) and their interactions have been translated into English.

#### *Direct and indirect uses of mobile phones*

As one of the main themes emerging from online interactions, direct and indirect uses of mobile phones was discussed by the teachers over most weeks of the PD. Nevertheless, the language used by the teachers in the early sessions was substantially different from their language in later sessions. In the following extracts, interactions from one of the teachers who was less interested in using mobile phones (T2) are presented. The overarching theme of the discussion was direct uses of mobile phones in the classroom for supplementing course books, or delivering teacher-created materials:

*I believe that using mobile phones in language classes can result in real chaos! I don't allow my students to take out their mobile devices during lessons. (2<sup>nd</sup> session)*

*Although these new technologies are all great and helpful, I think a major drawback in using them in our classes is related to the distraction they cause. We and our students are currently spending a lot of time in social media, and I'm pretty sure that if the students are allowed to take out their phones, they are going to chat with their friends or check posts on Instagram! (6<sup>th</sup> session)*

*I think that some of the uses of mobile phones in classes that you are talking about are fascinating and inspiring. I think that if we add them to our repertoire, we can help the students learn English in a better way. But, before doing that and allowing the students to use their phone during the classes, we need to create or promote new cultures of learning and using new technologies among them. (8<sup>th</sup> session)*

As it is shown above, both the language used by T2 and her beliefs changed over time. In the first extract (session 2), the teacher simply expresses her view regarding using mobile devices in the classroom, without providing much argument for it (reference to creating chaos). This type of negotiating conflicting ideas was typical for the early sessions, and the skilled conversations were mostly short in this period. In the sixth session, however, the same teacher positions herself differently with respect to mobile technologies, and tries to be more specific regarding the reasons for not using mobile devices. This change in the language and positioning is even clearer in the extract taken from the eighth session, where the language shows change in the teacher's beliefs by mentioning the fascinating and inspiring features of mobiles, and her enhanced understanding of promoting the culture of learning in using mobiles.

As for the teachers who were already involved with directly or indirectly using mobile phones, the online sessions provided an opportunity to reflect on their practices and think more deeply about their established beliefs. The following extracts for T5 are taken from the third, fifth, seventh, and ninth sessions:

*Before going to classes, I use my smartphone in preparing the lessons. In doing so, I plan the tasks and activities in a way that necessitates using mobile devices among the learners. The most typical use that I really like is using digital dictionaries, and mobile devices make it really easy for students to learn using a dictionary in an effective way. (3<sup>rd</sup> session)*

*Every innovation in teaching needs a lot of planning and hard work. The same goes for using mobile phones in the classroom. I want to emphasize that although their usage contributes to language learning and motivates the students significantly, not all classes are the same, and what works for me may not work for others. (5<sup>th</sup> session)*

*The use of mobile phones as a delivery medium for reading in the classroom does not result in significant changes in learning; I believe that we need to think about the ways mobile phones can extend the learning beyond the classroom. (7<sup>th</sup> session)*

*Obviously, mobile devices or other technologies are not the ultimate solutions for the problems we have in English language teaching, and they should not be regarded as the end in themselves, but we need to bring them to the classroom life in order to achieve the main goal, which is successfully learning a new language by our students. (9<sup>th</sup> session)*

In the above extracts, T5 recounts the way he uses mobile technologies both indirectly in preparing the materials and directly in the classroom while delivering the lessons (session three). At this stage, the teacher is mainly concerned with his own uses of mobile devices in a promotional way, which aims to encourage the other teachers to use tools like electronic dictionaries. As the PD moved on, the language used by the same teacher featured the realization that contextual differences are also important in implementing mobile-assisted language learning (session five). In the subsequent sessions, T5 represented some fundamental concerns regarding the use of mobile technologies to reshape learning in light of mobile phone usage. Relatedly, he talked about going beyond the classroom by using mobile devices (session seven), and positioned himself in agreement with the other teachers, as they all shared the same goal with respect to learners, regardless of the employed tools and technologies (session nine).

In general, regarding this theme, the analyses revealed that both supportive and less-supportive teachers' language and beliefs underwent changes from the first to the last session. For both groups, the discussions related to direct or indirect uses of mobile phones were associated with gradual and incremental changes in their contributions to the discussions, and the teachers used a more sophisticated language to profess their evolving beliefs and positioning themselves in relation to technology and other teachers.

#### *Challenges and benefits of using mobile phones*

The second main theme in the data was related to the challenges and benefits of using mobile devices. The extracts below are taken from the discussions, where one of the teachers (T3) talks about some benefits associated with using mobile devices:

*The use of mobile devices can make doing some tasks easy for the students; they provide a gateway to the information world. In this way, I think they might be motivating. (2<sup>nd</sup> session)*

*The use of mobile devices in the classroom creates new possibilities for supplementing the coursebooks; in this way, the materials become interesting for more students. (4<sup>th</sup> session)*

*If the students learn how to use mobile devices for educational purposes, it is possible to expose them to some authentic materials online. Increased authenticity is a factor that initiates more engagement with the learning materials and ultimately leads to more learning. (7<sup>th</sup> session)*

As the extracts show, T3 has experienced some conceptual change with respect to the role of mobile technologies in language teaching. In the early sessions, the language used by the teacher pointed to the changing beliefs, as he regarded mobile devices being only potentially motivating (gateway to information). However, with the increased input (mainly in the form of views put forward by pro-mobile teachers), the language used is both sophisticated and multi-directional (dealing with the students, materials, and learning outcomes), and it is more holistic in nature, which goes beyond the one factor represented by the teacher in earlier sessions (i.e., learner motivation and authentic materials).

Change in the teachers' interactions was also evident in the discussions that they had with each other regarding specific topics. For example, the following threads demonstrate the interaction among two teachers in the early sessions (third session) of the PD, where one of them was initially pro-mobile, and the other was against using them:

*T3: When using mobiles in the classes with beginner learners, a constant challenge is that we need to talk more; however, we know that teacher talk should be minimized.*

*T4: I think it doesn't really make much a difference when you consider the TTT (teacher talking time). Yes, we need to minimize that, but new-generation students are much smarter than what we think!*

In this thread, T3 mentions increased teacher talking time as a challenge in using mobile devices in the classroom. T4 contests her position and claims that the use of mobile phones does not significantly increase teacher talking time. He further resorts to digital literacy among the students (smarter students of the current generation). As the extracts indicate, both teachers engaged in negotiating a conflicting view, but the adopted language is simple and unidirectional vis-à-vis one issue or concern. However, during later sessions, online interactions among these two teachers showed significant differences in terms of language use:

*T3: It is really essential to use simple language [in English] for giving instructions. A few days ago, I asked them [students] to use their mobile devices to check something online, but it took me a lot of time to give them the required instructions. They seemed to be confused, too. Although they liked using their mobile phones, the session was a failure!*

*T4: But you can use their first language in these cases; you know it is sometimes OK or necessary to use L1. You can also group the students for doing such activities. In this case, if one student does not get what you want them to do, he/she can get help from others. It makes your job much easier if you want to stick to the use of English only. (8<sup>th</sup> session)*

As it is shown above, both teachers used more reasoning to talk about the same challenge discussed in the third session. In this interaction, T3 provided an account of her ongoing challenges with using mobile devices. Although she acknowledged that the students liked the experience (checking the input online), the use of "failure" to describe the session points to her resistance in using mobile devices with beginner-level students. In response to this message, T4 suggested judiciously using L1 as a resource for giving instructions. He further pointed out that grouping the students can help in providing instructions.

Overall, with regard to this theme, the scope of teachers' understanding and reasoning with respect to the perceived challenges developed significantly. Moreover, as the course proceeded, the teachers supported their reasoning with more justifications.



*Teaching different language skills using mobile phones*

Incremental changes in the teachers' interactions were also found in the discussions related to the use of mobile devices for teaching different language skills. For example, the following extracts show how one of the participating teachers (T1) developed an enhanced understanding of the affordances of mobile devices for teaching different skills:

*I remember using mobile applications for learning English vocabulary myself. I want to start with that. The next session, I am going to ask my students to install the application and learn TOEFL vocabulary. (3<sup>rd</sup> session)*

*The case with some applications is that it is possible to focus on multiple skills rather than one. My students are learning English vocabulary using an application, but the application helps them with pronunciation, too. (6<sup>th</sup> session)*

*The range of available resources for mobile-assisted learning seems to be beyond my imagination! I have found some apps that integrate different language skills including vocabulary and grammar, and reading that I care mostly about. It is also possible to use podcasts for improving listening. I am using these applications myself if I find them useful. (9<sup>th</sup> session)*

In the extracts above, the teacher talked about using mobile phones for teaching language skills. Nevertheless, the range of the intended uses and the applications of mobile technologies developed over time. In this regard, although in the third session, T1 aimed at using mobile applications for teaching vocabulary (TOEFL vocabulary), the interaction from the subsequent sessions shows that she developed an awareness regarding the functionality of the same applications for teaching other language skills, as in the sixth session she added pronunciation, and in the ninth session she further added grammar and reading (integrated skill learning).

Moreover, as one of the researchers acted as the moderator and facilitator of the online discussions, the online discussions started with asking the teachers to share their mobile-related practices. Data analysis revealed that in responding to the researcher's questions, the language used by individual teachers developed over time in terms of scope and sophistication. The following extracts represent one of the pro-mobile teachers' responses:

*Last week, I used a variety of activities in the classroom. In most activities, the use of mobile phones was integral for learning intended skills. (2<sup>nd</sup> session)*

*In one of my advanced classes, I sent a link to the group where students downloaded and listened to a radio report. I asked them several questions with a focus on vocabulary. Then, I asked them to read a news article related to the audio file. (4<sup>th</sup> session)*

*Given that it is really important to integrate the language skills in teaching, I posted three film reviews to the online group, and the students read them before the class. Then, in the class, I asked them to write a review of a movie they watched recently. Next, we moved to talking about movies and watching two trailers online. I think everyone enjoyed the class, and couldn't do these without internet connection and mobile phones. (7<sup>th</sup> session)*

In the extracts above, in the second session, the teacher provided a general answer with respect to sharing mobile-related practices. In the fourth session, the teacher provided more information regarding the type of the activities and targeted skills. In the final extract, which was taken from the seventh session, the teacher highlighted the importance of integrating different language skills, and used a more elaborate language to describe the activities and tasks. In this regard, in addition

to adding “integration of the skills” dimension, he also mentions “students’ enjoyment” for supporting his practices.

In sum, with respect to this theme, the teachers both developed in terms of perspectives toward mobile phones and in using a more sophisticated language in representing their ideas about using mobile phones. Such changes happened gradually as a function of mutual sense-making and shared understandings developed during the course.

## **Discussion**

The analysis of the data showed that generally two types of change featured in the teachers’ interactions over the course: Changing perspectives toward mobile phone usage and adopting a more sophisticated language in representing the understandings. Regarding the first type of change, the teachers gradually developed new frames of thinking about employability of mobile phones relative to their own practical idiosyncrasies. This finding resonates with those reported in Alemdag and Erdem (2017) in increasing the teachers’ awareness of their membership and practical issues. This finding is also in line with the arguments posited by Lantz-Andersson et al. (2018) and van Bommel et al. (2020) in that online PDs provide teachers with novel ways of conceiving of their professionalism in dealing with professional practices. In this regard, the teachers gradually developed their understanding and awareness of mobile phone usage, which was primarily a function of their membership in the online PD and the shared understandings (Nazari & Xodabande, 2020).

Developing a more professional understanding about mobile phone usage was not limited to the teachers who were less interested in using mobile phones. Rather, the teachers who were already interested in using mobiles also developed novel ways of understanding. This finding is in line with studies that underscore providing affordances that contribute to teachers’ professional competencies (Kelly & Antonio, 2016; Liljekvist et al., 2021; Parsons et al., 2019; van Bommel et al., 2020) and facilitate teachers’ sense-making of PDs as beneficial to their own and students’ growth (Lantz-Andersson et al., 2018; Parsons et al., 2019). The key to course effectiveness seems to be the point that PD from an SCT perspective should be grounded in teachers’ own practice and provide them with “reflection on [their] experiences and tacit beliefs with regard to teaching and learning” (Warford, 2011, p. 253). As the approach followed in the PD was a mixture of sharing the teachers’ own mobile-related practices and other issues in using mobile phones, the teachers seem to have found the course as a venue that can effectively support their PD. Such a sense-making has been considered as significant in PD effectiveness (Egbert & Borysenko, 2019), which happened to the teachers of this study.

The second type of change pertained to the development of the teachers’ language as the course proceeded. Over the course, the teachers provided more reasoning for their representations and supported their interactions with a more sophisticated language. This finding is congruent with the results reported in Karimi and Nazari (2021). This type of change aligns with the concept of articulation Freeman (1993) proposed. Defined as “the process through which the teachers gain access to their thinking about their classroom practice” (Freeman, 1993, p. 489), articulation increases as teachers integrate knowledge from PD with their practical knowledge. Relatedly, the teachers of this study gradually developed in supporting their representations with more solid justifications across the three themes reported above. This growth realized in the content of the teachers’ argumentations and the associated multi-facetedness in regard to the first theme, providing more reasoning for the effectiveness of the proposed alternatives as to the second theme, and reasoning with more elaborate understandings regarding the third theme.

Moreover, Vygotsky (1986), Freeman (1993), and Warford (2011) speak of the significance of gradually developing a language that aligns with individuals' growth, more specifically during PDs. Such a change was evident in the teachers' language, especially in relation to integrating different language skills via using mobile phones. In this sense, the teachers seem to have gradually adopted the language of the course, which was both a function of the ideas discussed in the course and their appropriation of the course content. Additionally, Freeman (1993) argues that such a change in language operates at two levels of local and professional languages. Instances of such a change were observed in the teachers' interactions in gradually adopting a more professional discourse in supporting their arguments with professional knowledge. These findings highlight that the PD enacted in this study was able to positively contribute to the teachers' sense-making of digital technologies as Lantz-Andersson et al. (2018) argued, here in relation to mobile phones. Such a sense-making actualized in creating reformulations in the teachers' beliefs about mobile phones, which was accompanied by changes in the range and content of their understandings about mobile phones.

## Conclusions

Although studying teachers' online interactions has received attention over recent years, there is little research on change in teachers' interactions in online forums. This study addressed this gap in the context of a PD structured around mobile phone usage. The findings indicated that the teachers changed both in their perspectives toward mobile phones and the linguistic artifacts they employed to represent their sophisticated understandings. These findings provide novel ways for understanding teachers' engagement with and participation in online communities in that both the content and discourse of teachers change by their membership in such communities.

The findings of the study provide several implications. First, given that online teacher education needs more fine-grained conceptualizations and most of the studies in this line of inquiry capture the content of teachers' membership, it is yet to be understood how teacher educators' role should be defined (see Alemdag & Erdem, 2017). The results of the present study could provide novel understandings for conceptualizing teacher educator roles. As we observed, teachers' participation in online PDs not only follows a content that has characteristics exclusive to online membership, it gradually contributes to the teachers' frames of thinking from a discursive lens. Indeed, interaction entails both linguistic and extra-linguistic processes that (re)shape online teachers' professionalism. In this sense, teacher educators should pay attention to both course content and developments in teachers' discourse in online forums. A myopic conceptualization in characterizing teacher educator roles is transitioning to the online forum with the same competences in face-to-face contexts, whereas online teacher education demands developing a specific knowledge base and honing online skills by the educators. A large part of educators' role is understanding the contributions of teachers' interactions to their sense of professionalism.

Second, given that teachers can now engage in different online PDs (Parsons et al., 2019), institutional policy-makers could benefit well from such affordances. As the participating teachers of this study articulated, they engage in and use multiple online resources to respond to their needs. Policy-makers could systematize such initiatives by developing a repository of online resources that all the teachers could benefit from. Such an undertaking seems both economically productive and pedagogically efficient in that teachers can resort to a rich repertoire whenever they need such resources. However, policy-makers and the role they can play in supporting the teachers with their personal engagement in online forums have been a less-trodden line of research in this area. As there may be policy-makers who run such initiatives in their contexts, this

idea could in turn be a research agenda in documenting the role policy-makers play in helping teachers with online PD.

In their review paper, Lantz-Andersson et al. (2018) concluded that “our review certainly raises the need for studies that investigate what teachers do online (rather than what teachers say that they do online)” (p. 313). This study addressed this empirical void and portrayed the teachers’ online interactions. This line of inquiry could be further extended by exploring teachers’ understanding of their membership and closely scrutinizing the interactions via methodological analyses such as conversation analysis. Triangulating interactional data with research methods like interviews and observations would provide a more complete picture of teachers’ sense-making of gradual growth. Moreover, further research with a greater number of teachers and across diverse intercultural contexts would provide interesting insights into how teachers’ online membership is mediated by their cultural differences and similarities. Additionally, observing the extent to which teachers’ online interactions realize in their classroom functioning would better indicate the congruity between their online interactions and classroom practices. We acknowledge that definitional attribution of change to the teachers’ membership in the PD of this study is unwarranted. There may be other mediating factors that have facilitated the teachers’ growth besides the experience of the PD. Further research may report on such competing forces and their comparative contributions against the enacted PD.

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**Declaration:**

The authors declare that they have no conflicts of interest.

**Funding:**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Acknowledgement:**

We would like to cordially thank the teachers who participated in this study. We would also wish to extend our thanks to the editor and reviewers of *IJLTR* for their helpful comments on earlier versions of the paper.

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