Reviewing the Intersection between Foreign Language Teacher Education and Technology

Una revisión de la intersección entre la educación de profesores de lengua extranjera y la tecnología

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The advent of new technologies in education has inspired a vast array of expectations in relation to the improvement of teaching processes. Surprisingly, the impact of these tools has not influenced the pedagogy of foreign languages as substantially and promptly as was predicted. Nonetheless, this article reveals that efforts are being made by scholars to increase the impact of new technologies in the preparation of educators. This review article takes a retrospective look at the last ten years in the field, focusing on the salient trends. Collaboration in computer mediated communication (CMS), teachers' attitudes and performance towards education programs, autonomous learning and project work emerge as tendencies.

Key words: CALL teacher education, EFL teachers' technology preparation, foreign language teachers' attitudes, foreign language teacher education

Las nuevas tecnologías en educación han inspirado una amplia gama de expectativas relacionadas con el mejoramiento de los procesos de enseñanza. Sorpresivamente, el impacto de estas herramientas no ha tenido la influencia rápida y sustancial que se esperaba en la pedagogía de las lenguas extranjeras. Sin embargo, este artículo demuestra que se están haciendo esfuerzos para incrementar el impacto de las nuevas tecnologías en la preparación de educadores. Este artículo de revisión da una mirada retrospectiva a las tendencias sobresalientes en los últimos diez años. La colaboración a través de comunicación mediada por computadores, las actitudes y desempeño respecto a programas de educación, el aprendizaje autónomo y basado en proyectos surgen como temas principales.

Palabras clave: actitud de profesores de lenguas extranjeras, educación de profesores de lengua extranjera, preparación en tecnología de profesores de inglés

Introduction

Teachers have conducted certain classroom practices for decades. In fact, these actions have become traditional ways to support students' learning. Thus, presenting content, involving students in researching information, getting learners to complete specific tasks or evaluating their processes continue being part of educators' agendas in schools. Whereas the essence of these practices do not seem to change quite rapidly, the tools and modes to carry them out have indeed suffered constant transformations. Without a doubt, technology is a common denominator in influencing how several elements in teachers' practices tend to change. It probably cannot be argued that introducing topics by means of posters and transparencies from overhead projectors, guiding students in searching for materials in physical libraries or using audio or video cassettes to involve students in activities are practices which belong to the past, but what can be attested is that there are definitely new possibilities challenging educators' traditional ways to do their jobs.

The previous scenario leads us to think how educators in different knowledge fields, school levels and contexts are positioning themselves in relation to the advent of technology in their practices. In this sense, in the field of foreign language teacher education several questions have become relevant in the last years with many of these queries probably being common to scholars across various pedagogical areas, yet others might involve the specific nature of the foreign language field. In order to contribute to answering these questions it becomes paramount to gain knowledge about the research and applications being conducted. The current review seeks to provide a substantial perspective on some of the main topics and concerns that have emerged in the intersection between foreign language teacher education and technology during the last decade. In addition to the tendencies in the field, some thoughts in relation to necessary further research will be addressed.

This review is based on the reading of articles and book chapters. Approximately 50 pieces were studied. The search to locate the material took place in various data bases and it resulted in an interesting collection composed of publications from several countries around the world. Unfortunately, it was not possible to find a representative number of articles from Latin America and Africa. The documents include experiences involving pre-service and in-service teachers in various kinds of educational settings: professional development courses, M.A or undergraduate programs. Almost all the publications are research reports and a few others are reviews, analyses or descriptions of applications.

After the information was located and studied, a categorization of the most relevant issues emerged. That classification has guided the structure of the coming pages in this review. To begin with, the broadest number of articles study and discuss EFL teachers' attitudes towards technology and the effect that their education in this field has on their

practices. A second major focus has been foreign language teachers' interaction with colleagues to collaborate in their education. Several Computer Mediated Communication (CMC) tools have emerged as crucial communication means for this purpose. Distance education becomes a special context in connection to CMC. Finally, this review briefly summarizes current pedagogical perspectives, Autonomous Learning and Project Work, as options for curricular design in Computer Assisted Language Learning (CALL) teacher education.

EFL Teachers' Technological Backgrounds and Attitudes

According to the present review conducted from publications in the last ten years, a fundamental aspect in the field has been to analyze how EFL teachers feel and react towards technology and their CALL education. This has taken the form of needs analysis to prepare programs (Albirini, 2006; Yüksel & Kavanoz, 2010; Hu & McGrath, 2011), on-going exploration parallel to courses (Koçoglu, 2009; Kiliçkaya, 2009), and final evaluations when implementations have ended (Kessler, 2006; Egbert, Paulus & Nakamichi, 2002). The vast number of studies in this direction seems to corroborate what Wang, Chen and Levy (2010, p. 290) comment in the following quote:

> Teacher education in CALL should not only be about learning about teaching or even teaching about teaching but should also be about fostering the trainee's personal development to become a confident and competent online teacher by paying careful attention to their emotions, feelings, and reactions.

Researchers favored mixed methods approaches to determine the expectations teachers or candidates had in programs and the impact of these experiences. Traditional qualitative tools, namely interviews, observation and focus groups were combined with statistical procedures to build and analyze surveys. With no doubt, the results of studies can contribute not only to the accumulation of a body of knowledge from specific contexts, but also to the confirmation that making informed decisions to nurture improvement acquires a high value when planning or implementing coherent curriculum.

In general studies reveal that teachers and future teachers are not indifferent towards technology; in fact, they show a positive attitude and appreciate the advantages it can provide them and their pupils (Albirini, 2006; Kessler, 2006; Hu & McGrath, 2011; Wiebe & Kabata, 2010; Mathews-Aydinli & Elaziz, 2010). Nonetheless, on the whole, when looking at the prospective or current use of technology in their classrooms, educators seem to express uncertainty or discouragement; this feeling emanates to a big extent from their lack of access to computers and related technology. Albirini (2006) concludes that approximately the 35% of Syrian high school teachers who participated in his study did not rely on these machines at home. In the particular case of pre-service teachers, being in contact with computers has been

established as a trigger of positive attitudes towards technology (Yüksel & Kavanoz, 2010, p. 669). Word processors, search engines, dictionaries and presentation tools seem to be the most common activities teachers engaged in.

Factors behind Teachers' Approach towards Technology

A substantial number of EFL teachers and future ones admitted not having sufficient skills to work with technology in their teaching settings (Albirini, 2006; Hu & McGrath, 2011; Kýlýçkaya, 2009; Kessler, 2006). Among the low percentage who perceived themselves as qualified, the majority had taught themselves with the help of teacher resources. Others had learnt through colleagues, revealing a tendency in which those possessing broader expertise coach their unskillful peers. Participating in previous courses as the foundation for technological skills was not a common answer from educators in these studies. In fact, Kessler (2007, p. 184) mentions that "It appears that formal CALL preparation is not influencing graduates' attitudes toward technology". The exception was reported by teachers in Egbert et al. (2002) and Chen's (2007) studies. The latter, in a study involving higher education teachers in Taiwan, found out that "teacher training appears to be the most dominant determinant of Internet use and has a direct effect. The effect of teacher training is positively related to attitudes, which are positively related to beliefs and perceived capability". (p. 1020)

A correlation between educators' expertise and their attitude towards technology stems from several studies (Kiliçkaya, 2009; Chen, 2007; Yüksel & Kavanoz, 2010; Egbert et al., 2002; Kessler & Plakans, 2008). Specifically, Albirini (2006, p. 385) determined that "higher computer competence may foster the already positive attitudes of teachers and eventually result in their use of computers within the classroom". Likewise, in a study involving Turkish teachers' use of interactive white boards, Mathews-Aydinli and Elaziz (2010, p. 247) established that as participants increased their number of hours employing this digital tool, so did their fondness for it.

Mentors, tutors and teaching practicum supervisors affect the attitude that those they coach assume towards technology. Kessler (2006), Kiliçkaya (2009) and Lord and Lomicka (2007) have shown in their research that EFL teacher educators sometimes do not possess the expertise and familiarity to guide their students within the technological field. The aforementioned aspect seems to concur with their reduced role as models to encourage teachers, for instance, when mentors do not integrate these tools in their own practice. Not obtaining substantial suggestions from their tutors also creates frustration in pre-service and in-service teachers.

Logistics aspects in their educative settings were often mentioned by teachers as they described how they felt about their embracement of technology. Due to the fact that the

creation of material and activities to engage their students required a substantial amount of time, they were distressed to attempt implementations. A similar reaction occurred when they tried to fulfill requirements in preparation and development courses. Working contexts were also unfriendly since, as in the case of state schools, quite often resources were not available to keep equipment and labs. The aforementioned aspects might sometimes imply the absence of administrative support. The previous findings are discussed by Albirini (2006), Yüksel and Kavanoz (2010), Hu and McGrath (2011), Kiliçkaya (2009), Egbert et al. (2002).

In part teachers' excitement and agency to introduce technology in their classrooms originated from the avenues these resources offered to empower their teaching methodology. Pre-service teachers who participated in Koçoglu's (2009) study about their development of technological and pedagogical content knowledge (TPCK) became aware of the necessary symbiosis between teaching English and technology, strategies and materials they could use and the relevance of a student-centered approach. Nonetheless, it is relevant to consider that the required transformation in traditional pedagogy can yield tough challenges for teachers. For instance, Hu and McGrath (2011, p. 52), observing high school teachers in China, found that "teachers were not certain about their own ability to meet the demands of student-centred teaching".

Mismatches do not only stem from teachers' intentions to innovate importing technology into their settings and the concrete practices they lead, but also between the actual curriculum in schools and the one they would need to develop when adopting Information and Communication Technologies (ICTs) (Albirini, 2006; Chen, 2007). In like manner, policies in continuing professional development (CPD) and teachers' needs can diverge as Hu and McGrath (2011) pointed out, revealing institutional and government disregard towards educators' conditions.

In addition to the previous factors, it is worth mentioning that supporting educators' collaboration with colleagues can render spaces to process disappointment and emotional distress and to become more confident as they learn from and with others (Chen, 2007; Koçoglu, 2009). In regard to the teachers' or prospective teachers' confidence in this field, studies seem to yield contradictory results. Egbert et al. (2002) in their study of teachers who had taken CALL graduate courses are akin to Egorov, Jantassova and Churchill (2007) who, researching pre-service teachers in Kazakhstan, characterized participants as assertive concerning their technological skills. Conversely, Yüksel and Kavanoz (2010, p. 669), exploring the attitudes of pre-service EFL Certificate Teachers, determined that their self-assurance working with technology was low.

To close this first section, I include several of the suggestions scholars discuss in their reports. A central reflection from those suggestions is this: "If decision-makers want to involve teachers in the process of technology integration, they have to find ways to overcome

the barriers perceived by the teachers" (Albirini, 2006, p. 386). In addition, guiding the various stakeholders in this process to become aware and reshape their beliefs cannot be underestimated. In this regard, for instance, Kessler (2006, p. 33) warns us about the widespread perception in the field that in order to gain technological skills to be successfully applied in pedagogical settings, practitioners should basically work by themselves.

Furthermore, providing teachers not only the necessary materials, but also training opportunities which reflect the models being studied is a first step towards better teacher education frameworks and should be bound up with opportunities for experimentation and practice (Albirini, 2006; Compton, 2009; Mathews-Aydinli & Elaziz, 2010). Likewise, investing to reach the previous goals requires the cooperation of specialist in technology with the various parties involved in the process (Kessler, 2006, p. 35; Kiliçkaya, 2009, p. 442). Scholars also mention the use of research to build informed frameworks (Kessler, 2006; Hampel & Stickler, 2005) and to formulate coherent policies (Albirini, 2006, p. 386). In short and following the previous author, leading teachers who can or will innovate by integrating technology into their classrooms, entails working in updating the various interrelated constituents of their working contexts, among them ELT methodologies and school staff.

CMC and Teachers' Collaborative Learning

EFL pre-service and in-service teachers' participation in computer mediated communication (CMC) with the purpose of learning collaboratively with others has become a clear objective in a wide number of programs (Chapelle & Hegelheimer, 2004). Precisely, a wide number of the studies collected for this state of the art describes or researches educational initiatives for teachers based on their interaction via digital media. The next pages inform about tendencies in the organization of these dynamics and the profile of participating practitioners as well as their contexts. Furthermore, the emerging research results from these studies will be condensed into various categories which explain the reflective, social and cognitive dimensions of EFL teachers' knowledge construction through CMC. Distance education will be a special framework to consider since it has been central in several publications.

Characterization of the Experiences

Ten publications were considered for this section. In general, they examine teacher education experiences in graduate sessions. Usually, students from two different universities interacted within the context of ELT methodology or CALL courses. The CMC encounters were integrated into the structure of classes as requirements. This means that students mostly attended face-to-face courses and connected virtually with peers as part of the assigned tasks. Most of the studies included groups of students from different nationalities and native

languages. In approximately half of the cases participants were being prepared to be teaching assistants while the others were perusing their teaching degrees.

The tele-tandem study conducted by Biondo (2011) connected an undergraduate Argentinean student teacher and a graduate Brazilian student. In this case, the graduate student worked in developing her skills as a university advisor and her undergraduate interlocutor sought advice for his teaching practicum. Three other studies included particularities in relation to the general description provided above. Participants in Egbert and Thomas (2001), Son (2002), and Hall and Knox (2009) exclusively attended distance education courses.

Asynchronous discussion formats were frequently used to establish group collaboration. Teachers or candidates communicated via e-mail or forums, for instance. The internet played a paramount role as a means for web-based discussion or conferencing. Video conferencing was incorporated in a tele-tandem project. Generally, participants were organized into small groups to discuss or collaborate in tasks. These class groups were heterogeneous (nationality, gender, age), as in Arnold and Ducate's (2006) research in which they also rearranged the groups after tensions inside them arose. Pairs appeared, however, they were not a common option. The way groups function was determined by the kind of activities participants were required to develop. It was common to find that participating teachers posted summaries or journal entries and peers were expected to respond (Lord & Lomicka, 2007; Lomicka & Lord, 2007; Johnson, 2002; Johnson, Bishop, Holt, Stirling & Zane, 2001; Kamhi-Stein, 2000).

The design of courses to guide EFL teachers to interaction and mutual learning was based on a broad range of strategies. Some of the models used to structure the collaborative learning practices in these projects originated from the socio-cultural theory of Vigotsky, Dörney and Malderez' model for group dynamics, Garrison's et al. approach to building communities of inquiry, Brown's stages of community building and Wenger's communities of practice. Teachers frequently would receive guidelines to learn how to use the technology required.

Instructors' roles were essential in the planning and implementation of the sessions. In fact, in most of the studies, these leaders acted as organizers; their roles were then reduced in comparison to the regular functions they carried out in face-to-face classes. Johnson et al. (2001, p. 178) consider that the previous circumstance led them to pay close attention to the quality and organization of tasks in their project. Motivating students to maintain their collaboration (Johnson, 2002) and adopting a questioning attitude (Biondo, 2011) count among the few alternative roles of instructors mentioned in the reports.

Qualitative or mixed method approaches were favored by scholars in these studies. Questionnaires and an interview helped them elicit participants' experiences and perceptions. Moreover, they commonly recorded teachers' and candidates' contributions in discussions. Transcriptions were analyzed to understand interlocutors' attitudes towards courses and the

technology being used. The quality and quantity of participation called researchers' attention in several cases. Findings can be categorized as follows:

EFL Teachers' Collaborative Reflection

Four studies were specifically aimed at leading educators in courses to reflect upon their current or future teaching practice: (Biondo, 2011; Lord & Lomicka, 2007; Arnold & Ducate, 2006; Dourneenn & Matthewman, 2009). Findings from these 4 research projects vindicate previous studies in regard to the emergence of reflection in CMC collaborative environments, namely, in digital discussion spaces. Lord and Lomicka (2007, p. 520) propose new perspectives to look at reflection: "community building, encouragement, praise and suggestion/advice". In addition, a twofold perspective of this thinking process is shared by Arnold and Ducate (2006, p. 57): "Students moved between their private world of reflection and the socially shared space of inquiry on the discussion board"; the joint enterprise of discussing to solve problems engaged teachers in meaningful thinking. Similarly, the mediation achieved between a pre-service teacher and his advisor in videoconferencing affected the former's reflection upon conflictive issues in his teaching practice (Biondo, 2011).

An increase in the quality and quantity of reflection as a result of asynchronous CMC is documented in Lord and Lomicka's (2007, p. 527) research: "It is evident that the different group dynamics, as well as the technological tools used for journaling, led to differences not only in quantity but also in the kind of reflection". Supporting the previous finding, Arnold and Ducate (2006, p. 57) assert that collaboration, the writing style and longer time for thinking contributed to participants' reflections on their beliefs.

Traditional artifacts used to involve teachers and candidates in reflection have been adapted to match the advent of technology in the educational field. Among the studies previously referenced, Kamhi-Stein (2000) and Lord and Lomicka (2007) illustrate these transformations: Teachers' journals adopt a digital format. Similarly, in this decade, electronic portfolios have gained a vast popularity. EFL teacher education has also incorporated these artifacts as several studies suggest.

Besides their well known connection with alternative as well as standard-based assessment and reflective practices, nowadays digital portfolios are bound up with teachers' acquisition of technological skills and the transfer of these abilities to their students. As in the case of journals, e-portfolios can become mediating tools to bridge cooperative learning among teachers in CMC environments. Studies conducted by Ting and Jones (2010) and Luke (2005) integrate the aforementioned characteristics to support Foreign and Second Language Teachers' professional development.

In the study conducted by Luke (2005, p. 43-44), teachers' portfolios included, in addition to common sections such as a resumé, teaching philosophy, samples of pedagogical work and reflections, internet resource pages linked to other ones. Technology made teachers' manipulation of portfolios more practical and enriching; it was a more dynamic resource to keep these artifacts updated. As they were in contact with digital audio and video recording, PowerPoint, camcorders and scanners, among others, practitioners felt they developed more technological abilities and were more self-confident with their capacities. In regard to collaboration, Ting and Jones (2010) determined that by using these digital tools, participants opened up to exchange their views with peers, lowering their anxiety when they were provided feedback.

Unveiling the Social Nature of EFL Teacher's Collaborative Learning in CMC

Due to the requirements in their courses, teachers and candidates joined others in discussing academic topics via the internet. Researchers established that participants appreciated having this opportunity. In general, social cohesion drawn from cooperation took place as peers mutually provided comments to support learning processes. In reporting distance learning participants' answers to questionnaires, Son (2002, p. 11) affirmed that "most students enjoyed their participation in the discussions and thought they were constructive since this practice supported their education as well as their collaboration". This reduction of social distance was related to group members' acceptance of each other.

As participants provided feedback to each other, scaffolding processes were expected to occur. A psychological dimension in regard to the expression of emotions emerged as transcendental in several studies. Lomicka and Lord (2007, p. 223) report that approximately 30% of the exchanges between teachers from two universities who belonged to a virtual reflection group were in the affective domain. In other occasions, though participants might not have often commented their thoughts about academic topics, they had the possibility to manifest their disappointment (Lord & Lomicka, 2007, p. 51). Findings in two studies bear interesting implications when looking at anxiety factors in virtual environments as a barrier for communication in nonnative speakers. Kamhi-Stein (2000, p. 437) found that the "participation of nonnative speakers did not differ significantly from that of native speakers". In like manner, Johnson (2002, p. 64) inferred that the "difference between the posting length of non-native English speakers and native speakers is much smaller (187 words per task vs. 264 words per task)".

By means of these collaborative virtual spaces, it was possible to use language processes meaningfully. The written nature of discussions about course topics helped

participants in Arnold and Ducate's (2006) project to understand issues better; not only would topics be approached through writing, but also in discussion. Even though the main purpose of these exchanges was to discuss topics related to ELT methodology and CALL, other issues made up part of the interactions. For instance, 10% of the messages posted by participants in Son's (2002, p. 6) study were not related to course tasks. This author also found out that teachers employed language with several communicative purposes, namely, greetings, asking questions, giving opinions, providing information, expressing support, and offering and thanking.

Similarly, nonnative speakers of English considered their opportunity to practice this language a benefit. In a like manner, for distance education, virtual communication becomes an opportunity for participants to learn about other cultures by means of their interaction with peers from different countries (Joffe, 2000). Another advantage in connection with EFL teachers' language use was their development of digital illiteracies. Johnson et al. (2001, p. 181) assert that "as they (participants) became more literate in this new medium and internalized aspects of electronic literacy, their online communication became more interactive"; skill improvement at this level led them to build rapport with others in virtual spaces.

As can be perceived from the aforementioned review of findings, CMC can bring a vast array of benefits to EFL teacher education in contexts where it is a complementary strategy for face-to-face courses. Likewise, distance education experiences, which in some circumstances become convenient options for pre-service and in-service teachers, benefit from this modality. Notwithstanding, to continue the description of CMC affordances in the target field, some challenges become now the focus of discussion.

Studies found that when participants felt discouraged to interact virtually with peers, the main reasons lay with time constraints, lack of skill to solve technical problems or their perception of the activity as voluntary or not (Son, 2002). In relation to the latter circumstance, during their study of collaborative autonomous learning abilities in mediated environments, Kessler and Bikowski (2010, p. 52) determined that most of the pre-service teachers seemed to be just trying to accomplish a requisite in their course whereas only a small number of them genuinely expanded their collaborative work with others.

Some research revealed possible limitations in relation to the extent that peers can achieve communication in virtual environments. For instance, in those occasions when there is no connection among group members' reflections and follow up responses, these spaces seem to be "mainly academic monologues" (Johnson et al., 2001, p. 179). In addition, a high number of participants in an international survey on teachers' distance education in TESOL underlined "the misunderstandings and the potential for lack of

understanding due to the nature of CMC" (Hall & Knox, 2009, p. 74)[1]. Finally, information from the previous survey also warned about the significant increase in the writing and reading that teacher educators and learners involved in distance education need to cope with as a result of email communication.

Autonomous Learning and Project Work in Call Teacher Education

One of the challenges CALL teacher education faces is to ensure that practitioners will transfer knowledge from courses to their practical work with students (Yüksel & Kavanoz, 2010; Kiliçkaya, 2009 and Luke, 2005). Specifically, the latter reported that participants did not regard themselves implementing in their classrooms some of the tools they learnt in the course. Nonetheless, even if educators tried to integrate what they learnt in their classrooms, a greater demand is to require them to sustain the changes they are bringing about. In this respect, Robb (2006, p. 35) states that the creation of coherent alternatives to solve this difficulty yields the need to take teachers' education in technology "beyond the mere teaching of today's software and skills to ensure that teachers can autonomously upgrade their knowledge".

Autonomous Learning

From a research perspective (Stockwell, 2009), and from a theoretical and experiential stand Robb (2006) argue that several factors continue limiting the access that EFL teachers can have to CALL education. Therefore, procuring the development of technological skills has often been educators' own enterprise. The implications of the previous situation can be twofold. Firstly, autonomous learning emerges as an independent option from courses and programs since these formal time-framed spaces cannot get teachers acquainted with all the fast changing knowledge in the technological field. Secondly, what teachers are learning on their own and how there are learning it might not necessarily benefit their teaching.

It follows that teachers need to be guided to learn how they can keep learning in this field, thus their acquisition of technological skills becomes purposeful in relation to the characteristics and needs of their working contexts. There are three basic dimensions worthy of consideration to expect the development of autonomous learning in CALL (Robb, 2006,

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1   Since researchers obtained less than 20% from the expected participation, they acknowledge the lack of statistical validity of this study. Nonetheless, they consider the data provide a fair picture of institution types and course types.

pp. 338-340): to possess a sufficient knowledge base so new information can be understood and used; to have the confidence and drive, thus technology is employed and finally, to be aware of where the materials and opportunities for learning are. Furthermore, the previous author mentions the help that educators should continue receiving from academics, as well as their working institution after courses or programs have ended.

The findings of a study carried out in Japan by Stockwell (2009) vindicate the principles commented on above. This scholar involved teachers in a seminar, which among other objectives sought to "provide strategies to facilitate self-directed use of CALL (p. 113)". Participants felt that their limitations to know where and how to access materials did not support their development of skills and knowledge of CALL. The lack of materials led educators to resort to what they found was available, not to what they had planned as part of their learning process. Conversely, a factor that fostered their autonomous learning was their connection to colleagues who employed CALL.

Building Curricular Options to Educate EFL Teachers in Technology

The last section looks at the planning and implementation of curriculum to support teachers or candidates in this field. Among the three articles which fall into this category, two of them (Olesova & Foster, 2006) exclusively adopt Project work as a backbone with which to structure programs and courses. Though the remaining one does not completely focus on this approach, it incorporates it in connection with other elements. Despite the fact that none of the cases shares the findings of complete research studies, they build on partial evaluations of what participants and experts have experienced while working with this approach.

Scholars in these experiences have embraced Project work as a unifying curricular element. In Debski (2006), the course objectives, procedures and assessment revolve around providing participants the elements needed to elaborate a final product, a cooperative project: a Website for the Cultural Programs. The previous instance is also related to another feature in Project work which has called teacher educators' attention: its potential to help in solving problems. Cunningham and Redmond (2002, p. 49) describe the planning of a field trip or the design of a newsletter as authentic problems which require pre-service teachers' elaboration of projects integrating technology. This approach leads practitioners to take action, to experience the knowledge they become acquainted with in courses. "Teachers work in the computer lab to design their own collaborative Internet Project which makes use of e-mail, the WWW, Nicenet, and Tapped-in" (Olesova & Foster, 2006, p. 242).

The integration of theory and practice takes place at various levels, in addition to the one mentioned above; "the project thus functioned as an interface linking the two parts of the course, and a stage where reflection on theory and design could crystallize into educational desirable solutions" (Debski, 2006, p. 107). Therefore, it is not only at the action level, but

also at the thinking level that these two dimensions of learning merge into a project work framework. The previous scholar also refers to pre-service teachers' possibility to identify a real life referent, authenticity i.e. their adoption of genuine roles as well as corresponding technological tasks and their comfort for counting on peers' help. Moreover , based on what Olesova and Foster (2006, pp. 244-247) perceived, in-service teachers gained a new and more positive perspective of the role of projects in their working settings they became more secure about their technological abilities and they seemed to improve their language performance being closer to the global community.

Finally, these publications include some aspects worthy of considerations to improve the process of project planning and implementation. Olesova and Foster (2006, p. 246) expressed that teachers need time to become users of specific technologies, for instance e-mail or social networks, necessary to work in the projects. Unfortunately, their excessive work load might not allow them much time during the course. They suggest guiding teachers to understand course requirements in advanced and encourage them to start some work on their own. Likewise, from what Debski (2006, p. 107) found during his experience, participants' extreme dependence on their instructors can turn into a difficulty. Similarly, this scholar warned about the unbalanced sharing of responsibility since enthusiastic candidates can develop most of the tasks the project demands, leaving their less motivated peers out of substantial involvement and thereby learning.

Conclusions and Further Research

In concluding, I would like to put this review into the perspective of other publications which have worked in establishing a state of the art for teacher education and more specifically in CALL during the last decade. In relation to the broader field, the findings in this study matched several of the topics that Avalos (2011) lists as tendencies. Her analysis determined that technological tools were among the most influential ones to support the education of teachers. Likewise, evaluating the factors behind the success and challenges in teacher education courses and programs has become an issue in the whole field. Finally, collaboration in learning and reflection are concerns which CALL teacher education shares with the wider area.

From a broader perspective into a specific scope, Hubbard's (2008) study on CALL Teacher Education from 2006 to 2008 stands as a meaningful review to compare findings. The publication includes the reduced time, inappropriate equipment as well as resources, undefined approaches and unprepared teacher educators as some of the constraints for practitioners' preparation. Among approaches which favor the connection between technology and EFL teacher education, this author identifies the use of portfolios, project

work, self-directed learning and reflection. In addition, EFL teachers' involvement in communities of practice becomes a growing scenario for teachers' CALL learning.

The state of the art which has been drawn in the current review agrees with the two other sources mentioned above. Together, these publications reveal that during the last decade, scholars' research has unveiled a lengthy list of constraints and some strengths in the efforts to educate teachers in CALL. The proliferation of this diagnostic research brings benefits to the field since, although these results are not generalizable, they can provide initial hypotheses for explorations in similar contexts. Nonetheless, what can be established is that beyond examining issues related to participants' expectations and involvement in courses and programs, scholars have also studied and shared emerging approaches for educating teachers. In that sense, tendencies in the field as collaboration, reflection, self-directed learning and project work seem to address several of the limitations.

Throughout this analysis, scholars' voices have been repetitive in pointing at critical issues which are worthy of deeper reflection. To begin with, teacher educators' preparation to instruct practitioners in the use and subsequent integration of technology in classrooms stands as a priority. For instance, during the realization of their project in Ireland, Rickard, Blin and Appel (2006) integrated an initial phase in their CALL teacher training program to expand the trainers' technological competences. Their expectation was to lead participant trainers to feel comfortable with their knowledge and skills to connect technology to EFL, so that they could provide quality guidance to teachers in the second phase of the program. This kind of framework can equip CALL teacher educators to vary and substantiate the roles they adopt (Hubbard, 2009; Wong & Benson, 2006). In online collaborative experiences for example, tutors have assumed an almost exclusive organizational role. Albeit this kind of interaction implies a natural reduction of many of their traditional roles, there can be new or alternative functions tutors can take up. At any rate, several studies reported that participants reclaim a stronger presence of teacher educators in virtual environments.

Collaborative online learning spaces, which stem from groups of teachers or candidates and might eventually become communities, are the second focus of reflection. Behind this concept lies the intention to provide practitioners additional options to learn with and from peers. Studies showed that affective, social and cognitive factors unite to define these virtual environments. A concern that springs from the various reports is that in most of the cases, course guidelines makes teachers' participation compulsory; it is not an option. How long can this kind of association last and how genuinely supportive can it be based on this kind of principles? The studies showed that these associations can effectively help their members to learn, but looking beyond what occurs after programs and courses end, other strategies to develop teachers' affinity with digital means can be incorporated. Rewarding participation

rather than penalizing absence or generating optional real life purposes are two starting points to lead teachers in generating solid and lasting bonds with technology.

One of the most serious concerns for scholars seems to be teachers' transferability to their work settings of the technological competences developed in courses. As Luke and Britten (2007, p. 254), among others, put it: "Leading service teachers to involve technology in their teaching practice and professional development has become a more challenging endeavor than expected". Then, some queries arise: How can programs encourage teachers to employ their acquired knowledge in planning and implementing CALL pedagogical frameworks, and how can they continue expanding their Technological Pedagogical Content Knowledge (TPCK) base? In this respect, two approaches seem to reflect a set of suitable principles to achieve substantial results: Project work and Autonomous learning. These pedagogical perspectives, which have proven to be effective in other areas of Foreign Language Learning and teaching, run parallel to the collaboration, student-centeredness, reflection and personality which have become clear tendencies in CALL teacher education. However, more robust research is needed to examine how these approaches affect teachers' learning.

In order to establish some other topics for further research, Avalos' (2011) general review becomes a useful reference point. Three issues included in her report, but which were not part of the findings in the current one, were partnerships between schools and universities, the school culture, and teachers' change in cognition, beliefs and practices. Further research in the field of CALL teacher education should consider the exploration of these concerns. Likewise, merging the findings in the current revision with Hubbard's review on CALL throws some light to conclude that the production of research is concentrated on only a few issues. Thus, diversifying the focus of inquiry to cover critical aspects which have not been studied enough becomes a priority. For example, teachers' language learning and intercultural development were the focus of a reduced number of studies (Sehlaoui, 2001; Müller-Hartmann, 2006; Pérez, 2010; Liaw & Bunn-Le Master, 2010).These aspects lay at the heart of what defines the EFL educators' profession and the studies during this decade in CALL teacher education do not address them deeply.

Similarly, another exploration worth of consideration is related to many teachers' reluctance to integrate technology into their practices. A side of this conflict which has not been explored in the field has in fact been studied by scholars in other subject areas. For instance, Capobianco and Lehman (2010) examined science teacher's development of identity within the integration of technology to their preparation. Their study raises interesting questions about how technology is challenging pedagogical fields to reshape their traditional ways of addressing the learning and teaching of their subject matters. This, of course, leads teachers to question their pedagogical actions and their future.

This review sought to gather a representative and inclusive sample of experiences conducted in different countries around the world. That objective was partially achieved since publications from Latin America and Africa were not constantly available. Despite the fact that some might eventually be found, the production of studies from developed countries broadly overrates the research conducted in developing nations. In that sense, I would like to leave readers with the following quote from Hubbard and Levy (2006, p. 236):

Much of the literature and discussion on modern CALL relates to situations in the developed world, most particularly in North America and Europe. By adopting this perspective, numerous assumptions tend to follow without question or reflection: that technological infrastructure is stable and reliable, that a wide range of software applications are available to all; that institutions are receptive to the introduction of CALL; and that the practices of language teachers are readily amendable to change if the opportunity for training is provided.

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