

## **Pre-service teachers' perceptions on educational networking: an exploratory study**

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### **Abstract**

The motivation to carry out the learning experience presented in this paper derived from three premises found in the review of literature that sustains the empirical study: i) social networking is a daily routine for most western world citizens; ii) (portuguese) non superior schools are equipped with computers and Internet access; iii) the integration of the technologies in the curriculum is related to the ICT training teachers have in their initial education programs. Taking these assumptions as a guide, social networking activities were integrated in an ICT program at a Portuguese university enrolling 26 pre-service teachers from humanities (History, Geography and Philosophy). For one semester student teachers used PROEDI ([www.proedi.ning.com](http://www.proedi.ning.com)) a social networking created to be an informal space for professional growth Portuguese speaking teachers. For data collection we used observation of the interactions (sociometric analysis) as well as two online questionnaires (initial and final) to evaluate students' perceptions on educational networking. Results are presented and discussed.

**Keywords:** social networking, pre-service teachers, ICT, teacher preparation

### **Introduction**

The recent development of digital technologies, in particular the Internet, allowed for the emergence a new philosophy of the social web (Coutinho & Bottentuit Junior, 2009) that demands, as pointed out by Selwyn (2013), for a globalized perspective on the role of digital technologies within education. In fact, as the world becomes more and more flat (Veen & Vracking, 2009), the widespread use of terms like “virtual schooling”, “school 2.0” or “edgeless university” reflect “the increasing fluidity and fragmentation of educational places and spaces” (Selwyn, 2013, p. 6). Through the Internet, we can accede to online spaces for learning and develop new competencies and skills at our own pace and according to our needs (Coutinho & Alves, 2010). Learning is becoming more and more a lifelong activity that demand for new competencies and skills (Coutinho & Lisboa, 2011), reported in literature with different designations that Cachapuz, Sá-Chaves and Paixão (2004), inspired by the Delors report (1986) ,refer to as the five basic knowledges for an active 21<sup>st</sup> century citizenship: learn to learn, to communicate in a globalized world, critical thinking, to solve problems and to manage conflicts.

This scenario demands for a reflection from all of us, teacher educators, who feel the responsibility of educating a future generation of teachers who are proficient in creating technological learning environments that engage students in learner-centred environments where interaction and cooperation are essential for the success in the knowledge society we live in (Coutinho, 2009a, Coutinho 2010). We agree with

Lambert and Gong (2010) that preparing teachers to use the technologies in the classroom as always been a challenge. The literature presents examples both of successful and unsuccessful cases of classroom technology integration but, as Kay (2006) and also Coutinho (2009a) point out it lacks a consensus on which educational programs and strategies work better to prepare teachers who integrate effectively the technologies in their teaching practices, cognitive tools that enhance the development of the skills students need to perform in their future jobs as responsible citizens of globalized society of today.

As teacher educators we need to strengthen the gap between the use of digital technologies inside and outside the school; in fact, despite the huge amounts of investments in the equipment of Portuguese schools in the last decade, recent research show that the Internet and Web 2.0 technologies are absent in most classrooms (Alves 2008; Domingues, 2010). In this context some questions arise: if schools have computers and Internet access; if the new generation of teachers are already from the digital native generation (Prensky, 2001) and use social networks in their daily routines; then why not to explore the potential of educational networking for training beginning teachers?

Educational networking refers to the use of Web 2.0 tools in educational settings (Hargadon, 2008). On the other hand, the concept of professional development encompasses both formal and informal teacher education/training activities that contribute to enhance professional skills. As defended by Marcelo (2009), for professional growth to occur teachers need to acquire the capacity of adaption to change as a result of both of experience and a systematic analysis of his own practices. This a process that lengthens through teaching life but that begins in the initial education stage, particularly when we refer to the development of digital literacy skills (Lambert & Gang, 2010). Besides, an extensive body of research shows the benefits of collaborative, contextualized and enquiry-based learning for teachers' professional development (Kershner, Pedder & Doddington, 2013). Social networks "are really just collections of Web 2.0 technologies combined in a way that help to build online communities" (Hargadon, 2008, n/p.) so they have all the ingredients to offer educators opportunities for beginning teachers to develop a myriad of ICT skills and competencies through the sharing of ideas and experiences, collaborating with peers, creating and publishing online digital artefacts at the time they reflect on lessons learned (Lisbôa & Coutinho, 2011a). The learning experience we present in this paper intends to be a contribute to the state of the art related to the use of educational networking in teacher education programs.

## **Background**

At the School of Education of the University of Minho (Portugal), we have been preparing future teachers to use technologies in the classroom for the last three decades; the audiovisual in the 80's, the computer in the 90's, then the Internet and more recently, Web 2.0 tools were gradually introduced into our pre-service teachers' education programs. We have published disseminated the results of the research carried out as well as our own reflections and insights of the different pedagogical experiences carried out since 2006, and we are aware that our work was not for nothing (Coutinho, 2009b, 2012). As stated by Lambert and Gong (2010) we agree that, according to adoption theories (Geoghegan, 1994; Rogers 1995, *apud* Lambert & Gang, 2010, p. 58), one must consider successive stages in the process of technology integration – knowledge, persuasion, decision, implementation and confirmation. However, only the

first three are within the influence of teacher preparation programs like the ones we minister at the University of Minho. The last two occur in the real classroom but we are now rehearsing some initial feedback from follow up observation in the schools that encourage us to pursue with the initial assumption: the type of training influences definitively the integration of ICT by beginning teachers (Coutinho, 2009a) as verified by Sadaf, Newby and Ertmer (2012) in their recent study that highlight some influencing factors, for instances the relation with the area of teaching: “successful use of Web 2.0 depends on the meaningful integration of these technologies with the subject being taught” (p. 171)

The training experience reported in this paper is slightly different from previous ICT courses (Coutinho, 2010, 2012): for the first time, social networking tools were introduced as a strategy for beginning teachers to discuss the conceptual topics of the ICT program, to reflect on lessons learned, to share experiences and digital resources and to construct collaborative knowledge.

## **Method**

The empirical study was developed in the second semester of year 2010/11 and enrolled a group of 26 student-teachers who attended a program on Educational Technology (ICT) as part a Master in Teaching (Bologne Model) that gives professional certification to teach in basic and secondary schools. Academic background were philosophy (10) and History and Geography (16).

The ICT preparation program, is a one semester course (15 weeks) with face to face classes (3 hours/week) complemented with online activities supported by Web 2.0 tools. The program, developed according to the literature and previous authors research (Coutinho, 2012) is structured in two complementary parts: a) the conceptual framework that sustains the integration of ICT in the curriculum; b) the hands-on activities where students use technological tools to create digital resources to use in the real classroom. In order to attain the course objectives, students are organised in group of 3-4 according to their curricular area of teaching and have to read and analyse a selected bibliography, discuss the readings inside the grou and develop several collaborative written tasks using Google Docs. The hands-on activities consist on the creation and management of blog as a group e-portfolio; image edition using Gimp; sound edition using Audacity; creation of podcasts as comments to selected Youtube Videos; creation of a WebQuest per group on a selected topic using the web page editor Google Sites. Digital artifacts are usually presented to the class for comments and are evaluated both by the instructor and the colleagues in a democratic fashion.

The 2011/2012 edition was similar to this traditional format in most components but had an additional feature: social networking activities were incorporated as part of teachers activities, replacing the use of the blog as a group portfolio (Coutinho, 2012). This time, students worked in small groups as usual, but use the forum discussion tool of the PROEDI social network as the space to share and discuss course theoretical issues. The PROEDI ([www.proedi.ning.com](http://www.proedi.ning.com)) is part of a doctoral projet supervised by one of the authors, and was launched in january 2011 as an open space for Portuguese speaking teacher professional development. The community has 393 effective members that participate actively in the constructing of knowledge inside the community (Lisbôa & Coutinho, 2011b).

The instructor presented the PROEDI social network at the second class of the semester and all student teachers were invited to register and become members of the

community. Since then, students were invited to contribute, according to their will, to the forums that were opened on the PROEDI community during the semester. Besides this open participation, that has been very intensive around topics such as “Blog and Wiki as pedagogical tools”, and “Podcasting in education”, one specific forum were created for the group :“Technology versus Pedagogy”. All students had to contribute to these forums with comments that could included text, images, videos, and links to related sites. Forum discussion were mediated by the instructor that worked as the e-moderator of the group, inciting for participation, giving feedback and support. Individual contributions were considered for students final assessment (15% of total mark).

In order to evaluate the social networking experience data were collected from three complementary sources of evidence: i) an initial and final online questionnaire, ii) indirect data were collected through the analysis of the interactions generated inside the discussion forum “Technology versus Pedagogy”.

The initial questionnaire was administrated in the first day of class and was organized into four sections: i) biographical data (age, gender, academic background); ii) digital literacy (ownership of computer, Internet access, Web 2.0 tools known/used, iii) perceptions on the potential of social networking for teacher education and iv) previous ICT preparation. For the final electronic survey, itens of previous questionnaires were adapted for the present study aiming to collect data i) perceptions on the Proedi social networking experience (open ended), ii) the value of the ICT training program for teacher education (10 itens on the format of 5 points likert scale, varying from Total Disagreement to Total Agreement).

## **Results**

### **Initial Questionnaire**

According to data obtained in the initial questionnaire (23 respondents), 77% were female, ages ranged between 21 and 46 years old, average 30 years old. Six participants were students, six had previous experience in teaching in local basic or secondary schools, and the remaining had other professional experiences or were jobless and returned to the university to get professionalization.

Asked if they knew the term Web 2.0, 23% said “Yes” and 77% said “No”, what is surprising attending that many of them belong already to the digital natives generation (Prensky, ). In respect to Internet access and use, 95,5% said they acceded to the web every day, mainly from their homeplaces (90,9%), using a notebook (45%), or a computer desktop (45%). Only 10% said they used their mobile devices to get connected. The Web 2.0 tools they knew and used for personal uses were Facebook (73%) followed by Wiki (64%) - confirming data obtained in previous studies showing that many students still confound wiki with wikipedia – then Google Sites (43%) and Blogs (27%). The tool they knew less were Podomatic (100%), Del.ici.ous (90%) Ning (82%), Flirck (64%) and even Moodle (50%), what seems strange (most portuguese non superior schools use Moodle), but understandable as the majority were pre-service teachers.

Regarding social networking, 82% said were members of a social network; Facebook was the first choice of all of them, but two also mentioned LinkedIn, one Twitter and another one Google+. For most participants the context for using social networking was entertainment (73%) followed by educational purposes (50%). Asked if they believed in the potential of social network for classroom use (open ended

question) the answers were quite diversified: 16 participants said “Yes”, 4 “Yes” but with a condition “supported by the teacher” and the other 3 said they had no opinion.

The final section of the questionnaire investigated if students had previous ICT preparation. According to data obtained, 55% had attended previous ICT courses at the university and 20% in continuous training courses at school (some of the participants had previous teaching experience). The type of education programs attended were mainly face to face (80%), blended (15%) or totally online (5%). As to the type of ICT education they needed 45% said the course should combine theory and practice but with emphasis in the area of teaching (Philosophy or History/Geography); 40% said it should give priority to hands on activities (handling of technologies, creation of digital artifacts), and only 3 participants said it should be mainly theoretical.

### Final questionnaire

The final questionnaire intended to evaluate the social networking experience as well as a global feedback on the ICT program for teacher preparation.

- The value of the educational networking experience

In order to obtain opinions on the potential of the educational networking the questionnaire included one open ended question formulated as follows: *“On the context of your Educational Technology program you were invited to participate in the Proedi social network. Do you think that this bid was beneficial for your preparation as a future teacher? At what levels?”*

18 of the 19 respondents answered the question. In order to analyse the contributions, exploratory techniques of content analysis were used (Coutinho, 2011). As recommended by Bardin (2011), we began making a “floating reading” to the whole text in order to detect the main ideas that were latent in the discourse of the future teachers. An initial array of 6 categories emerged from data, but, as suggested in the literature the opinion of an expert encoder was carried out. After discussion, both encoders agreed in a set of 5 categories to reduce data. Then, independently each encoder codified the corpus of analysis using as unit of analysis the thematic unit (Bardin, 2011) consisting on a group of words that together allow to extract an idea with unambiguous sense from participants speech. Interater percent was calculated at the level of 86%, considered a high value that ensures reliability of the coding process.

Results obtained are presented on table 1.

Categories	Nº	Evidences (participants words)
Sharing of ideas/experiences/ knowledge	8	<i>It is a useful social network to share information, the best I ever known</i> <i>It allowed sharing ideas with peers</i> <i>Mainly because it allowed sharing ideas (...)</i> <i>To share ideas that enhance the integration of ICT in teaching practices</i> <i>I could easily get to know other colleagues opinions on the use of new technologies in educational contexts</i> <i>It has been very fruitful at the level of sharing ideas with other teachers</i> <i>To share experiences is always very important</i> <i>To share experiences</i>
To become aware of new educational tools	7	<i>(...) to know new tools and technologies to apply in educational contexts</i> <i>I made contact with new kit of Web 2.0 tools that seem interesting to integrate in school work</i>

		<i>I discovered new pedagogical tools that maybe useful to engage my future learners</i> <i>To know new tools and its potential</i> <i>It allowed to contact technological tools that I didn't knew and believe can favor the teaching and learning process</i> <i>It let me know some tools to help my teaching of History and Geography</i> <i>(...) to know new tools</i>
Interactions with more experienced colleagues	6	<i>It allowed to interact with colleagues</i> <i>(...) interact with more experienced ICT teachers in the use of ICT in education</i> <i>The network helps future teachers to discuss ideas and opinions on the different educational paradigms</i> <i>It allowed to share ideas and information about educational topics useful for my future profession</i> <i>It made me get closer to other teachers resulting in more interaction</i> <i>It allowed interactions with teachers at the global scale</i>
To develop digital literacy	5	<i>(..) it is an educational network that allows us to get update and enhance competencies related to ICT in education</i> <i>Through Proedi I developed new conceptual knowledge and technological skills</i> <i>It helped to develop and apply ICT to promote better learning in the classroom</i> <i>The Proedi network is very rich in ICT contents.</i>
To reflect on the potential of educational networking	4	<i>It enhanced a reflection on the potential of social networking for sharing experiences</i> <i>It allowed to get in touch with different spaces for learning</i> <i>It was very important to reflect on the new dilemmas a teacher can face in a globalized world...</i> <i>Off course it is a social network that informs, communicates and allows sharing of ideas, opinions and information between teachers of different areas but the goal has always been only one: to make classes more dynamic and engaging.</i>

From participants discourse the five interesting “big” ideas emerged from data where (in decreasing order of representativeness, based on the number of occurrences): 1st) to share ideas/experiences/ knowledge; 2nd ) To become aware of new educational tools, 3rd ) to interact with more experienced colleagues, 4th) To develop digital literacy and 5th) To reflect on the potential of educational networking. These results are consistent with what the literature reports on research on ICT in teacher education in particular with adoption theories (Davis, 1989 and Rogers, 1995) studies on attitudes and beliefs (Wang, Ermmer & Newby, 2004; Vannatta & Fordham, 2004, Fernandes, 2006) as well as research that analysis the type of training/program that influences positively the curricular integration of ICT in the classroom (Lambert & Gong 2010, Rocha, Mota & Coutinho, 2011, Shafer, 2008). On the other hand, reading the teachers speeches, we see insights on the use of ICT different form the traditional format – to support lecture-based instruction; in fact, teachers refer to technology uses that enrich the pedagogical kit of a 21<sup>st</sup> century teacher as recommended by the UNESCO policy framework of ICT standards for prospective teachers: “Capable information technology users; (...) Problem solvers and decision makers; Creative and effective users of productivity tools; Communicators, collaborators, publishers, and producers; Informed, responsible, and contributing citizens” (UNESCO, 2008, p. 1). Some examples:

*I discovered new pedagogical tools that maybe useful to engage my future learners*

*It was very important to reflect on the new dilemmas a teacher can face in a globalized world...*

*Through Proedi I developed new conceptual knowledge and technological skills*

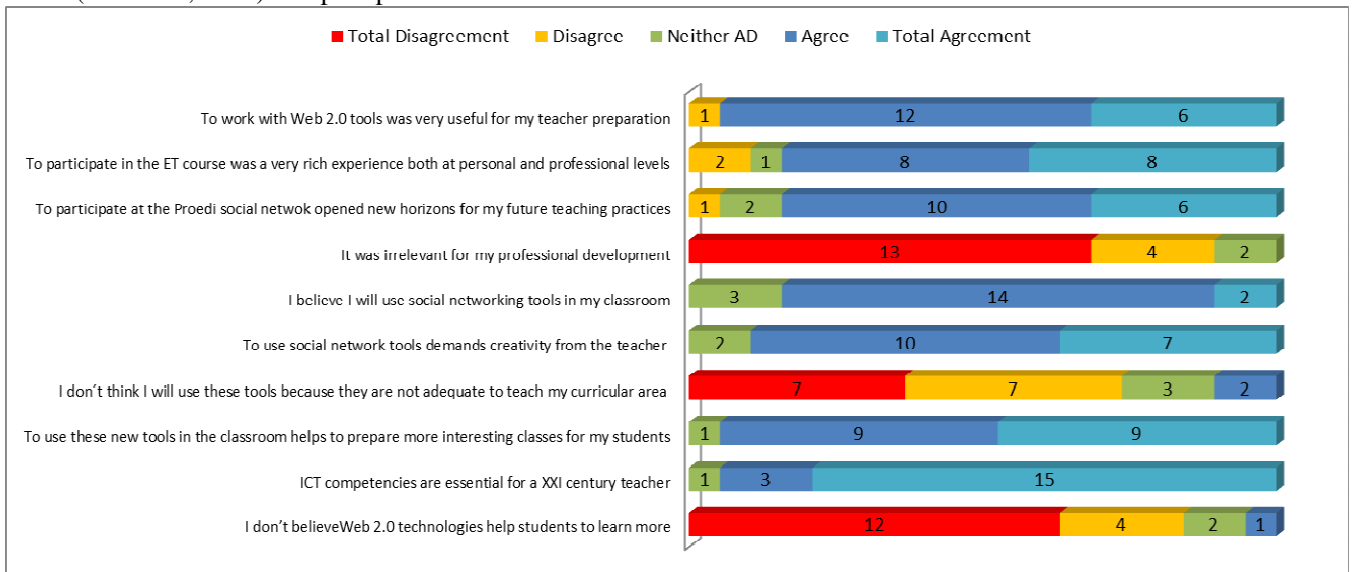
*It allowed interactions with teachers at the global scale*

*The network helps future teachers to discuss ideas and opinions on the different educational paradigms*

- The value of the ICT program for teacher preparation

It is no longer appropriate to suggest that these types of uses are adequate to meet the needs of the 21 st century learner. Using technology simply to support lecture-based sinstruction falls far short of recommended best practice

Ten items in the format of a 5 point Likert scale of agreement (Total Disagreement TA - Total Agreement TA) evaluated the participants opinion on the value of the education program/social networking experience for their teacher preparation. Seven items were formulated in a positive manner and 3 in a negative statement in order to avoid answer pattern (Coutinho, 2011). Graph 1 presents data obtained.



Graph 1 – The value of the ET/social networking experience for teacher education

A global glance of the graph show how positively students valued the ICT program they attended: all positive items received high degrees of agreement - blue/violet coloured bars - and all negative items received high levels of disagreement - red/yellow coloured bars – (“It was irrelevant to my professional development” (13TD+5D) “I don’t believe that technologies will help students to learn more” (12TD+4D) and “I don’t think I will use Web 2.0 tools because they are not adequate to my curricular area of teaching”(7TD+7D).

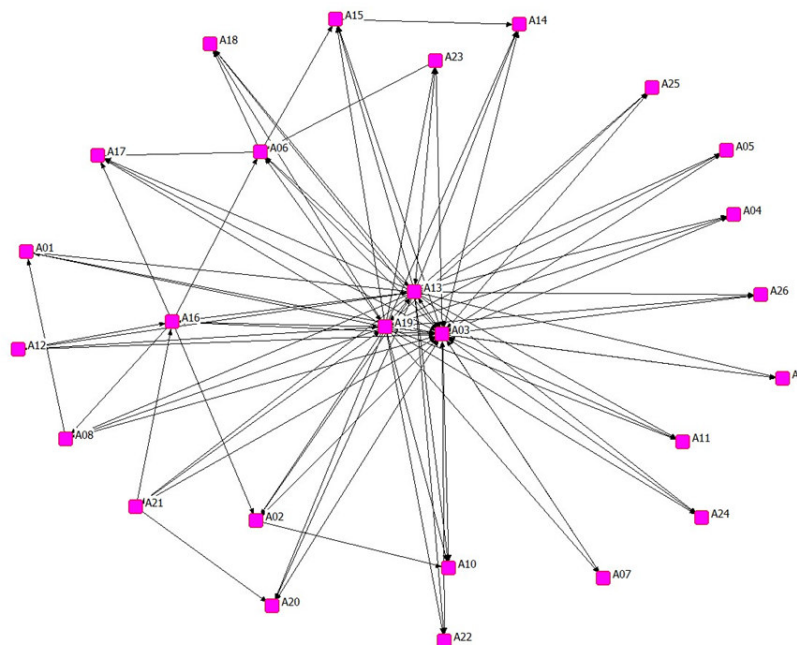
We can also verify that the highest degrees of agreement are assigned to statements that connect directly the education program: “ICT competencies are essential for a XXI century teacher” (18 participants Totally Agree-15 or Agree-3);“To use these new tools in the classroom helps to prepare more interesting classes for my students” (9TA+9A);“To work with Web 2.0 tools was very useful for my teacher preparation” (8TA+12A); “To participate in the ICT course was a very rich experience both at personal and professional levels” (8TA+ 8A). These opinion is confirmed by the high level of disagreement in the negative formulated item that evaluated the same dimension: “It was irrelevant to my teacher preparation” (13TD+4D).

The intention to integrate social networking, in their future teaching practice is also evident in participants positioning regarding the following statements: “I believe I will use social networking in my classroom” (2TA+ 14A), and “To participate in Proedi social network opened new horizons for my future teaching practices” (6TA+10A) confirmed by the high negative value evidenced in statement “I don’t believe that Web 2.0 technologies help students to learn more” (12TD+4D).

## Social Network Analysis

Social Network Analysis (SNA) consists in the analysis of the interactions inside a social network through the computation of quantitative indicators (density, degree of centrality, intermediation, closeness, proximity) that allow to understand the type and intensity of relations established (Hirschi, 2010). The source of evidences for SNA is observation, in this case the number of interactions established between the 26 members of the discussion forum; for the sociometric analysis we used the software Ucinet and for graphical representation the Netdraw software (Borgatti, 2002).

In the “Technology versus Pedagogy” discussion forum participated 26 members that attended the ICT course. A total number of 118 ties were developed in a total of 650 possible relationships; the result is an index of density of 18, 2%, that shows this a low density network, not much rich in interactions (Lemieux and Ouimet (2008). This pattern is visible in the graphical representation of the network (see Graph 2).



Graph 2 - Forum interactions.

Although the scarceness of interactions – literature demonstrates that the bigger the number of members in a discussion forum the lower is the density of the network - it was important for us to know which members led the discussion, performing an outstanding role inside the community. This information comes from the analysis of the quantitative indicators referred above. The first one, the degree of centrality, indicates the number of nodes (members) that interact directly with another. We immediately verify that the main actor of the network is A03 (the instructor) as 24 members (96%) established relations with him, followed by A013 and A19. This picture reflects a high index of centrality for the whole network objectified in the percent values of 88, 66% and 84,33% for inputs and outputs (Velázquez & Aguilar, 2005).

The second is the degree of Betweenness, an indicator of the paths that link all network nodes. In other words it represents the possibility an actor has to intermediate the relations between pairs of nodes, assuming the control of the communication inside the network (Velázquez & Aguilar, 2005). On our case, A03 (the instructor) was the main actor with an index of 77,2%, followed by A13 (6%) , A19 (4, 06%) and then, A16, A06, A02, A08, A15 and A17 with



around 1%. The third indicator, the Index of Closeness) shows the capacity a member has to attain all other nodes in the network (Velaquez & Aguilar, p.16). as expected A03 has the higher degree of proximity (96,15) followed by A13 (56,81) and A17 (55,55).

As final remark we can say that, despite the low density and high index of centralization, we verified that in this particular forum, the main role in the network was not exclusive from the instructor (A03); in fact, two students assumed a very active role in the dynamics of the network, showing what is reported in the literature regarding the development of feelings of belonging and empowerment that lead to the so desired shared leadership (Lisbôa & Coutinho, 2012)

## Conclusions

We absolutely agree with Lambert and Gong (2011, p. 54) when, at the beginning of their paper, that "The technological preparation of pre-service teachers has been an ongoing challenge since the advent of computers in schools."

We feel this challenge for the last two decades, when computers entered the educational system of our country and we had to adapt our teaching methods to the demands of a global society than was becoming more and more technological advanced and digital (Selwyn, 2013). As teacher educators we could not keep teaching educational technology in our teacher education programs indifferent to the outside unstoppable world. Progressively we introduced computers, educational software, multimédia but with the outbreak of Web 2.0, the opportunities and challenges multiplied. As stated in the UNESCO report (2008), "New technologies require new teacher roles, new pedagogies, and new approaches to teacher training. Our previous research shows that the successful integration of ICT into the classroom demands new competencies from teachers and it is our responsibility to educate a new generation of teachers (Coutinho & Bottentuit Junior, 2009).

The learning experience presented in this paper shows that beginning teachers enthusiastically joined the challenged of using a social network as a space for the development of online activities as part of the curricular tasks of their ICT program. We verified they interacted in the discussion forums actively, as it was not only the instructor who assumed the mediation of the process of collaborative knowledge construction. The feedback obtained on the online questionnaires shows positive perceptions towards the use of educational networking in teaching practices that encourages its inclusion in formal education programs that intend to prepare digital competent beginning teachers.

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