Social networks and knowledge construction promotion in e-learning contexts

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Abstract

The presentation concerns the "Minerva" project co-financed by E.U. aiming at identifying and promoting "good practice" in the design and delivery of e-learning courses (i.e., activities that teachers/tutors may use to foster social dynamics allowing participants to advance in knowledge construction). Accordingly to the principles of action-research, the project has been implemented in four subsequent phases, starting from October 2006, up to the end of October 2008: 1) an exploratory study on a sample of noteworthy e-learning experiences (on the European scale); 2) design and delivery of e-learning courses – in academic domains - based on emerging "good practices;" 3) process and outcome evaluation of e-learning experimental courses; 4) identification of "guidelines" intended to foster good practices useful to promote knowledge construction through social interaction and 4) dissemination activities (international meeting, web-diffusion, etc.). Principal findings will be presented during the conference.

Keywords: Socrates-Minerva action, European Commission, good practice, guidelines, social dynamics, e-learning.

1. INTRODUCTION

In the last 20 years the development of new technological tools and the increasing need of life-long learning, led to a growing attention on online education , that is e-learning activities. In turn, the interest toward e-learning has given rise to a considerable amount of activities, experiences and research on the application of technology for supporting learning activities - especially applied to higher education. Thus, Open and Distance Learning (ODL) and Information and Communication Technology (ICT) in education have become more and more a field of interest both for scholars and practitioners involved in learning activities ("providers" of education at different level and in different contexts).

Globally, this phenomenon has attracted a rapidly growing amount of research facing up technology-supported learning from different theoretical perspectives (for a review: Larreamendy-Joerns & Leinhardt, 2006; Resta & Laferrière, 2007). Moreover, its multi-facet character made e-learning a trans-disciplinary field of inquiry, including psychology (educational, social and cognitive psychology), learning sciences (pedagogical and didactic sciences, educational technology), computer science (artificial intelligence, agent-based systems), and communication sciences.

The increasing interest and use of online education gives rise to a vast panorama of experiences having in common the use of technologies within learning activities. Now a teacher or tutor aiming at organizing an e-learning course can wonder if all learning experiences using technologies are effective at the same level, i.e., which are the most effective strategies to adopt when planning and realizing e-learning activities, in order to foster knowledge acquisition in learners.

Starting from this emerging interest and demand from the field, applying a sort of "knowledge transfer" approach, the European project **"Social networks and knowledge construction promotion in e-learning contexts"** (http://minerva.ing2.unibo.it) has the main aim to provide ICT-practitioners with good practices and guidelines drawn from empirical research in psychology of education focussing in particular on the idea of social nature of knowledge and abilities developed especially in the Vygotskian tradition. In detail, based on research evidence concerning the complex relationships between social interaction and cognitive activities, we aim at detecting, describing, and suggesting educational practices and technological artefacts which may foster the beneficial effects of social interaction on knowledge construction.

Accordingly to the principles of action-research, the project will be implemented in four subsequent phases, starting from October 2006, up to the end of October 2008: 1) an exploratory study on a sample of noteworthy e-learning experiences (on the European scale); 2) design and delivery of e-learning courses – in academic domains - based on emerging "good practices;" 3) process and outcome evaluation of e-learning experimental courses; 4) identification of "guidelines" intended to foster good practices useful to

promote knowledge construction through social interaction and 4) dissemination activities (international meeting, web-diffusion, etc.).

2. RATIONALE

In the panorama of online education, three major education perspectives has been detected (Larreamendy-Joerns & Leinhardt, 2006): the presentational view, the performance-tutoring view, and the epistemic-engagement view. In the presentational and performance-tutoring views persists the pedagogical model based on single learner interactions with content, by means of the web-based system. In these cases (e.g., those based on accessible and standardized Learning Objects) "obsolete" uni-directional forms of knowledge transmission from the teacher (the expert) to the learner (the novice) are reproduced. Attention is devoted to the designing and delivering of high-quality didactic contents, which should ensure proportionate high-level learning outcomes. Interaction is mostly conceived as the possibility to perform effective exchanges between a learner and a technological environment that is supposed to provide the learner with all the best possible supports.

Educational research over the last 20 years has indicated that learning is a social process, a co-construction of knowledge process, enabling learners to become a member of community of practices through active participation (Lave, 1997). According to Larreamendy-Joerns & Leinhardt (2006), the epistemic-engagement view, based on the socio-costructivist approach and sociocultural theories of learning, relies on social interactions and considers that the learning process takes place in the context of social interaction. In this approach, social interaction (in a three-polar view of the learning process involving students-teacher-content) more than student-content interaction (a bi-polar view), is viewed as the privileged occasion for learning.

In fact there is ample empirical evidence that cognitive processes necessary for deep learning and information retention occur in social interaction and that "collaborative learning" is the "royal road" to knowledge acquisition (e.g. Kreijins et al. 2003). Experimental studies on social influence, argumentation, and reasoning suggest that these advanced cognitive outcomes are more likely to appear when participants are engaged in specific interaction situations (peer-to-peer interaction, minority influence, active cliques in virtual social networks, etc.), whereas other and more diffused social dynamics (teacher-

centred networks, etc.) are more likely to promote superficial information scrutiny and passive reproduction of delivered knowledge.

Summing up, despite the accumulation of research on the effectiveness of collaborative learning, learning and co-construction of knowledge are not an inevitable consequence of allowing students to interact with each other (e.g. Cacciamani & Mazzoni, 2006; Hoadley, 2004; Lehtinen, 2003; Mandl et al. 2006) and just placing students in groups does not guarantee collaboration: social interaction does not take place automatically just because an environment makes it possible from the technological point of view. Thus, although the power of social interaction and of collaborative learning, deeming social interaction as an instructional precept that requires no further explication and that constitutes itself a guarantee of learning is a pitfall to avoid (Kreijins et al. 2003).

Now we could wonder how stimulate social interaction fostering collaborative learning, which actions or practices can be carried out?

3. AIM OF THE PROJECT

The aim of this project is to recognize "good practices" and practical guidelines which may facilitate collaboration and support it in e-learning courses i.e., activities that teachers/tutors may use in order to foster the emergence of social dynamics that allow participants to engage in deep scrutiny of information, divergent thinking, and advancement in knowledge construction.

4. OVERVIEW

In the first phase of the research an exploratory study on a sample of noteworthy e-learning experiences (on the European scale) was conducted. In the second phase we designed and delivered e-learning courses – in academic domains – aiming at applying examples of "good practices". Finally, we identified "guidelines" and practical tips aimed at fostering practices and activities promoting knowledge construction through social interaction.

5. THE EXPLORATORY STUDY

Aiming at identifying which pedagogical and technological tools, activities or strategies are useful to enhance the effectiveness of social interaction in e-learning contexts, we conducted an exploratory study on a sample of noteworthy e-learning experiences on the

European scale. 78 experiences have been collected in several European Countries. The 74.4% have been realized within University courses or within life-long learning experiences.

Several aspects involved in the design of e-learning courses have been examined, in order to identify and to illustrate various examples of activities that teachers/tutors may use, in order to encourage the emergence of social dynamics that may allow participants to engage in the deep scrutiny of information and divergent thinking in order to advance learning.

In particular, the study explored several aspects, which are considered fundamental to the realization of successful e-learning courses based on effective online collaboration (for more details: Matteucci, 2007).

5.1. Questionnaire

A questionnaire has been created *ad hoc* to study some noteworthy e-learning experiences (on the European scale), and for identifying example of practices which may be considered existing "good practices" intended to foster knowledge construction through social interaction. The questionnaire consists of five main dimensions: General data (concerning *structure, procedure, and didactics,* the e-tutor, the course, and the participants), technical aspects (platform and most effective tools, features and technical possibilities to collaborate), organization of the group work and giving feedback and collaborative activities. Each of these dimensions is further subdivided into more specific aspects. In particular, as for the collaborative activities, drawing on the assumption that cognitive processes occur in social interaction (Doise & Mugny, 1984), we explored the design of the learning environment. As for the **cognitive** aspects of collaboration, the questionnaire included items concerning the learners' online discussion, argumentation and different perspectives contemplation, collaborative problem solving and knowledge exchange. As for the **social** aspects of collaboration, the questionnaire asked if dysfunctional phenomena of group work happened during the course (i.e., group conflicts, superficial discussions, dysfunctional competition, ignoring minorities, diffusion/lack of responsibility, and pursuit of personal goal) and the practices used to solve these problems.

5.2. Results

As for the cognitive processes, it became evident that tutors value collaboration very important. It should be noticed that the cognitive aspects of the collaboration processes are rated much more worthy of attention by e-tutors, compared to the social dynamics beyond the collaborative interactions. Therefore, most interventions, which were put into practice in e-learning courses, deal with the promotion of the cognitive functioning of individuals, rather than with the support of effective social interactions.

In particular, online discussion and exchange of knowledge seem to be the most important processes (M=5.19 and M=5.23 respectively) and the former, probably because of its more general character, is also the aspect in which e-tutors intervened most (80.8%). Collaborative problem or case solving is, on the contrary, the least important aspect (M=4.70), although the high variance of the score indicates that a number of e-tutors rate this aspect as much above (or much below) this average score. A possible explanation is that e-tutors who adopted problem-based learning are likely to consider this aspect as very important, while the other respondents consider it less important.

As for the social aspects of the collaboration process, the majority of e-tutors did not intervene, and the main motivation is that intervention was not necessary. Two principal interpretations can be formulated: 1) dysfunctional phenomena in collaboration were either not present or not noticed in several experiences; 2) in other experiences these social phenomena- if present -were not considered as a significant problem for e-tutors. The only aspect, which saw the majority of interventions by e-tutors, was actually the learners' tendency to turn to the e-tutor, in order to ask for content-related information, and to wait for answers, instead of posing questions to their peers. This may be explained with the fact that in these situations, e-tutors are directly involved in the phenomenon, since they have to do something in reply to learners' request/wait.

The most interesting and recurrent methods of intervention used by e-tutors to promote various cognitive and social processes of collaboration are similar, as far as practices are concerned. They consist in the creation of groups, roles/responsibilities assignation, use of rules/scripts, different forms of feedback (also of provocative nature) and various types of activities for learners (e.g. collaborative construction documents, discussions on peers' problem solution, ePortfolio, etc.)..

6. E-LEARNING COURSES AND EMERGING PRACTICAL GUIDELINES

After the exploratory research, in the next step of the project we designed and delivered e-learning courses based on emerging "good practices". Afterwards, the project foreseen to evaluate the processes and the outcomes achieved in the experimental e-learning courses and to identify practical guidelines useful to conceive and realize successful e-learning activities based on effective collaborative activities (following the principles of action-research,).

6.1. E-learning courses

Seven e-learning courses have been realized involving in total more than 440 students. They have been realized in university contexts. The courses intended to promote student construction of knowldge by means of different strategies (see table 1).

Table 1

	Institution	Title	Target group (N)
1	University of Bologna -Fac. of Psychology (I)	"Goal orientation in e-learning courses"	Adult Students (240)
2	University of Bologna -Fac. of Psychology (I)	"New technologies and training"	Adult Students (30)
3	University of Bologna -Fac. of Psychology (I)	"Promoting the quality of argumentation in forum discussions: an experience in a full distance statistics lab"	Adult Students (35)
4	University of Bologna - Depart. Electronics (I)	"Promoting student collaborative work in a software engineering course"	Adult Students (80)
5	University of Neuchâtel Faculty of Humanities (CH)	"Reasoning on data analysis for psychology and educational science"	Adult Students (20)
6	University of Neuchâtel Faculty of Humanities (CH)	Academic competencies on psychology and education (a course to foster studying competences)	Adult Students (87)
7	Ludwig Maximilian University – Fac. of Psychology and Pedagogy (G)	"Cognitive and social activities as well as tutorial support in a virtual seminar"	Adult Students (15)

6.2. Practical guidelines

Following the exploratory study and the e-learning courses we realized, we identified some practical guidelines functional to the practical realization and implementation of e-learning activities which foster knowledge acquisition and effective collaborative activities. As a matter of fact, the teacher/tutor especially influences the design of her/his e-learning course

and the support of the learning processes. Other factors influencing the learning process are input variables like individual or group characteristics. Practical guidelines identified concern the different design possibilities and support methods and the way how specific processes could be supported. In specific, we distinguished guidelines concerning the input, the process and the outcome of the design of the learning environment.

As for the **input,** we identified guidelines about how to design effective learning environments: and particularly, which kind of learning task provide and which didactical design employ. The group composition has been considered as well, in terms of group composition and organization. Guidelines about design principles concern also the role of the computer which is necessary as tool to provide information, to give individual feedback and to allow collaboration, as well as to technically realize collaboration.

As for the **process**, practical guidelines about hot to promote effective cognitive and social activities have been identified. Cognitive activities in collaborative e-learning courses comprise all activities which are related to knowledge or information exchange between the collaborators. The social dimension of the process is concerned as far as, by definition, collaborative e-learning courses imply that participants perform their cognitive activities together with other individuals (i.e., other participants, tutors, and teachers). In specific, we identified strategies and tips about how to foster sharing knowledge and online discussion in group work, to stimulate argumentation and the exchange of different perspectives, to support the organization and planning of group activities, to foster collaborative problem/case solving. As for the social side of the process, we outlined guidelines focused on how to foster constructive confrontations among students and conflict regulation, to promote motivation and to monitor group achievement goals orientation, to organize effective participation among students in group work, how to organize the group in terms of expert guidance and peer-to-peer active collaboration. Teachers' feedbacks have been object of analysis as well and we identified tips about content-specific feedback and feedback on collaboration.

As for the output, we presented a technique for monitoring and analyzing individual and collaborative actions in collaborative e-learning environment : the Social Network Analysis. Finally, we presented some guidelines about the technological issue, particularly about how to choose an e-Learning platform that may support social interaction.

7. CONCLUSION

The main aspire of the project was to promote the development of educational practices, and particularly of Open and Distance Learning, on the basis of innovative experiments and of the principal results of the socio-educational psychology. In particular, we intended to promote understanding among teachers and decision-makers and the public at large of the weight of social interaction in e-learning activities, and to suggest effective design principles. We hope to have attained our main aim by means of the good practices identified in a sample of European e-learning experiences and of the guidelines that we outlined at the end of this two-years work. We consider these findings as a step forward to the attainment of the Council Resolution relating to educational multimedia software, adopted on 6 May 1996, which emphasised that the use and evaluation of ICT in education must lead to an improved approach to meeting teaching and learning needs and introduce new methods which take full account of the evolution of the role of the teacher, give pupils and students a more active and participatory role, personalise learning, encourage a cross-curricular approach and foster collaboration and multidisciplinarity.

8. THANKS and DISCLAIMER

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