Chapter 1
LOLA: A Collaborative Learning Approach Using Concept Maps

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ABSTRACT
The Online Learning Laboratory, LOLA, is a collaborative learning methodology for classroom-based and distance learning that was defended in a PhD thesis and used in several subsequent research studies. In this chapter the author describes the first results of a case study undertaken with students on a postgraduate course in education. A further activity (the construction of a concept map) was added to the six activities in LOLA, and its inclusion was the object of this study. The methodological approach used in this research was a case study with an exploratory objective. To answer the questions raised in the study, a new review of the literature related to the following subjects was carried out: restructuring, implementing and following up the online learning laboratory methodology using concept maps; drawing up and applying a questionnaire; and analysis and discussion of the data obtained. A non-probabilistic convenience sample was used. Their analysis and preliminary considerations focus on the data gathered from the students.

INTRODUCTION
At the same time as the virtualization of teaching represents a challenge for education in the 21st century, the use of Virtual Learning Environments, whether to support classroom-based teaching or develop distance-learning courses, also represents a possible response to the need for continuing teacher education.

For Siqueira (2005, p. 190) “the Internet is not a passing fashion, fad or craze, as some of its more radical critics believe. It has come to stay. And it is evolving at incredible speed.” While the Internet and virtualization of teaching are an established fact, it should be borne in mind that the mere use of information and communication technologies in the teaching-learning process does not in itself guarantee a quality process. In this scenario, a need therefore arises to seek new educational models that
are able to meet the demands of the educational community.

This need led to the development of the Collaborative Learning methodology known as the Online Learning Laboratory (LOLA), the aim of which is to ensure that the subject develops an independent, critical attitude to the production of knowledge. This concept was developed in a doctoral thesis in 2002, and in the six years since then it has been used in various postgraduate classes in education and applied in a number of later research studies. As with any innovation in the field of learning, particularly in the context of virtual education, the processes involved need to be constantly reevaluated to ensure the quality of the training itself. In the case of LOLA, this was no different. In each class, experiences are reconstructed and suggestions from students and teachers are added, as there is still much to be done to develop a pedagogical approach that meets the needs of this new model of virtual education based on collective knowledge construction.

In this paper we describe research undertaken with master and doctoral students in the PUCPR Postgraduate Program, in which a further activity (the construction of a concept map) was added to the six activities in LOLA. The inclusion of this new activity was monitored and evaluated and resulted in a new study, which is described in this paper.

COLLABORATIVE LEARNING IN A VIRTUAL LEARNING ENVIRONMENT

Cooperative and collaborative approaches are frequently confused both in terms of what they mean and the concepts involved. This failure to distinguish between them may be due to the similarity between some of the principles that characterize them. Both approaches are based on active learning involving the sharing of experiences between the actors in the teaching-learning process; the combining of individual and social skills to produce knowledge; the taking of responsibility for one’s own learning and for that of others; and respect for the diversity and heterogeneous nature of the members of the group (Matthews, Cooper, & Hawkes, 2004).

In spite of this and other similarities, there are fundamental differences between the two approaches. They differ in terms of the role, authority and degree of intervention of the teacher; the hierarchicalization of the teaching-learning process; the construction and assimilation of knowledge; the way in which the groups are organized; and individual and group responsibility for the activities (Matthews, Cooper, & Hawkes, 2004).

The idea of cooperation in the teaching-learning process is known to date back to classical antiquity, but it is only in modern times that it has come to acquire greater importance. Under the aegis of the Newtonian-Cartesian paradigm, cooperation has lent itself since the 18th and 19th centuries to professional education and the preparation of students for life in society. Because it leads to more structured, controlled activities through a more hierarchical process, cooperation has very often been used as a technique for group work.

In the beginning of the 20th century, with the emergence of the movement known as the New School, the concept of cooperation gained strength. Various educators in this movement, such as Profit, Freinet, Cousinet and Ferrière, started to include cooperative activities in their methods. Particularly worthy of note is the work carried out with cooperative groups by Dewey, who proposed that citizenship and democracy should be exercised by means of work in groups and interaction with fellow students.

As early as the first half of the 20th century, some researchers, such as Koffka, Lewin, Deutsch, Piaget and Vygotsky, were introducing ideas related to cooperation and collaboration into their theories. Later, Suchman and Bruner carried out research into inquiry learning, and Skinner investigated programmed learning and behavior modification, corroborating the discussions about
cooperation, collaboration and competition. It is also worth mentioning the pioneering:

Johnson brothers (David and Roger), of the University of Minnesota, and Robert Slavin, of John Hopkins University. Others who can also be considered pioneers are Elliot Aronson (University of California, Stanford), Spencer Kagan (University of California, Riverside), Noreen Webb (University of California, Los Angeles) and Sholomo Sharan (University of Tel-Aviv, Israel). (Freitas & Freitas 2002, p.13)

More recently, with the ever-more intensive use of information and communication technologies in education, the characteristics associated with the hierarchicalization of the teaching-learning process and the style and degree of intervention of the teacher in cooperative learning have proved to be less well suited to an approach in line with the paradigm of complexity. Indeed, these resources favor nonlinear, interactive communication, which ends up significantly changing the acquisition and appropriation of knowledge.

Thus, it seems quite clear to us that the choice of a collaborative learning approach is much better suited to exploration of the range of possibilities offered by online education.

Collaborative learning is a model for the Internet, which promotes interactivity and collaboration between peers and the exchange of information between individuals in a group (Cord, 2001, p.1). Interactivity is one of the most important characteristics of communication and one of the determining factors in learning (Henri, 2002, p.3).

LOLA: A COLLABORATIVE LEARNING SPACE USING CONCEPT MAPS

The purpose of the Online Laboratory is to promote learning in a collaborative framework using planned and interactive activities. The activities in LOLA, whether individual or group ones, are aimed at encouraging knowledge construction. It is during the process of managing the activities in LOLA that the groups organize themselves and prepare a work plan that is defined and negotiated collectively.

The aim in the Online Laboratory is to provide an environment characterized by an active and interactive collaborative methodology, which is ensured through the use of technologies that allow online communication. Silva & Santos (2007, p.28-29) pointed out that to construct an interactive approach, it is necessary to allow multiple experiments and expressions; to provide an assembly of network connections to allow multiple occurrences; to provoke situations that generate creative restlessness; to engineer hypertext routes; and to mobilize the experience of knowledge.

The Online Learning Laboratory, LOLA, is implemented by developing the seven fundamental activities it embraces: discussing texts chosen by the teacher; inserting links and proposing connections with systematized knowledge; questioning existing knowledge; replying to questions that have been drawn up; preparing concept maps; producing new knowledge; and evaluating the procedures that were used.

The seven activities were carried out in the classroom or in the EUREKA virtual learning environment. According to Silva (2003, p.62), “the virtual environment is the online classroom.”

LOLA SUPPLEMENTED WITH CONCEPT MAPS: SOME CONSIDERATIONS ABOUT THE EXPERIENCE GAINED

The seven activities in LOLA are developed in a classroom or virtual learning environment to achieve the theoretical and practical aims of a critical, creative and reflexive education. The activities are as follows:
1. The first LOLA activity, Commented Reading, involves reading material related to the theoretical basis for the subject proposed by the teacher. Each group or student is responsible for reading a text introduced by the teacher and, after discussing it using the chat tool, must prepare a commentary on it using the chat (synchronous) and/or forum (asynchronous) tools to write it. Once the comments on the text that was read have been prepared, it must be published and can be the subject of new comments by other teams. During this collective process of critical analysis of the contents of the text, the students are practicing the management of heterogeneity.

2. In the second exercise, Inserting Links, the students must carry out the bibliographical research, or research into the “state of the art” of important topics related to the subject matter. Any additional information obtained must be made available to all the students so that they have a range of views on the same subject. By delegating the act of looking for texts on the Internet and publishing them with comments, the student has to select course content and becomes responsible for his/her own learning. Torres (2007, p.14) emphasizes that material chosen by students for teachers and students is just as useful as that chosen by teachers. Teachers and students thus establish a true partnership that
LOLA helps them to play a collaborative, active and primarily reflective role in the process of knowledge acquisition and production. The links to content matter chosen by students for students were published using the EUREKA tool known as Links along with comments made after a critical reading (Figure 1). When students accessed their fellow students’ texts they were expected to publish new comments in the virtual environment.

3. The third exercise is that of Questioning existing knowledge and is fundamental to LOLA. It aims to develop the skills of questioning knowledge. Working at times individually (QuestInd) and at times in small groups (QuestGru), the objective is for the students themselves to prepare questions on the text they have read. For Torres (2007, p. 15) the teacher’s role is to provide guidance. He or she must encourage the students to go beyond formulating questions that are merely factual or conceptual and encourage them to try to develop more complex questions related to interpretation, comparison of uses, analyses, syntheses and evaluations. The activities of questioning existing knowledge and answering questions were carried out with the Forum tool in the VLE (Figure 2).

4. The fourth exercise is that of answering the questions that were drawn up. In this activity the students must answer questions prepared...
by their peers. By working individually (RespInd), the students establish their own criteria both for choosing the question and for the content and length of their answer. However, when the questions are answered in groups (RespGru), agreement about the possible choices must be negotiated and the social skills required when working together must be developed.

5. The fifth exercise is that of preparing concept maps using texts recommended by the teacher or by the students as the starting point. According to Molina, Ontoria, and Gómez (2006, p. 108) “A concept map is a schematic resource for presenting a set of conceptual meanings included in a structure of propositions. Concept maps provide a schematic summary of what has been learnt, arranged hierarchically”. The preparation of the comments in the first two activities, Commented Reading and Inserting Links, prepares the students for the activity Preparing a Collective Text. After carrying out the first five activities, the students have to prepare a concept map that is a synthesis of the texts the team has worked on (synthesis here is understood to mean not merely a summary of someone else’s ideas but rather the students’ own individual and singular productions), thus making them work as authors in the production of knowledge, as “a map represents the knowledge of the person who created it at a particular time” (Marriott & Torres, 2006, p.

Figure 3. Concept maps produced by student Raquel
6. The sixth exercise is that of producing new knowledge. The first stage of the exercise consists of the dialog between all the group members to choose the subject about which they will produce an article. During the second stage, the students start the actual production of the text. Each member writes their own contributions, which are forwarded to other members, who in turn complete them and refute or add ideas. It is in this interactive process of producing the text, when the dialog between all those involved allows them to reciprocally modify it, that knowledge is produced. The texts that were created during the activity involving production of new knowledge were also sent to the other participants by email and published in the portfolios in the Content tool (Figure 5). For Leite and Fernandes (2002, p. 60), a portfolio is a pedagogical procedure whose aim is to encourage active learning and promote the development of cognitive, social and affective competencies. According to the same authors, a portfolio makes students aware of their responsibility for their own or their peers’ learning process.

7. The seventh exercise is that of evaluating the procedures used. The cycle of activities finishes with an evaluation by the students themselves of their performance. Armed with the portfolios, the students discuss

Figure 4. Concept maps produced by student Marcus
issues such as the questioning of existing knowledge, the answers that were drawn up, the connections to existing knowledge proposed, the production of the collective text and even the students’ ability to evaluate these very activities.

It should be noted that all the LOLA activities, including those that were carried out in the classroom, were published in the EUREKA environment at the Pontifical Catholic University of Paraná, enabling a virtual portfolio with all the individual and group work by the students to be created. EUREKA is a web-based environment that allows collaborative activities to be developed.

In this environment communications for the whole group were sent using the info tool (Figure 6), and e-mail is used for communication between individuals.

**SOME BRIEF CONSIDERATIONS ON THIS STUDY**

Having given a brief bibliographic review of the subject of this study and a short description of the activities in the online learning laboratory, we now present a number of considerations about LOLA that are the fruit of one of many studies undertaken to improve this methodology for classroom-based and distance education.
This study was carried out with students on the Masters and PhD courses in Education at the Pontifical Catholic University of Paraná. Most of these students are teachers who work in primary or secondary education or lecturers in higher education. Thus, the data that were collected relate to a homogeneous population made up of the students in the group under observation.

We used the methodology known as Descriptive Research, as according to Knupfer this combines elements of quantitative and qualitative research and in some cases also includes ethnographic aspects. In this method nothing is inferred, but everything that is happening is described accurately. Knupfer also states that this methodology has gained recognition and acceptance in studies in the area of educational technologies (in Gomes, 2003, p.258).

It was also defined that this research would make use of a type of descriptive study known as a case study, as according to Lüdke & André (1986, p.17) this helps focus the investigation on “what is unique about it or particular to it, even if it subsequently becomes clear that there are certain similarities with other cases or situations”.

Gil (2002, p.54) points out that the results of a case study are very often “presented in open form, i.e., as hypotheses rather than conclusions”, allowing the process to be more flexible and any corrections that are needed for new investigations to be made.
The data were collected by means of a questionnaire distributed to all the students, who responded voluntarily. The qualitative analysis was based on the students’ experience as teachers and relevant data and observations to complement and provide greater depth to the interpretation of the data from the questionnaires.

Based on the data gathered at various stages during the study, the preliminary conclusions described below can be drawn.

**FUTURE TRENDS**

The experience gained from the use of concept maps in the online learning laboratory is highly significant and well suited to the educational demands of a new technology-based, globalized society. It undoubtedly represents another step forward in the development of educational approaches based on innovative teaching-learning concepts supported by the use of new information and communication technologies. The author therefore suggests that this research be continued to improve this model so that it may be used in other levels and forms of education.

**SOME PRELIMINARY CONCLUSIONS**

The use of virtual learning environments and the Internet as tools in the teaching-learning process is a recent experience that is still in the process of being discovered. In consequence, suitable methodologies for these new educational environments need to be developed. Recent studies indicate that many researchers recognize that interaction, whether it be in the form of collaborative or cooperative methodologies, or a combination of both, is an essential element. It is through interaction that one can combat a sense of isolation, maximize learning and develop aspects such as responsibility and independence. It is also through interaction that students can be prepared for better educational and social performance and for the work of researching, analyzing, negotiating and writing and the very production of knowledge.

In LOLA the seven activities proposed promoted student involvement in the collaborative methodology used in the subjects. This involvement meant that in addition to producing knowledge, the students sought to face their discomfort in challenging interactive situations and develop personal and social relationship skills. It was also observed that the fact that students had to behave as researchers, the need for them to change roles, the changing from individual work to work in small groups, the constant preparation of questions and comments, and the self-assessment in relation to the whole process meant, according to the students, that they matured in terms of their teaching-learning process. In addition, and still from the perspective of the students, the work in LOLA led to most of them adopting a more proactive, responsible and independent attitude.

With regard to the addition of the activity involving the building of concept maps, most of the students felt that the use of this technique helped to understand the texts chosen by the teacher and peers, to organize ideas and thoughts, to structure reasoning, to produce new knowledge, to reflect on subjects, to systematize concepts and to organize the study.

It is worth noting that new procedures open doors to a new era of methodologies and challenges for the teaching-learning process supported by the new technologies. In an age when information is at everybody’s finger tips, it is important to know how to look for, evaluate, discuss and produce this information.

**REFERENCES**


**KEY TERMS AND DEFINITIONS**

**Collective Knowledge Construction:** Knowledge constructed collectively by students engaged in collaborative or cooperative activities.

**Collaborative Learning:** Collaborative learning is a student-centered methodology for learning. By working in groups, students’ knowledge is constructed by their participation and interaction. This is achieved by becoming involved in activities aimed toward a common goal. It solidifies socialization not only “by” learning but also “in” learning.

**Eureka:** PUCPR’s collaborative virtual learning environment developed since 1995 in partnership with Siemens. In 1999 it became fully functional and started being used by the university as a support for its online education. It now has more than 30,000 students in its nearly 8,000 classes.

**Interaction:** The process that emerges from the participation of all learners that interact among themselves by means of information, points of view, queries, and ideas that occur in a learning environment.
Interactivity: Process that emerges from the participation of all learners that interact among themselves by an active dialogue, a constant exchange of information, points of view, queries, and ideas that occur in a learning environment.

LOLA: Online Learning Laboratory, LOLA, is a collaborative learning methodology for classroom-based and distance learning that was defended in a PhD thesis and used in several subsequent research studies.