Open Source Collaborative eLearning

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Abstract

Open source collaborative eLearning draws on a constructivist perspective with learners actively engaged in exchanging ideas, negotiating meanings and creating knowledge resources that are freely and openly shared. Collaborative eLearning is valuable in transnational university partnerships where faculty, students and programs benefit mutually from diverse perspectives. This investigation of a teaching and research partnership, with a United States and a Central American university, involved faculty in reviewing curricula, collaborative teaching and engaging students in collaborative knowledge construction. Surveys and interviews with 52 participants over two semesters revealed significantly higher ratings after refining strategies and adopting a six-event Collaborative Knowledge Construction model. Results support an "Any Place Same Time" approach and the continued growth of transnational partnerships to advance open source eLearning.

Key Words: open source, transnational, constructivist, collaboration, eLearning.

1. Introduction: Reflections on Open Source Collaborative eLearning and Transnational Education

Our research and development efforts are designed to establish meaningful and sustainable transnational collaborations between faculty, students and academic programs across universities and ultimately K-12 schools. These mutually beneficial collaborations involve the sharing of ideas and resources concerning coursework, curricula, academic programs and co-teaching activities. We use the term open source collaborative eLearning in the broad sense where open source refers to all knowledge resources that are jointly constructed and openly shared. This definition is similar to Thomas Friedman's [1] broad interpretation of open sourcing as a key factor that is leveling global societies and economies.

Computer science professionals associated with the open source software movement [2], often use the term open source in a more focused reference to software licensing agreements that allow the general public access to software code under relaxed or non-existent copyright restrictions. Certainly many of the policies and ideas that are now incorporated in open source knowledge resources were derived from the open source software movement. This migration of open source ideas is exemplified in the way that leaders in open source software, including MIT, are now offering open courseware that covers topics on engineering, health sciences, the humanities and arts. The addition of open source expands perspectives on transnational collaborative eLearning. It is not only that people from different parts of the world are collaborating for a time to build knowledge resources. Open source adds the perspective of a continuous community effort to address and openly share ideas and solutions on important problems.

Our interpretation of transnational open source eLearning begins with the premise that partnerships between institutions will be mutually beneficial where faculty, students and prog rams contribute significantly in advancing learning environments. This differs considerably from descriptions of "off shore" transnational education [3] where sending institutions are located in a country different from where the receiving institutions' learners are based. We prefer the literal interpretation of transnational education as "education that transcends national boundaries" without the diminishing stipulation that there are unique sending and receiving institutions. This interpretation involves faculty, students and institutions growing together in mutually beneficial learning environments that support sustainable constructivist pedagogy.

2. Open Source Collaborative Teaching

This investigation of an international university partnership highlights some of the strategies that we used to enrich our courses and academic programs at the University of Costa Rica (UCR) and the University of Kansas (KU). Every university partnership will be unique and the overall goals may differ. Our pilot development involved, three one-on-one faculty partnerships covering courses in Educational Technology, Language Analysis, and Second Language Acquisition at both universities. We focus this investigation on the Educational Technology partnership that reviewed curricula, syllabi, instructional strategies, technology resources, and facilities to assess how we could combine our strength to improve the quality of our courses and academic programs. We drew on previous experience in designing interfaces and systems for eLearning content [4, 5], faculty professional development [6] and using technology to enrich language learning in rural urban K-12 schools [7]. We also benefited from a rich heritage of experiences between UCR and KU including a 50-year formal partnership in international studies.

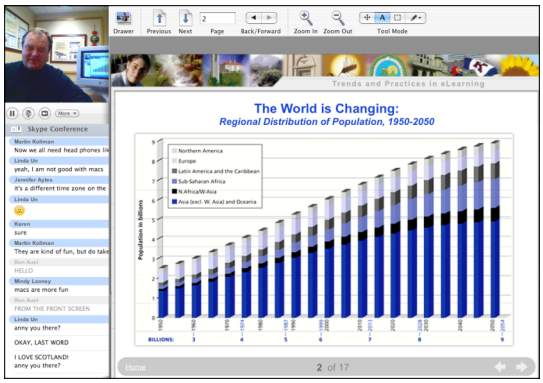
The University of Costa Rica is the largest university in Costa Rica with many established ties to businesses, industry, and K-12 schools. UCR founded the first

Teaching English as a Second Language (TESL) program in Central America. This offers KU's faculty and student a unique perspective of current trends and strategies for implementing successful and sustainable programs in Latin America. Ranking in the top 20 Schools of Education in the United States, KU's School of Education has many outstanding educational technology initiatives, academic programs, and 25 years of experience in preparing TESL doctorates worldwide. International partnership between other universities will likely offer different, but no less significant, opportunities for expanding diversity and growth in research and academic programs.

After analyzing course syllabi and teaching strategies, the faculty partners determined the topics that they would teach. The primary instructor at the host institution taught most of the classes and the "guest" instructor taught at least one live and one online session at the host. This method capitalized on the understandings and experiences of each faculty member to enrich the instructional quality in both courses. For example, the faculty partner at UCR is experienced in working with diverse students in integrating technology in language learning. This topic fit well in the Integrating Educational Technology class taught at KU. The faculty partner at KU had experience in designing user interfaces with online glosses, a topic that fits well within the Technological Resources for Language Learning course taught at UCR.

Faculty posted their presentations in advance so that students could download the materials before the presentations. We sought to develop an affordable strategy that employed standard audio equipment, video cameras, free teleconferencing software (Skype) and a readily accessible (PDF) format for presentation. The presentations typically lasted about 40 minutes with 15 minutes for questions. As our experience increased we began to add pre and post activities to augment the sessions where students were asked to review notes, locate materials in advance, and provide follow-up reports. Figure 1 shows the layout for the online presentations. In this case, students could see the instructor in the upper left corner with the chat board directly below and the presentation as a PDF on the right side of the display screen.

Figure 1: Online Collaborative Teaching

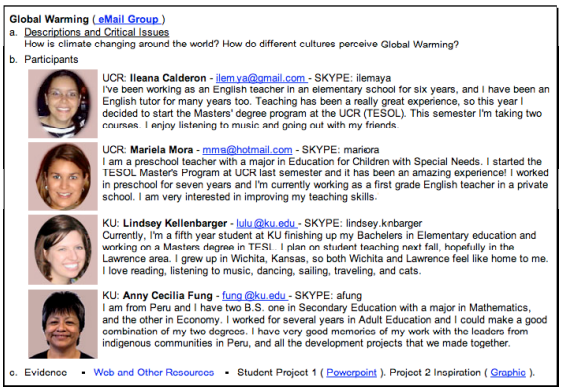


3. Collaborative Knowledge Construction

Janet Salmons [8] defined collaborative eLearning as, "constructing knowledge, negotiating meanings, and/or solving problems through mutual engagement of two or more learners in a coordinated effort using Internet and electronic communications." Salmons described the levels of engagement in collaborative eLearning as: dialogue, peer review, parallel review, sequential collaboration, and synergistic collaboration. Stahl [9] noted that successful cooperative behaviour requires trust-building activities, joint planning, and team support. Duffy and Cunningham [10] also note that the primary outcome of collaborative knowledge construction is the dialogs and reflexivity among learners.

In addition to sharing teaching presentations we also sought to engage students in activities where they collaborate to construct new knowledge. Drawing on the philosophies of Piaget [11], Papert [12], Bruner [13], and Vgotsky [13], this constructivist approach assumes that the most meaningful learning occurs when learners are actively involved in mentally constructing new information. Rather than the direct one-way "pouring in" of knowledge that often characterizes traditional instruction, constructivist's pedagogy focuses on the importance of peer relationships, the context, the learning environment and learners' beliefs.

Figure 2:Knowledge Construction Teams



With these constructivist principles in mind, we developed instructional strategies for piloting the Collaborative Knowledge Construction activity in the summer semester. We planned to form teams of 3 to 7 students with approximately equal representation from each institution and use an approach advocated by Hitz [14], to engage learners in team projects where they construct artifacts that demonstrate their new knowledge and skills. Our classes did not meet at the same time so the communication among the international team members was organized through the knowledge construction team web site shown in Figure 2 and relied heavily on asynchronous email and threaded discussions. We did have synchronous Skype teleconferences with the two classes where the faculty met and discussed the project status. We also instructed the students in the use

of Skype and encouraged them to arrange live teleconferences with their group on their own time. Our first task was to assist student in selecting the topics with international implications that would be interesting and meaningful to students and relevant for our courses.

During the initial course and program review we noted that both the KU and UCR educational technology courses engaged students in building resources that focused in part on one of the six National Educational Technology Standards (NETS) to advanced students' social awareness and encouraged them to "apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities." Aside from being relevant to critical aspects of both courses, we saw these "social awareness" activities as a means to begin the process of establishing a more open source approach to building knowledge resource on topics that are of interest and importance to transnational audiences. Furman and Negi [15] observed that social work educators must begin to help students become more comfortable with transnational exchanges. When forming teams to engage in open source collaborative eLearning, some examples of topics that students investigated include: Bilingualism, Healthy Diets, Ageing Populations, Immigration, Worldwide Adoption of e-Communities and e-Books, Global Warming, Reef Pollution, Rainforest Destruction, and the Central American Free Trade Agreement (CAFTA).

The review of literature and planning for the pilot projects raised several questions regarding these transnational collaborative activities. How do online teaching presentations compare to traditional face-to-face communications? Did the eLearning technologies support adequate faculty-students and student-student interactions? Are the topics and course content deemed important and relevant? Did the activities advance understanding of culture and language? How can we best design the collaborative knowledge construction activities to maximize cooperation and engagement of all team members? Do attitudes and benefits from collaborative eLearning differ across gender, institutions, ages or experience with online courses? With these questions in mind we framed the following research with the understanding that we would use lessons in the pilot phase to revise and extend the subsequent collaborative partnerships.

4. Method

Participants: The investigation involved two faculty and 52 student participants, 22 from UCR and 29 from KU who ranged in age from 22 to 58 years with a mean age of 27. Data collection took place during the Summer (N=24) and Fall (N=27) with 16 male and 36 female participants. The multicultural nature of participants included natives from Brazil, Canada, China, Columbia, Costa Rica, Panama, Peru, Puerto Rico, Saudia Arabia, South Korea, Taiwan, Tunisia, Turkey and at least 9 of the United States.

Survey Instrument: We designed an online survey on international collaborative eLearning using a 5 point likert scale (1=strongly agree, 3=neutral and 5=strongly disagree) with items regarding the technical clarity and relevance of presentations, comparisons to traditional face-to-face presentations and the success of interactions among the instructors and other team members in the collaborative knowledge construction activities. The survey collects information on Age, Gender, Online Course Experience, Academic Major and Institutional Affiliation. The survey also included open-ended questions including: "How does this online collaboration activity compare to a traditional face-to-face educational collaboration. How is it better? How is it worse? What are the advantages and/or disadvantages of international collaborations?

Procedures: Although the faculty partners had previous experience in the collaborative co-teaching, the collaborative knowledge construction was a new activity that we first piloted in the spring semester. Both of our courses were held in lab environments, and we conducted site visits midway during the semester to meet with faculty, plan activities and review technical configurations. We administered the survey at the end of the Summer and Fall semesters using the online SurveyMonkey system.

5. Results

Survey Results:

We compiled descriptive and analytical statistics using SPSS from the survey data. After reviewing the survey results from the summer (N=24) semester and the responses to the open ended items we made several adjustments to our courses and strategies and administered the survey at the end of the fall semester (N=27). Table one shows the results on items from the survey on collaborative eLearning. Means for the summer semester class were near "neutral" (M=2.9). The fall semester means (M=1.9) were clearly lower indicating, "agree" to "strongly agree." The significantly lower values for the fall semester indicate that the participants agreed more strongly with the positively worded items.

The results showed that older students rated many aspects of the collaborative eLearning activities higher than the younger student in the course. With Pearson correlations on 47 subjects (some missing age data) we found that the item "…covered important content" was negatively correlated with age (-.326, p=.029). In other words, older participants agreed more with these positively worded items. We also found significant negative correlations with age and items: "had an international flavor" (-.336, p=.024), "helped me to learn important ideas" (-.412, p=.005), "was as good as a face-to-face presentation" (-.328, p=.028), and "made me want to learn more about the speaker's culture" (-.352, p=.018).

Table 1. Collaborative eLearning Across Semesters

	Sum	*Fall*	*Sum*	*Fall*	*F*	*Sig.*
1	M=2.2	M=1.6	SD=.82	SD=.84	5.948	P=.018*
2	M=3.5	M=1.8	SD=.93	SD=.75	49.41	P=.000**
3	M=2.3	M=1.7	SD=.99	SD=.81	4.064	P=.049*
4	M=2.4	M=1.5	SD=.75	SD=.64	9.004	P=.004**
5	M=2.7	M=1.8	SD=.81	SD=.85	16.33	P=.000**
6	M=3.0	M=2.2	SD=.91	SD=.97	7.33	P=.009**
7	M=3.3	M=1.9	SD=1.2	SD=1.0	18.83	P=.000**
8	M=3.3	M=2.7	SD=1.1	SD=1.3	2.56	P=.116
9	M=3.3	M=2.1	SD=1.3	SD=1.0	12.50	P=.001**
10	M=3.0	M=2.0	SD=1.2	SD=.98	11.14	P=.002**
11	M=2.4	M=2.0	SD=1.1	SD=1.1	1.016	P=.318
	M=2.9	*M=1.9*	SD=1.0	SD=.93		

Survey items were rated on a 5 point Likert scale (1= strongly agree, 3= neutral, 5= strongly disagree)
**P<.05, **P<.01; Summer N=24; Fall N=27; F(1,50)*

Survey Items (abbreviated)

1. *was easy to see.*
2. *was easy to hear.*
3. *covered important content.*
4. *had an international flavor.*
5. *helped me learn important ideas.*
6. *made it easy to ask questions.*
7. *was as good as a face-to-face.*
8. *learned about another language.*
9. *was easy to interact with the instructor.*
10. *was easy to interact with other students.*
11. *I learned more about other cultures.*

Comparisons across institutions revealed a significant difference for only one survey item with the 22 UCR participants rating the collaborative eLearning presentations somewhat "easier to see" (M=1.6) than the 29 KU participants (M=2.1) (F 1, 50= 5.590; p=.022). The ANOVA analysis did not reveal significant difference on the survey items for the factors of gender, online course experience or academic major.

The open-ended comments from the summer semester generally began with positive comments about the value of collaborating with individuals from a different nation. For example, one participant listed advantages of "intercultural communication, language practice, losing fear about interpersonal relationships, opportunity to challenge our knowledge and compare it with other university students." Another participant for the summer session described that they, "learned about important ideas in another culture; learned about their technology; how they learned and what they were learning." The disadvantages listed by the summer participants centered on problems in communicating with their partners (37 references). These communication comments related to technical difficulty in hearing or seeing their partners and especially to scheduling difficulties. One participant explained that, "class meeting times can not match up … and communication was primarily through email." Another participant explained, "There are moments when ambiguity could affect the normal communication process, since it is impossible to take into account face gestures." Several comments asked to, "Have the class times overlap more to allow for more communication with other students."

Comments from the fall semester were more positive. When asked to compare this online collaboration project to a face-to-face collaboration, one participant explained, "It is better because we share information from other countries and learn from each other, and this interaction is not always possible." Another commented, "It is better in the sense that it is a very good example of how technology can be used effectively in a multicultural learning," and "it is a perfect way to put into practice everything you have learned about a language, cultural, personal and academic aspects."

While the fall semester comments include few references to technical problems, again there were many references to scheduling challenges. Despite the fact that there was some overlap time, one participant mentioned, "we can not agree on a date/time to chat online because of studies, work, time, and Internet access." Another participant explained, "sometimes it is hard to agree on a time and day to work together… maybe the students can have a designated time to communicate."

5. Conclusion and Recommendations

The insights drawn from the summer investigation guided our development of the collaborative knowledge construction model that we used in the fall (Figure 3). The educational events are scaffolded to establish confidence, develop requisite technical skills, and build trust, communication and teamwork in collaborative knowledge construction. Because team members did not always share the same schedule or place we clearly defined the educational events in terms of expected outcomes. This allows for checkpoints for each event so that all class members could understand and learn from each other. We used a team planning web site (Figure 2) with a description of the team's topic, member photos, brief biographies, email and Skype addresses as well as ranked list of information sources and the final knowledge resources. We used teleconferencing (Skype) to present and confirm outcomes at each event across universities.

Table 2. Collaborative Knowledge Construction Model

	Educational Events and Outcomes
1	**Select Topics** *List of topics and draft description(s).*
2	**Form Teams** *Team member's bios, photos, & addresses.*
3	**Define Goals and Evaluation** *List goals and evaluation rubrics.*
4	**Identify and Rank Information Sources.** *Post top 10 web or other information sources.*
5	**Prototype and Revise Resource(s)** *Web, Wiki, Concept Maps, PowerPoint …*
6	**Demonstrate & Celebrate Accomplishments** *Present and Post Knowledge Resource(s)*

During the initial teleconference for the knowledge construction activity, the students 1) select and describe a list of possible topics. Next, they teleconference to 2) form teams and exchanged biographical and other information. After working together as a team, they present their 3) goals and the evaluation rubrics that they will use to assess the success of their final knowledge resource(s). The next step asked team members to 4) identify and rank the information resources in a top 10 list for their topic. During the early pilot trials, we asked students to post an unranked list of web resources. We added the requirement to rank the list in order to develop communication and teamwork early on using an apparently low stakes task that became more demanding than we first anticipated. Imagine that your team has decided to investigate the impact of global warming. You Google "global warming" and after receiving 29 million matches, you must determine which web site is most important. Your teammates in another country are also wading through millions of matches and you must agree on which is the first, second and third most important web site. What began as a simple listing of web sites became a significant research and team building activity.

Following principals of rapid prototyping, team members 5) prototype review and revise the knowledge resources which might include web sites, wikis, concept maps with inspiration, graphical diagrams, or PowerPoint slides that represent the collective knowledge of the team. The teams present their prototypes in a teleconference to peers from both universities who are encouraged to provide constructive reviews, alternative viewpoints, and the ability to reflect and improve on their own learning.

The culminating outcome is to 6) post and present one or more mediated knowledge resources. This event has three stages: preparation, presentation, and questioning. In the preparation stage, items are posted at least 2 days in advance of the presentation. These presentations can become highly motivating when guests are invited. One of the more rewarding surprises was when two students from Costa Rica became so engaged in their final project work that they decided to personally finance a trip to Kansas, in the cold of November, so that they could meet with their team members and present their final projects in person.

We did not initially anticipate that older students would post higher ratings for several items, including "had international flavor, want to learn more about culture, and was as good as a face-to-face presentation." than the younger "digital native" students. This might be because the non-resident foreign students are somewhat older and they highly value transnational exchanges. It might also be because the mean age for the improved design fall semester (M=29.8) was higher than the spring (M=24.8). These findings suggest that collaborative transnational exchanges will be appreciated by learners of many ages.

Many eLearning advocates [16] tout "Any Time /Any Place" advantages of eLearning. Transnational collaborative eLearning requires that learning participants be in different places. As Robin Mason, [17] explains, "the strongest arguments (for eLearning) relate to the benefits of a global student body… including: working with students from many different countries, shared expertise, access extended to educationally disadvantaged and multi-cultural course content." On the other hand, results from this investigation do not support the notion that asynchronous "Any Time" eLearning is as effective as synchronous eLearning. Humans are social. They like to meet. There is a give-and-take quality to synchronous communication that enhances immediacy [18] and fosters more absorbing, more rewarding, more now learning. Thus, we advocate an "Any Place Same Time" model for collaborative eLearning.

This jointly-sponsored teaching and research partnership serve as a model for collaboration that engage researchers in worthwhile activities and tangible deliverables including joint teaching, curricula, course improvements and co-authoring of research that neither side might accomplish on their own. These initiatives also foster a greater appreciation for diversity among faculty and students. Moreover, each unique transnational partnership will increase capacity for open source collaborative eLearning.

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