DEVELOPING ELECTRONIC PORTFOLIOS IN A COMPUTER SUPPORTED COLLABORATIVE LEARNING ENVIRONMENT: A CASE STUDY WITH PRE-SERVICE ELT TEACHERS

Hamdi Erkunt, Gülcan Erçetin, Senem Yıldız. Boğaziçi Üniveristy.
Hamdi.erkunt@boun.edu.tr, gulcan.ercetin@boun.edu.tr, senem.yildiz@boun.edu.tr

Forty seven college level senior pre-service EFL teachers enrolled in an ELT materials development course were randomly divided into two groups of 23 and 24 respectively. Using Knowledge Forum, both groups worked on three problems of understanding regarding development of ELT course materials for a semester. At the end of the 12 week semester, the participants were asked to prepare electronic portfolios containing their selection of best student contributions to the Forum. Although both groups used Knowledge Forum to develop their electronic portfolios, only one was provided with a set of knowledge building principles for guiding their selection and explanation of contributions. Portfolios were scored for explanation and evidence of knowledge building. Moreover, both groups were given a paper based essay in order to assess their conceptual understanding of the problems they worked on. The essays were evaluated for conceptual understanding. The results indicated that the groups differed significantly in their portfolio scores, but not in their conceptual understanding scores. In other words, providing the students with principles in their selection of portfolio entries had an impact on the quality of portfolios.

Keywords: knowledge building, electronic portfolio, collaboration, conceptual understanding

BİLGİSAYAR DESTEKLİ ÖĞRENME İŞBİRLİĞİ ORTAMINDA ELEKTRONİK PORTFÖY HAZIRLAMA: İNGİLİZCE ÖĞRETMENİ ADAYLARIYLA YAPILMIŞ BİR VAKA ÇALIŞMASI

Eğitim fakültesi son sınıf öğrencisi ve İngilizce öğretiminde ders malzemesi geliştirme dersi alan kırk yedi İngilizce öğretmeni adayı 23 ve 24 kişilik gruplara rasgele böldük. Bilgi Meydanı (Knowledge Forum) kullanarak her iki grup da İngilizce dersi malzemesi geliştirmeyle ilgili üç anlama problemi üzerine bir dönem 7/24 çalıştılar. 12 haftalık dönem sonunda, katılımcılardan Bilgi Meydanı'ndaki öğrenci katkısı notların en iyileri hangileriyse onları toplayan ve sebeplerini açıklayan bir portföy hazırlamaları istedik. Her iki grup da elektronik portföylerini Bilgi Meydanı'yla hazırladı ama sadece birine, seçme ve açıklamada kullansın diye bir bilgi inşası ilkeleri listesi verdik. Portföyleri, açıklama derinliği ve bilgi inşası kanıtı var mı diye değerlendirildik. Öğrencilerin üzerinde çalıştıkları problemlere dair kavramsal anlamalarını ölçmek üzere her iki grup da kısa birer yazı yazdırttık. Yazılardaki kavramsal anlamaya baktık. Sonuçlar, gruplar arasında portföy puanlarında anlamlı bir fark göstermesine rağmen, kavramsal anlama puanlarında bir fark ortaya çıkarmadı. Yani, öğrencilere portföy notu seçiminde ilkelerin verilmesi portföylerinin niteliğini etkilemiş oldu.

Anahtar sözcükler: bilgi inşası, elektronik portföy, işbirliği, kavramsal anlama

Knowledge has become a potent factor in economics, moving in to replace industrial production and goods. Some already consider knowledge as the defining characteristic of our age with its accompanying society, which are referred as Knowledge Age and Knowledge Society. Collaborative inquiry has become popular educational goal and asynchronous networked environments that assist students in their common understanding, progressive inquiry, and social construction of knowledge or domain knowledge inquiry. Knowledge creation and dissemination entails cultural exchange of ideas between various knowledge partners in an environment with mutual trust, rights and responsibilities, as well as established routines, regimes and strategies (Peters, 2006). Aligning measurement, assessment, instruction and curriculum is a desirable goal and reaching it calls for assessment approaches that characterize and scaffold learning. Quality of student participation and variation is an issue in Computer Supported Collaborative Learning (CSCL) with the apparent problems of the insufficiency of just asking students to discuss to lead to a satisfactory discussion, how to best teach collaboration and inquiry, and assessing individual and collaborative knowledge advances (Lee and others, 2006).

This study investigates the effects of developing electronic portfolios on conceptual understanding and knowledge building. The portfolios were developed in a second generation Computer Supported Collaborative Learning (CSCL) environment called Knowledge Forum, which provides an asynchronous networked environment. Knowledge forum is distinguished from other learning management systems with its promotion of processes such as "defining problems and hypothesizing, researching and collecting information, analyzing and collaborating" (http://www.knowledgeforum.com/Kforum/inAction.htm).

Forty seven college level senior pre-service EFL teachers enrolled in an ELT materials development course were randomly divided into two groups of 23 and 24 respectively. Using Knowledge Forum, both groups worked on three problems of understanding regarding development of ELT course materials for a semester. At the end of the 12 week semester, the participants were asked to prepare electronic portfolios containing their selection of best student contributions to the Forum. Although both groups used Knowledge Forum to develop their electronic portfolios, only one was provided with a set of knowledge building principles for guiding their selection and explanation of contributions. Portfolios were scored for explanation and evidence of knowledge building. Moreover, both groups were given a paper based essay in order to assess their conceptual understanding of the problems they worked on. The essays were evaluated for conceptual understanding.

This study partially replicates another CSCL research (Lee and others, 2006) which devised and tested electronic portfolios as a means to characterize and foster knowledge building with high school students with the key design factor of turning over the epistemic agency to students. They found significant differences both in portfolio scores and conceptual understanding between the groups which prepared electronic portfolios with and without knowledge building principles, which were provided at the beginning of the semester with the intention of helping portfolios to become a means for aligning learning, collaboration and assessment in computer forums. Thus, the findings of both studies demonstrate the role of the knowledge building principles in guiding and scaffolding student selection of best notes and their explanations.

Four hypothesis were formed: (1) Students working on portfolios guided by knowledge building principles will show deeper inquiry and more conceptual understanding than their counterpart; (2) Students' knowledge building discourse, reflected in portfolio scores, will contribute to their domain understanding; (3) Knowledge building portfolios will support to assess and foster collective knowledge advances; and (4) Students working on portfolios without the knowledge building principles are likely to produce fragmented understanding, scattered discussion and superficial work as opposed to the other group of students.

Results

This was an experimental study where the participants were randomly assigned to two groups. Both groups were exposed to the knowledge forum for one semester. However, one group was expected prepare a portfolio with KB principles while the other without KB principles. The effect of preparing

portfolios with or without KB principles on conceptual understanding as well as explanation and evidence of knowledge building were explored. In order to correct for different sources of possible errors, the alpha level for statistical analyses was set at .01.

Participation and collaboration in database usage

The ATK indices analyzed were the number of notes created, the number of scaffolds used, the percentage of notes read, the number of keywords used, and the number of notes linked. Table 1 provides descriptive statistics for database participation.

Table 1: Database participation

	# of notes created	# of scaffolds used	% of notes read	# of notes revised	# of keywords used	# of notes linked
N	45	45	45	45	45	45
Mean	18.42	15.44	83.27	4.02	19.67	88.62
SEM	1.537	1.716	3.4414	1.018	2.029	2.09
Median	22.00	15.00	93.00	2.00	16.00	93.00
SD	10.308	11.510	23.07	6.827	13.610	14.02
Range	33	47	90.00	41	46	60.00
Min.	3	0	10.00	0	0	40.00
Max.	36	47	100.00	41	46	100.00
Sum	829	695	3747.00	181	885	3988.00

The ATK indices were combined using factor analysis. Two factors were obtained. The indices that loaded on the first factor were the number of notes created, the number of scaffolds used, the percentage of notes read, and the number of keywords used. This factor explained 52.2% of the variance. The number of notes linked loaded on the second factor, which explained 19.26 % of the variance. The two groups were compared on these two factors using factor scores. Independent samples t-tests showed no significant differences between the groups on either factor. Since both groups were exposed to the knowledge forum using the same procedures until the last week, this finding was in tune with our expectations. In other words, students were expected to differ on portfolio use and conceptual understanding, but not on database participation.

Portfolios and conceptual understanding

Table 2: The portfolios and the writing task given for conceptual understanding were scored by two independent raters. The interrater reliability between the two sets of scores for the portfolios was .95 while that for the writing task was .84. Table 2 provides the descriptive statistics.Table x: Descriptive statistics for portfolio scores and conceptual understanding

Variable	Group	N	Mean	SD	SE
Portfolio scores	w/out KB principles	22	3.39	.91	.20
	with KB principles	20	4.06	.62	.14
Conceptual understanding	w/out KB principles	22	8.32	3.67	.78
	with KB principles	20	6.85	2.10	.47

Independent samples t-tests indicated that the group means for portfolio scores were significantly different, $t_{40}=2.74$, $p<.01$. On the other hand, the means for conceptual understanding were not significantly different, $t_{40}=1.59$, $p>.05$

Relations among database participation, portfolios, and conceptual understanding

A correlation matrix was obtained for the ATK indices, portfolio scores and writing scores (see Table 3).

Table 3: Correlation matrix

	conceptual understanding	notes created	scaffolds used	notes read	notes revised	keywords used	notes linked
# of notes created	.029						
# of scaffolds used	-.042	.870**					
% of notes read	-.218	.515*	.448**				
# of notes revised	-.104	.401*	.409**	.207			
# of keywords used	-.163	.769**	.707**	.453**	.327*		
# of notes linked	-.136	.122	.107	.165	-.084	.173	
portfolio score	.094	.083	.116	.241	.039	.291	.060

** p<.01 0.01
* p< 0.05 level

The ATK indices were significantly correlated among themselves except the number of notes linked. On the other hand, portfolio scores and conceptual understanding scores did not correlate with each other or with the ATK indices.

*Portfolios with and without knowledge building principle*s

Students provided with knowledge building principles have shown an awareness of the discourse and these principles seem to scaffold their detection of progressing course. Student #18 talks about how principles of working at the cutting edge and monitoring own understanding helped him realize the importance of culture in English Language Teaching (Table 2). Student number two, however, complains about the lack of structure in the Knowledge Building Environment (KBE) and the need for direction for a progressive discourse as he was unable to relate the discourse to any of the principles (Table 2). This student may also be reflecting the semi-conventional nature of the course with structured and teacher controlled course conflicting with the intricate and unpredictable nature of KBEs with no one setting a definite agenda.

Table 4 An example of portfolio with knowledge building principles

In my opinion, the best topic of the [Knowledge Forum] for this semester was this topic which is related with culture [1]. The main question was whether culture should be involved in language teaching materials or not. Since this topic was very controversial, I guess we were eager to participate in discussions and it led us to come up with different ideas and views.
As is seen, there were many build-on posts and annotations (clusters of discussions) on this topic. I tried to choose the posts according to the criteria and principles in the guideline and came up with the following posts, because they seem extend the common edge of understanding *[principle 1: working at he cutting edge]*. Also, they help to turn our attention to other views and they recognize discrepancies and misconceptions and new insights *[principle 3: monitoring own understanding]*.
So, a good discussion began with Fatma's post [2] in which she gives emphasis on which parts of a culture should be taught. Along the way, some of us, including me, initially thought that the culture should be discarded from ELT classrooms [3]. But later on as the discussion proceeded some of the posts were helpful [for me] to understand the importance of culture in language classroom [4]. Also, the article by Cem Alptekin made me rethink about my view on the importance of culture.

I think a likely conclusion to the question could be that language and culture cannot be separated from each other [5, 6, and 7].

Note: the numbers in superscripts refer to other notes in the communal database. Italics are added by the authors for emphasis.

Table 5 An example of portfolio with knowledge building principles showing the need for more structure for KBEs.

The topic of discussion is "the role of culture in ELT materials" and the main question is "How do you define 'target language culture'? Should it be included in English teaching materials? Why or why not?" Here, again we find the same problem. Instead of first clarifying the concepts as the instructor mentions in her post [1], we directly jump into the question of whether we should include culture specific items in English teaching materials. At the very beginning of the discussion, this point can be seen clearly. We hardly ever get to a point where one of us defines the term 'culture' for us [2]. Our instructor, unlike for the other topics of discussion, intervenes us here, which I think is really necessary for these kind of knowledge building forums because we need to have a roadmap which will take us to the point where we want to get to. Our instructor's post [3] is intended for us to come up with more sensible and related points for discussion, and for preventing us to wander around and writing something without propose.

One of my posts [4] takes the reader to a point in which he will look at the discussion from a different perspective. This is necessary, I believe, because at some point, we can't help writing the same ideas with different words over and over. Someone should trigger some other form of discussion, but with enough care of course, not to lose contact with the main problem. I can not provide examples related to the guidelines because it is almost impossible to find a post relevant to them. None of us monitored him or herself throughout the discussion, nor we couldn't find a solution to the problem with collaborative effort. Actually, there is no solution to it. that we have provided our friends with information from different sources as a friend did in her post [5] is really stimulating for us, this means that we are thinking about the problem but we are not thinking about how to solve it systematically. After she posted this note, that's it. She only got one response to her note, and some other people put forward some new unrelated notes to her. This probably stems from the flexible writing environment of page design, I mean, we can build on to any note we would like to, but there should be some strict rules for the discussion to evolve in an effective fashion through which we will reach to an end point. I didn't get too much sense from what I have read in the discussion because they were too separate from each other. The forum should be more structural.

Note: the numbers in superscripts refer to other notes in the communal database.

Table 6 An example of portfolio without knowledge building principles

The topic of the discussion is the role of culture in ELT. Throughout discussion we tried to answer the question: how do we define target language culture? Should it be included in English teaching materials? Why or why not? In my opinion, although this question seems to be simple in nature, it actually implies quite complex issues in ELT. As I have already proposed in one of my first postings we need to move step by step in order to answer the question.

The first thing that we all have to agree is how we can define a target culture of a language which has developed to be a lingua franca. A friend proposed a definition in [1]. Even though this definition may not encapsulate all our perspectives of culture, at least it serves as a thread which gives some clear borders what should be included or not. Someone else gave a very good comment on what should be the next step we should take [2]. In that posting she suggested the idea of 'referring' and not 'imposing'. This is very true because as part of the implication of globalization everyone seems to be aware or at

least there is an effort to make everyone aware that we, as humans, live in a various and heterogeneous society. From this situation emerges a need for tolerance and understanding among each other. To illustrate this need I also gave some examples in [3] and [4] with analysis on it [5]. Those examples are practical things that happen in our real life which show how important is having an awareness of cultural background differences when we interact with others.

Back to our primary question about including target language culture in ELT, from all our discussions I can conclude it is an inevitable aspect of ELT materials development. Again if we back to that friend's definition, we include cultural aspect consciously or unconsciously in every interaction we make, including interaction in a classroom between teacher and students, between teaching-learning materials and students, between students and other students, etc. This is just a matter of how some culture can dominate more over others. I find discussing about the impact of, let's say Christmas, to Moslem students in ELT materials as too superficial. There will not be any harm for those students; in fact it will broaden their point of view. It may demotivate those students when we explore such kind of topic too depth. But the question is as someone else emphasized in her posting, an ideal situation for teaching and learning is to refer not to impose the target culture.

All in all, a reasonable answer has emerged from this discussion, thanks to those postings mentioned above. The flow of the discussion was just the same as what I have in my thought; step by step.

Note: the numbers in superscripts refer to other notes in the communal database.

We also provide an example of students who also selected notes for their portfolios without the scaffolding of knowledge building principles. Student follows the strategy of finding an acceptable answer to the question with no notion of improvable idea or collective advance, consistent with Aalst and others findings.

Table 7   Teacher guidelines on knowledge building principles and portfolios

Guidelines on Knowledge Building Principles and Portfolios
You were engaged in discussing questions from the beginning of this semester, with the other students that formed a virtual community. You have used the Knowledge Forum for these discussions: ideas were created and improved. You need to select four best clusters of notes together with a summary note that explains why you have selected the notes. Use the principles and criteria to help you with note selection. You can include your notes and notes written by others.

Principle One: Working at the Cutting Edge
o   Identify knowledge gaps, inconsistencies and ask productive questions
o   Pose problems that extend the edge of understanding of the community
o   Pose problems with potential for continual discussion and inquiry (i.e., interest many people)

Principle Two: Progressive problem solving
o   Show continual efforts to grapple with problems posed by classmates
o   Pose notes aimed at addressing the original problem and questions arising from them
o   Show sustained inquiry: Identify the problem, solve the problem, but keep asking new questions
o   Reinvest efforts to keep solving new problems to improve ideas
Principle Three: Collaborative Effort
o   Use various KF functions such as references and rise-above to make knowledge accessible
o   Summarize different ideas and viewpoints and put them together as a better theory
o   Help classmates to extend and improve their understanding
o   Encourage classmates to write notes that follow the other principles
Principle Four: Monitoring Own Understanding
o   Explain what you did not know and what you have learned
o   Recognize discrepancies and misconceptions and new insights; trace own paths of understanding
o   Show your new ways of looking at things (questions, ideas, issues) after examining other KF

notes

Principle Five: Constructive Uses of Different Sources of Information
o   Use information from other sources (Internet, newspaper…etc) to support or explain your ideas
o   Bring together classroom learning, information from textbook, classmates' KF notes
o   Provide contrasting or conflicting information to what is printed in the textbook
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Please address the following questions:
- What is the topic?
- What is/are the question(s) of discussion?
- How did your thinking about the question changed/evolved over time?
- How do they relate to the given knowledge building criteria?
- Do you think a reasonable answer has emerged out of the discussion? (Please make references to relevant notes by using the "reference" feature)

An exemplar portfolio note would be as follows:

The topic of the discussion is creating ELT materials. Main question was who should write these materials? I pick this attempt to answer it (write the question and give the note as reference). I initially thought that……… (give the appropriate references and how it relates to the criteria), I think a likely conclusion to the question is that …… (give the appropriate references and how it relates to the criteria).

Please do the same for the all three main problems that were discussed during the semester. Do this in the portfolio area. Use a new note for each cluster/group.

Rating scheme taken from E.Y.C. Lee et al.

Table 8   The rating scheme for portfolios

Rating	Descriptors and Indices
1	Identify the theme of a cluster Make very brief or no description of the cluster
2	Make brief analysis with little conclusion Make general statement without referencing to others' notes Give superficial interpretation of notes with own judgment Give personal views with limited referencing to the note clusters
3	Provide a very brief description of the discussion Indicate agreement or disagreement to the discussion without much explanation Attempt to weigh the relevance of an argument but fail to incorporate relevant aspects Make some interpretation but fail to make reference to the relevant notes selected
4	Provide a brief description of the discourse with shallow personal elaboration or evaluation Identify different strands of discussion but with very brief description Attempt to reinterpret and understand the note content Attempt to provide a brief comment on the discussion Draw relevant conclusions Make good selection of notes as related to curiosity and inquiry Show personal reflection and identify high points with elaboration
5	Provide a detailed description of the discourse Identify groups of ideas and classify arguments within a discourse Construct explanations showing reflection

Build in own interpretation when analyzing the discourse
Deduce the logic of an argument in a discussion thread
Evaluate the quality of notes; draw relevant and appropriate conclusions

6   Identify the key question and critical turning points
Identify misconception/knowledge gaps in the discourse
Articulate the growth of ideas (agreement, disagreement, and alternative solutions) in the discussion thread identified
Add own interpretation while articulating the growth of ideas
Evaluate the applicability of a solution generated for the questions
Summarize and synthesize the diverse ideas/arguments in the discourse
Demonstrate the interaction between community knowledge and individual knowledge
Draw conclusions that contribute to personal and collective knowledge advancement

Rating scheme taken from E.Y.C. Lee et al.

To assess conceptual understanding, the participants were administered the following writing task: "We have been exploring major issues regarding materials development process in foreign language teaching, namely teacher-proof materials, the role of materials in language teaching, and the role of culture in language teaching materials. In about 300 words, express your view on the following question: Who should be responsible from designing language teaching materials (teachers versus materials developers)? Why?". Students' responses to the writing task were coded using the rubric given in Table 9. Each criterion in the scheme was evaluated on a scale from 1 of 5, 5 being very good. Thus, the maximum possible score on the writing task was 20. All the essays were scored by the two teachers of the course independently and an interrater reliability of .87 was obtained.

Table 9 The rating scheme for the writing task

Descriptors
• Discussion regarding the role of materials in language teaching
• Discussion regarding the role of teachers in materials development process
• Discussion regarding the role of materials developers in materials development process
• Clear standpoint on who should develop the materials; sound justification on any given argument

Discussion

We have described an undergraduate level course with a limited knowledge building environment of complex and unpredictable interactions. Here no single person sets the agenda (Sawyer, 2003, p.19) and there was a potential of goals emerging within a complex network of people and ideas. Students were given three problems of understanding and with rudimentary introduction and support on knowledge building and the Knowledge Forum as software they used for the purpose. This study was a partial replication of Aalst, Chan study where they have found that students provided with knowledge building principles as scaffolds participated more and engaged in deeper inquiry. In this study the groups only differed in making their portfolio note selections with and without using KB principles as scaffolds. Therefore we scored their portfolios for explanation and evidence of knowledge building. We also scored their final writing tasks for conceptual understanding using the same rating scales of Aalst and Chan study (Table 7 and 8). Students using KB principles as scaffolds for their selection and explanations differed significantly in their depth of explanation and evidence of knowledge building,

consistent with the Aalst, Chan study. The groups showed no significant difference, however, in their conceptual understanding.

Aalst and Chan propose that "portfolio is an innovative design that captures the distributed nature of cognition and taps into the phenomenon of collective knowledge building… Portfolios are not just learning products; they reflect group cognition and they demonstrate how students make sense and produce meaning collaboratively. A portfolio note is a group accomplishment with multiple contributions from students; it is also more than an additive account as it shows how knowledge emerges and advances in the community. In analyzing the online discourse, students cam make the community's progress explicit and visible to themselves and others… As students engage in analyzing community discourse, they also reconstruct their own understanding." (p.81). Aalst and others, however, compared three separate groups one as control, another just doing KB, and two others that differed only with the inclusion of KB principles in their preparation of the portfolios. This study, on the other hand, had two groups who only differed in utilizing a set of KB principles and, unlike Aalst and others' study, these principles were provided not all throughout the semester, but only at the final week when their only task was providing portfolios, even though there were a few additional new notes created that week. Therefore the significance of the difference in depth of explanation and evidence of knowledge building is that, the criteria are at least useful in their construction of individual or collective knowledge and looking for a progressive discourse.

The one condition differed among the two groups is that one was provided with a set of five knowledge building principles as scaffolds for their choice and explanation of choice of notes in their portfolios. The group was provided with the principles only at the final week of their course as they worked on their portfolios. Therefore, only a partial and conditional replication of Aalst study is performed, whom not only used KB principles as a tool of analysis but also as pedagogic and assessment tools as they turned over the responsibility of identifying knowledge building episodes in the computer discourse to their students during the whole semester, hypothesizing that "without knowledge building principles and criteria, students could easily see collaboration merely as an activity to produce correct answers… Knowledge building principles may help students understand progressive discourse."(p.) As shown in tables x, x, and x, there is some evidence of understanding the progressive discourse as the student mentions the principles as factors of his awareness of views of others, discrepancies, misconceptions and new insights as they occur over time. The evidence is weak, though, as another students, who is also provided with the principles to choose with complains about not finding any notes worthy of the principles and suggest that lack of structure for the discourse led many redundant points hampering any possible progress. This can either be due to this particular students' awareness of the lack of progressive discourse or the impatience for obstructions toward a correct answer.

The results indicated that the groups differed significantly in their portfolio scores, but not in their conceptual understanding scores. In other words, providing the students with principles in their selection of portfolio entries had an impact on the quality of portfolios.

It is concluded that electronic portfolios guided with knowledge building principles may provide to be a useful tool for aligning assessment and learning in collaborative networked environments, even as a part of more traditional course structures. Turning over the epistemic agency to students in collaborative environments requires characterizing and fostering the endeavor because students do not just collaborate when required.

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