

# Using webquests in a museum-based multiliteracies dynamic learning intervention: Ubiquitous learning made possible?

Stefania Savva, University of Leicester/Cyprus University of Technology, UK/Cyprus  
Nicos Souleles, Cyprus University of Technology, Cyprus

*Abstract: Today's emerging technological achievements seem to be moving towards the realization of ubiquitous learning as described by Weiser (1991). Nevertheless, ubiquitous learning is not preconceived or a priori; the number of possibilities offered by such learning can only happen "if breakthrough strategies and practices are implemented that reconceptualize the content, processes and human relationships of teaching and learning" (Cope and Kalantzis, 2008:582). Bearing the previous in mind, the aim of this paper is to report on the findings from a doctoral thesis on pupils' learning experiences of and through museum-based multiliteracies. Drawing from the literature, analysis and evaluation of the qualitative research methodology this paper addresses how engagement with an online educational tool such as webquests impacts upon pupils' multiliteracies learning experiences, and what kind of multiliteracies pedagogy approach can support ubiquitous learning.*

*To facilitate understanding a learning framework developed for the purposes of an educational intervention, the Museum Multiliteracies Practice (MMP) is presented in brief. Following this, the findings of the intervention are discussed in the context of the case study undertaken with a group of primary aged students to determine the extent to which the intrinsic characteristics of ubiquitous learning could be served by the affordances of the webquest method and multiliteracies pedagogy.*

*Keywords: Learning framework, Webquests, Multiliteracies pedagogy, Ubiquitous learning, virtual museum*

## Background to the study

As new technologies become increasingly 'popular tools' in education (Doering, Beach and O'Brien, 2007; Miller, 2008), researchers have focused on studies of computer technology-enhanced learning and in particular virtual museum-based learning (Ho, Nelson and Müller-Wittig, 2011; Jackson and Adamson, 2009). The importance of such work lies in the blurring of boundaries between the real and virtual (Hwang, Tsai and Yang, 2008), sharpening the processes of inquiry and learning (Pena-Shaffa and Nicholls, 2004; Tsai and Tsai, 2003), and enhancing participant collaboration and exchange (El-Bishouty, Ogata and Yano, 2008; Roschelle, Rosas and Nussbaum, 2005; Hwang, Wu, Tseng and Huang 2011, 993).

Cope and Kalantzis (2008) suggest that "ubiquitous learning is a new educational paradigm" (p.576) which can be achieved through certain moves that are characteristic of ubiquitous learning (Figure 1). These, according to Cope and Kalantzis can contribute to an "agenda for educational transformation" (pp.579-581).

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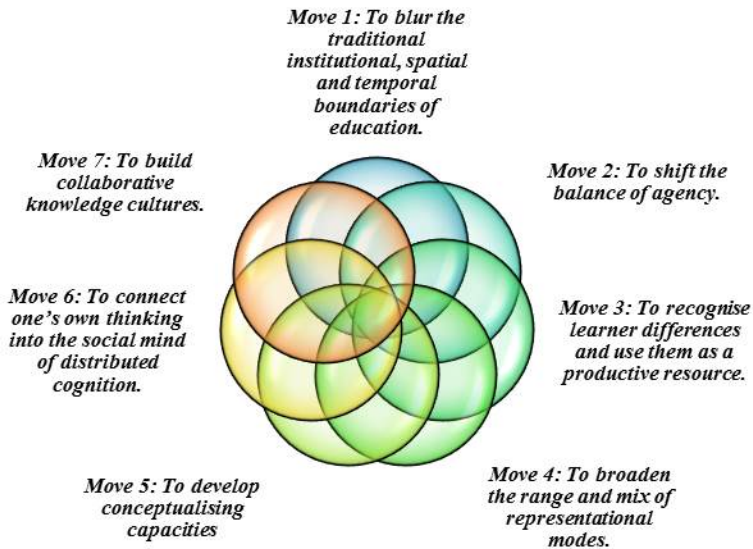


Figure 1: Moves characteristic of ubiquitous learning  
Source(s): Cope and Kalantzis, 2008, 579-581.

Move 1 (Figure 1) suggests that ubiquitous learning enables anyone to learn at any place and anytime (Yahya, Ahmad and Jalil, 2010, 120; Burbules, 2009, 16). This broadening of the 'where' of learning is part of a greater movement towards 'lifelong learning'.

Move 2 (Figure 1) is characterized by the blurring of the boundaries between the teacher and the student and "knowledge makers and knowledge users" (Cope and Kalantzis, 2008, 580). In the new media age, ubiquitous computing has transformed the ways students learn. Students collaborate with each other and the teacher as a facilitator of constructing meaning.

Move 3 (Figure 1) is derived from a general acceptance that we should be responsive and reflective to the "various 'subjectivities'-interests, intentions, commitments, and purposes – students bring to learning" (NLG, 1996, 72). Ubiquitous learning can be a means to support the former with students as designers working in groups; thus becoming collaborative knowledge-makers (Cope and Kalantzis, 2008, 581).

Move 4 (Figure 1) discusses how ubiquitous computing allows recording and transmission of meanings in multiple ways, multimodally - the oral, the written, the visual and the audio (NLG, 1996, 78). These representations can occur from the users themselves as anyone can take up any task. Despite this approach it is long recognized "as more relevant, and powerful, and poignant" (Kress, 2003) for learning, little systematic attempts have been undertaken to address such modes and practices in formal educational institutions.

Move 5 (Figure 1) deals with the increasing awareness that to engage with the world of ubiquitous computing requires "complex technical and social architectures to be a creator or user" (Cope and Kalantzis, 2008, 581). These new media need higher-order abstraction and metacognitive strategies such as "conceptualizing sensibility, sophisticated forms of pattern recognition and schematization" (NLG, 2000, 64) which students should engage with.

Move 6 (Figure 1) deals with the (re)cognition that in the era of ubiquitous computing, "you are not what you know but what you can know" (Cope and Kalantzis, 2008, 581), meaning that the device provides the potential for knowledge. This ascertainment suggests that educators should create new standards to evaluate learners' capacities to know how to know in this new environment.

Move 7 (Figure 1) is concerned with the social aspects of learning. Lave and Wenger (1991, 29) suggested that learning occurs within a process of co-participation in a community of practice and requires a responsibility for the outcome. The former occurs based on how learner differences in terms of “experience, knowledge, ways of thinking and ways of seeing” (Cope and Kalantzis, 2008, 581) can complement the learning process. Nevertheless, this route to ubiquitous learning requires higher order thinking skills and metacognitive understandings.

## Learning framework

Bearing this in mind, i.e. the premises of the ubiquitous learning agenda as explained above, a particular framework was developed for exploring the potential of pedagogical innovations grounded in museum-based technology enhanced approaches. The Museum Multiliteracies Practice (MMP) is grounded upon a creative overlap of different pedagogies and concept theories (Figure 2). The core pedagogy that drives the framework is multiliteracies pedagogy as proposed by the New London Group (1996) and Cope and Kalantzis (2000). A pedagogy of multiliteracies is posited as “a teaching and learning relationship that potentially builds learning conditions that lead to full and equitable social participation” (NLG, 1996, 60). The intention is to teach students to recruit previous and current experiences as an integral part of learning to make meaning (Cope and Kalantzis, 2000). The ultimate goal should be to enable the reader to use any or all of the resources available to transform the meaning of text so as to be meaningful to them and apply it to different contexts. Lave and Wenger (1991, 161) refer to this as ‘changing participation in changing practices’.



Figure 2: The MMP learning framework

As seen in Figure 2, the theory of ‘communities of practice’ also informed the MMP framework. A community of practice is understood as “a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice” (Lave and Wenger, 1991, 98). The understanding is that students should construct their own meaning and learn through collaboration and interaction with others to inform current and future practices. Therefore, the MMP framework was set to flourish as a community of practice.

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To merge the goals and ideas of multiliteracies pedagogy and the theory of communities of practice in a museum-based learning context, Schwartz’s (2008) theory of museum-based pedagogy was utilised as opposed to traditional museum educational approaches. Museum-based pedagogy appears to be working within the affirmations of multiliteracies pedagogy as the aim is to ‘actively engage’ students to think beyond the museum's contents to its immediate and broader contexts; to develop a competence at analyzing the museum's means of persuasion, the ways in which the museum makes arguments through and about the objects that it displays (Schwartz, 2008, 29).

**Research design**

To test the feasibility of the MMP framework in a real life setting, a case study research strategy was undertaken which enables a holistic and in-depth investigation of the phenomenon (Yin, 1994, 13-14). In particular, an intervention was designed, implemented and evaluated in a primary school with a group of students coming from various cultural and linguistic backgrounds. A total of 13 students (5 boys and 7 girls) aged 10-12 from Grades five and six were recruited for the final study using a non-probability, purposive sampling (Cohen, Manion and Morrison, 2007) and following on from their parents’ or guardians’ written consent. The students engaged in multimodal design of a virtual museum from March until May 2012 in Limassol, Cyprus.

In a case study multiple sources of evidence can be used in the data gathering process (Yin, 1994, 13-14) which allows triangulation (Stake, 1995). Qualitative data were collected from: a) my research notes, b) naturalistic observations during each session, c) semi-structured interviews with students, d) the final product produced by students, i.e. the virtual museum.

To assist interpretation, a hybrid methodology of qualitative methods of thematic analysis-identification of emerging themes (Daly, Kellehear, and Glikman, 1997) - incorporating both inductive (data-driven) and deductive (a priori template of codes) methods was employed. This approach complemented the research questions: the tenets of qualitative research were integral to the process of deductive thematic analysis while allowed for themes to emerge directly from the data using inductive coding. Selected segments of the transcripts that corresponded to each category, code or notes were located and created clusters of codes according to common subject matter. The procedures followed for the research are represented in Figure 3.

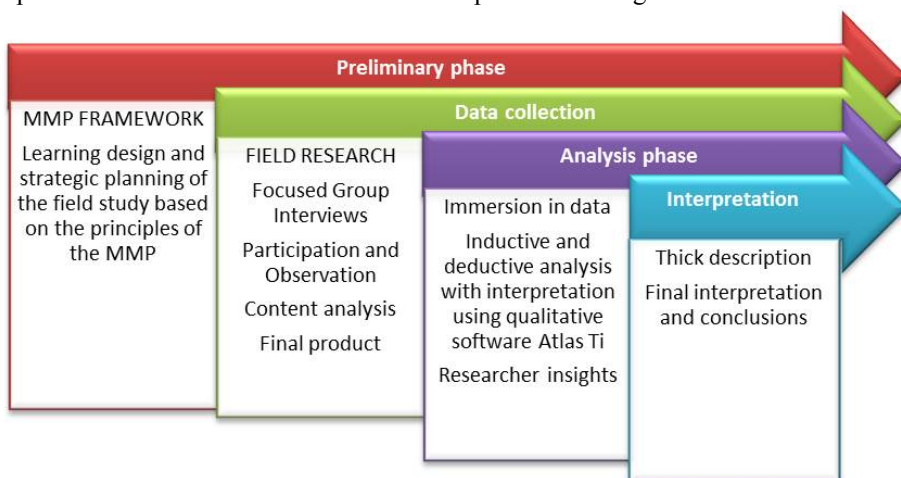


Figure 3: Qualitative Research Process

## Design of the learning unit

To carry out the intervention the decision was to plan for instructional development/design or curriculum development and evaluation. This is described by educational researchers in general as a process that involves the design and evaluation of instructional resources or educational packs (Kimpston and Rogers, 1986; Richey, Richey, Klein, and Nelson, 2004; Richey and Klein, 2007; Heinich, Molenda, Russell, and Smaldino, 2002). Drawing on these authors in designing the content for the various stages of the intervention, there were three layers of work: selecting the topic and designing the relevant activities, designing the materials for the construction of the virtual museum, and incorporating these into a coherent instructional resource for students to work with.

Following an induction session with students where they decided to create a museum in their hometown, Keeler's (2009) and Fasy, Heitzenrater, Rotchford, and Telthorster's (2006) worksheets were employed at this point to assist with the architectural aspect of the project: developing the museum floor plan and engaging in modeling/construction work (Artifacts, e.g. 3D models, animation, etc. In addition to these, more specific worksheets were added such as for building the rooms of the museum in perspective and hanging paintings.

The next step in the design for the instructional resource focused on how to incorporate the two tasks, students' research on the topic and the construction of the virtual museum in a way relevant to the principles in the MMP framework. The conclusion was that the best approach to unfold the intervention would be to utilize the 'webquest method' introduced in 1995 by Dodge. A webquest is an active process of directed discovery during which students take up an active role to solve a problem or participate in a realistic situation (Dodge, 1999). Stepping somewhere in between the outside world and the school environment, the basic source of information in a webquest is the internet but often not the only one while attention is given to define the parameters of the students' activity to focus in analysing and using in meaningful ways the information found (Hammond and Allinson, 1989; Jonassen, 1991). In this process the teacher's role is to act as a facilitator between new technologies and the students. The intention is to support the students in their efforts and create a climate of collaboration between the teacher and the students and among the students themselves (Papanicolaou and Gregoriadou, 2006).

Webquests provide with a direction, a set format for the educator in planning lessons by defining the fundamental elements and the structure which these lessons should adopt (Figure 4). This can save time for the educator while allowing the necessary flexibility to adapt the project to the students needs and interests.

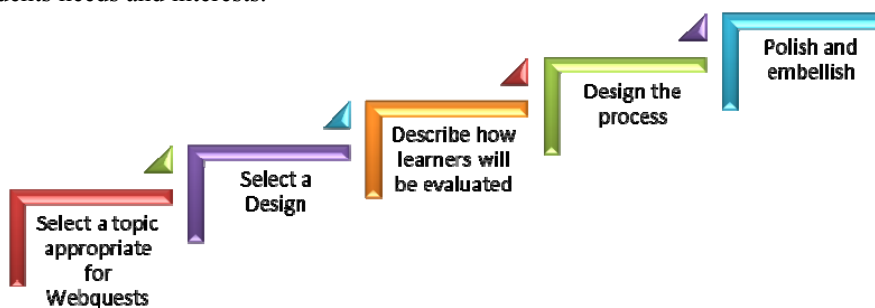


Figure 4: A linear description of the design process of a WebQuest. (Adapted from Dodge, 1999)

The process illustrated in Figure 4 started once the students decided on the content of the intervention during the induction stage of the research intervention and was completed before students embarked on the creative stage of the intervention, which was the third of the five stages of work. To prepare the webquest first required becoming familiar with resources available

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online about the chosen topic. Starting from a basic Google search the next step was to seek specific sites dedicated for teachers and the topic in hand. Next, the process entailed the identification of topics that fit in with the school objectives and the students' interests and for which there are materials online. Specific sources were located which would encourage students to use during the implementation of the project. Following this and depending on the student's skills and the goals of a given activity they could extend the search in other sources online.

To develop a webquest actually required to create a web site, starting with a template saved a lot of time. In this mindset Dodge's Questgarden website was utilized to create the webquest. The Questgarden is basically a site which allows creating a domain and manipulating webpages to write text and upload worksheets for a single webquest. There are four elements in the webquest and these were used in the process of developing the different activities of the intervention: the *introduction* which is usually a short paragraph that introduces the activity to the students entailed a scenario (Appendix 1). The *task* informed the learners of what their end-result or culminating project will be (Appendix 2). The *process* identified the steps the students should go through to accomplish the task (Appendix 3). It also included the online resources students needed, and provided scaffolding for organizing the information gathered. The *evaluation* described to the students how their performance would be evaluated (Appendix 4). The *conclusion* summarized what the learners will have accomplished by completing the webQuest (Appendix 5). The process of designing the materials for the webquest lasted a month (mid-January until mid-February 2012).

### Implementation of the MMP framework

The MMP framework was implemented using the webquest method with students working on desktop computers with a built-in camera. The initial phase of the project involved introducing the group to the virtual museum concept using the webquest designed. The activities involved creative play and innovative experimentation using multimodal resources. Links to virtual museum platforms were provided in the process element of the webquest which students could follow. This procedure was the first step for students to begin imagining, visualizing (Smith and Woody, 2000; Lister, 2008) and conceptualizing individually what constitutes a museum.

During the immersion phase that followed students engaged in constructing their own virtual museum by working in heterogeneous groups, mixing students with different abilities and levels of performance. Groups developed different rooms of the museum, creating storyboards with objects, writing text, finding audio and videos to upload on the webquest. Both virtual and real objects were used to create the virtual learning environment. All groups completed museum rooms with the same content and students could compare and contrast the rooms created. Each group populated one room and the whole class created a single museum. Developed groups included novice and experienced technology users and novice and experienced writers. At one point the entire class created a single room using a projector. In the end, all student work was put together into the final museum.

### Findings

Six themes emerged across all interviews and supplementary data sources: blurring of learning boundaries, dynamic student role, empowered subjectivities, multimodal meaning making, collaborative learning and motivational effect of the webquest. The following is a discussion of key findings in relation to the moves characteristic of ubiquitous learning as described by Cope and Kalantzis (2008).

#### *Blurring of learning boundaries*

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The development and implementation of the virtual museum supported the unobstructed access to learning, characteristic of move 1 of ubiquitous learning (Cope and Kalantzis, 2008, 579) in that it blurred the boundaries between the school and the outside world. Through the web museum platform students could learn at any place and any time provided that they had internet access. Students seemed engaged by this idea.

“I think museums are nice places but I prefer online ones now that we have created our own because I can enter from the screen of my computer at home and learn everything. It’s easier and more fun like that...” (FN, St.5, Gr.6)

It was noticeable that students reported accessing the webquest from their homes to add content or show their work to their parents. In this sense, the webquest contributed to creating a link between these students schoolworld and their lifeworld (Barton, Hamilton, and Ivanič, 2000).

### *Dynamic student role*

The processes within the webquest method allowed the teacher’s role to be supportive to the students’ work. Students immersed into the process of design and creation of the virtual museum environment as both novices and facilitators. As an inquiry-driven form of learning (Dewey, 1938, 1991; Kuhn, Black, Keselman and Kaplan, 2000), students directed their own investigatory activity; they were actively involved in asking questions, plan their activities and reach to conclusions about their work (Kuhn et al., 2000, 496–497). These findings suggested overall positive gains that parallel technologically-enhanced intervention studies which facilitated webquests through student engagement in group work with more student ‘ownership and responsibility for their own learning’ (Looi, Chen and Ng, 2010, 24) and for their peers.

“I thought it was great that we got to decide the topic for our museum and then which pictures to load, how many information to put in the labels for each object at the museum, well I enjoyed that. This is not how we do the lesson usually...” (FN, St.2, Gr.5)

Within the approach adopted in the intervention, it was important that all members of the group felt equal among others and the teacher’s role was supportive to their work rather than acting as an authority figure. Students directed their own investigatory activity, they were actively involved in asking questions, plan their activities and reach to conclusions about their work (Kuhn et al., 2000, 496–497). Relationships developed during the project and the ways in which learning was encouraged, are not commonly found in a traditional classroom.

### *Empowered subjectivities*

The premise in utilizing the MMP framework was to allow for students personal stories to be exposed in the classroom and enhance the learning process. According to Cope and Kalantzis (2008, 576) ‘recognizing learner differences and use them as a productive resource’, is characteristic of ubiquitous learning. Indeed, there was evidence that students’ subjectivities were empowered. Throughout the project students were acknowledged for their personal attributes and what is more, they were granted freedom to express and celebrate their individualities with others in the community of practice cultivated. The previous can point towards the realisation of being responsive and reflective to the “various ‘subjectivities’- interests, intentions, commitments, and purposes – students bring to learning” (NLG 1996, 72). The webquest served to fulfill some aspects of ubiquitous learning; the students believed they were re-introduced to the school environment starting from a clean sheet when they engaged in this project.

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“I think that the best part was that I got to do what I was interested in. I could even talk about my trip last year to my dad’s village and how people there support each other...And then I got to hear other children talking about what they remember from their home countries and we shared our ideas about how to create the virtual room...” (FN, St.1, Gr.5)

Overall, there was an indication that the students who were coming from different cultural and other background were more engaged in the intervention than they were in their everyday school activities and felt comfortable sharing their personal stories and experiences (observation notes, week four). Indicative is the statement from the Grade Six teacher who frequently joined the sessions. He noted that:

“I could not believe that E. was so enthusiastic about it all. He is usually distracted and does not show interest in any of the classroom activities. So surprised to see him behaving so well and contributing to the class...” (FN, TG6, week seven)

The previous statement is only one example of a student who was characterized by both the principal and the classroom teacher as a ‘troubling case’ because of his misbehaviour and lack of interest as he did not know the Greek language and spent most of his time disturbing his classmates. Surprisingly, during the course of the intervention this student unfolded many aspects of his personality and blended well with his peers. His progress during the intervention was noted by other students.

“At first she sat next to me because I was the only one she talked to. Later, she didn’t need me, she was comfortable talking to more people and helped us a lot with the stories she told us from her country’s traditions.”

“I did not know she knew so many things, she was always distant and not easy to talk to. I was surprised to see she could help us with all the information we had to gather for creating the museum room.” (FN, St2 and St9, week three and four)

It was considered that this student’s interest in the topic of the sessions and freedom to express himself during the intervention motivated him to participate in the project.

### *Multimodal meaning making*

One of the intended learning outcomes of the intervention was to develop multimodal awareness. The former was pursued through students’ exposure to a range of semiotic resources using the webquest, and sensitivity to semiotic affordances and constraints, aligned with New Literacies (Gee, 2008) focal interests and emphases. Students were provided with opportunities to visualize and explore ideas or models embedded in visual imagery during the search for content for the galleries for their virtual museum. The sessions included writing tasks although these were minimal comparing to multimodal activities which are consistent with multiliteracies pedagogy.

The findings from the field notes and the final product created (the virtual museum) suggested that students’ choice of multimodal resources focused on use of video and animated clips apart from still images. These findings are in contrast with Ho et al. (2011)’s research where students used predominantly still images and made limited use of other multimodal resources such as 3D models for AR artifacts. It is possible that focused and systematic exposure to multimodal sources would broaden even more students’ frequency of adoption of multimodal resources.



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The use of the webquest within the principles of the MMP framework served to fulfill the potentials of ubiquitous learning through engagement of students with a variety of texts of great linguistic and cultural diversity, displaying knowledge and representation in multiple forms: print, images and combination of forms in the digital context. In this sense, it can be derived that there was ‘a broadening of the range and mix of representational modes’, which according to Cope and Kalantzis (2008) relates to moves characteristic of ubiquitous learning. The process of compiling sources for the virtual museum using the links and guidelines from the webquest facilitated reflection on ways they articulate messages conveyed by visual culture.

“I think that pictures are very powerful, more than written text for sure. While when I read a text, I have to be very focused to understand it and sometime the language doesn’t help...” (FN, St.10, Gr.6)

During the process of selection of multimodal resources, students realized that electronic texts are fluid and dynamic. Writing became “multi-vocal” and intertextual (Snyder, 1996). Students reported a level of awareness of the impact of multimodal forms of expression:

“I think that it was best to use as many ways as we could to make the virtual museum because people have different preferences and so they might like watching a video more, or listening to music than reading a text. So yes, it was important to use many means to make the museum easier to understand...” (FN, St.6, Gr. 5)

It can be derived from the above that students took the first steps towards becoming critically literate about the texts and social practices found online. This proved to be an important step to critically engage with the text they employed or the choices they made.

“I noticed how the author of the article I wanted to use for the museum was from Africa. I think it showed in the way he spoke in his text about freedom and I thought he must have experienced something that made him talk like that...” (FN, St.3, Gr.5)

Nevertheless, the move from viewing semiotic resources as discrete units to making meaning through establishing purposeful interactive links across various resources (Luke, 2003) required further work. It was not possible to discuss them in depth in class or reconstruct and reflect on the visual experiences they articulated due to their difficulty in making critical connections and little time available. Although there was an intention to help students represent their knowledge in complex manners and encourage higher order skills, there was an apparent weakness in achieving higher-order abstraction and metacognitive strategies which are considered possible based on the affordances of ubiquitous learning.

“I just wrote the text as I would for any school task. I didn’t look deep into why somebody wrote these things... I was only interested in writing the important parts and that is all...”

“I don’t think that it makes much difference having so many different media in the museum. Of course it is fun but I cannot think of any other reason for using them...” (FN, St.1, Gr.5 and St.12, Gr.6)

This indication of a lack of capacity for higher order thinking, using deep understanding in new ways’ (Anstey and Bull 2006, 60) could be explained in terms of students’ lack of systematic engagement with similar activities in class (MOEC, 2012) and also the lack of sufficient time due to the nature of the intervention. The challenge was for students to work

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towards a meaningful synthesis, that is, shifting ‘from collection to connection’ (Luke 2003, 400) to establishing links and coherent flows across varied multimodal resources. It was not possible to a maximum degree for texts to be studied in their social context and from a range of contemporary social perspectives (Moore 1997, Pope 1998). The previous suggest that there is still space for broadening students’ perspectives on semiotic affordances and constraints (Norman, 1988), utilizing various semiotic resources for metacognitive benefits.

### *Collaborative learning*

The intervention evolved as a community of practice in that students appeared to benefit from the collaborative learning dimension (Kuhn et al., 2000; Vygotsky, 1978) of the project both by learning on their own but also while learning with others in the group (Looi et al., 2010). Within the virtual environment of the webquest site created, students learnt to behave as scientists while they collaboratively identified problems through observation and inference, form and test hypotheses, and deduce evidence based conclusions about underlying causes (Dede, Clarke, Jass Ketelhut, Nelson, and Bowman, 2005). Interaction with peers enhanced classroom participation and acquiring a sense of belonging, a satisfying identity, and stimulated imagination in particular for students who were coming from varied background. Participants revealed generally positive gains through the collaborative learning environment that was mediated via the webquest. The following are characteristic of students’ views:

“I really felt great being part of the group. It is usually difficult for me to follow because of the language but in the group we were all keen to create the best room and I could contribute to the team because it was not all about writing...” (FN, St.10, Gr.6)

I found the webquest really helpful to search for pictures and videos, the rest of the group wanted my help because I am good with computers, it was nice to be able to show them stuff...” (FN, St.12, Gr.6)

The use of the webquest method was particularly important to connecting students’ thinking practices within a socially distributed cognition (Cope and Kalantzis, 2008, 581). Positive benefits of group work over a sustained period ranged from teamwork and collaboration were reported by students:

S4: It was great that we could share our ideas in the group and combine them to create the rooms and the gallery. I think that the guidelines on the webquest helped us a lot to work together. Some of the tasks were difficult and I don’t think I could do them on my own. Listening to others’ ideas about it was great because I learnt a lot from them.

S9: It was better to work with my classmates than alone. In this way everyone is assigned roles and has their own piece to contribute... and then we put all these together to make something really good! (FG1, post project, 22/12/2012)

In addition, to learning more from their peers:

S3: In the group you can see who is good in what areas and thus gets to work on that more. And then if you are weak at something, you will not be that involved, you do other things.

S5: It helps us learn more about each other working in the group, we have to understand each other. And now that the project is over we know more about what things each likes, for example preferences for animals, feelings etc. (FG2, post project, 22/12/2012)

There was also evidence of emotional support in the group:

S11: At first I didn't like working with other because I did not like all the people in my group. As the time passed, we learnt to work with each other and it was not easy but we succeeded a lot and I became friends with some of them [the students]. (FG2, post project, 23/12/2012)

The field notes and observations in the classroom indicated high levels of group talk and participation during the completion of tasks. Students would talk to each other, raise arguments and ask questions, even provoke each other to find solutions to solve the problem (Kuhn et al., 2000). Through exposing different views in the group, students improved their capacity to acknowledge different perspectives on the same problem or situation and how to use this knowledge creatively to revise their ideas. In this sense learners became designers of their experiences while working in groups, as collaborative knowledge makers (Cope and Kalantzis, 2008, 581).

#### *Motivational effect of the webquest*

The descriptive narratives from the intervention point that the implementation of the webquest method was successful in improving students' performance with regards to engagement in classroom discussion and practical activities. The students' enthusiastic participation in the lessons and contributions to class discussion validated the choice. Although there was no formal form of assessment of students' performance, students' self-evaluation and interviews at the end of the project indicated that there was a significant improvement in these students' level of confidence in engaging with a range of media and sources while they felt more inclined to participate to the classroom activities:

S5: Our work during the lessons is not as interesting. I enjoyed using the webquest, it was more fun. I liked the activities and it was great that we got to work with pictures, video, sound and more.

S7: I would prefer that the lessons are always like that, using computers. I particularly liked how the webquest was built, I think it helped me during the process and it developed our creativity skills. (FG1, post project, 22/12/2012)

The most commonly reported reason among students for feeling that the webquest was helpful, was that its visual nature enhanced understanding (particularly through the use of moving imagery and animations). The former confirms other research that the visual, kinaesthetic and auditory forms of computer-assisted activities motivate students (Passey, Roger, Machell, McHugh and Allaway, 2003). Despite the initial technical, logistic difficulties, an overall positive response was registered with regard to the use of the webquest as reflected in the data.

## **Conclusions**

The findings from the implementation of the webquest method could be used as a basis for creating dynamic environments for ubiquitous learning. The inference is that within the technology enhanced museum learning environment developed the participating group of students had opportunities to widen their engagement with various composite discourses that came from their own multicultural, multilingual and technologically literate background. The use

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of the webquest method proved motivational for developing students' capacity in using new technologies. What is inferred from the evidence of the motivational aspect of technologies for learning in this case study is that if the webquest method is indeed an effective way of promoting independent learning and problem solving, it would be worthwhile to find ways of allowing children to explore software for themselves in a structured, supportive environment (Goodison, 2002, 294). It could be that the combination of the motivation such as enjoyment from the use of computers and the increased practice of particular tasks at an appropriate level can increase the amount of time students spend on particular activities (Higgins, 2003).

However, what is noticeable is that from the findings in this research it appears there are no inherent qualities in webquests for developing students' higher order and critical thinking skills. Even these students who have been characterized multimodally literate (Davies, 2006) or digitally natives (Prensky, 2001), are not 'per se' equipped to make critical connections and advanced cognitive processes. Using the webquest method based on the learning framework of the MMP proved that it has the potential to empower students' awareness of and uptake of literacy practice by taking into perspective the social aspects of literacy which entail the influence of variant cultures, languages and symbols to make meaning. There was evidence that the use of a webquest and the MMP framework succeeded to improve the level of students' multimodal awareness and critical use of the range of media and modes available in contemporary societies. Nevertheless, it cannot be claimed that the designed environment substantially addressed the full potential of ubiquitous learning. Dillenbourg, Schneider and Synteta (2002, 16) stress that there is still a need for developing new technology that supports specific pedagogical functions (e.g. group regulation or project management). The challenge however is to find an appropriate balance; technology enhanced learning should aim to reach a deep understanding of the relationship between technological, or even technical, choices and teaching/learning processes (Dillenbourg, et al., 2002, 15).

The case study reported in this paper is a unique example and any implementation of similar learning designs should be supplemented by additional research to sufficiently address the value of webquest methods to facilitate ubiquitous learning. For students to develop higher order skills and metacognitive understandings, requires further investigating the kind of practices and technologies that allow us to transform education in the 21st century.

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## ABOUT THE AUTHORS

## USING WEBQUESTS IN A MUSEUM-BASED MULTILITERACIES DYNAMIC LEARNING INTERVENTION: UBIQUITOUS LEARNING MADE POSSIBLE?

**Author Name:** Stefania Savva is a PhD candidate in Museum Studies at the University of Leicester in the UK. Following on from her undergraduate studies in Primary Education in Greece, she completed an MA in Art, Craft and Design Education in London in 2009. With experience of working as an educator in both formal and informal settings, Stefania is currently a Research Assistant at the Department of Multimedia and Graphic Arts, Cyprus University of Technology. The research project she is involved and is supervised by Dr Nicos Souleles explores the use of iPads in undergraduate art and design education. Overall her research interests include multiliteracies pedagogy, e-learning pedagogies and virtual learning environments, digital humanities, culturally responsive teaching and arts education.

**Author Name:** Dr Nicos Souleles worked in Higher Education in Sydney Australia as Head of the Department of Multimedia Design at KvB Institute of Technology (1995-1999), as Course Leader for the BA in Multimedia Design and Digital Animation at Cumbria Institute of the Arts in England (1999-2008), and Programme Co-ordinator at the University of Sharjah in the United Arab Emirates (2009-2011). Currently he is Assistant Professor at Cyprus University of Technology in the Department of Multimedia and Graphic Arts where he also runs a research lab titled 'Networked Learning in Art and Design'. Nicos was awarded a PhD in Educational Research from Lancaster University in England and is a member of the reviewer panel for the MERLOT Journal of Online Learning and Teaching (JOLT).