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STUDENTS' CONSTRUCTION OF A VIRTUAL MUSEUM FOR MULTIMODAL MEANING-MAKING: THE CASE OF A PILOT INTERVENTION

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Abstract

This paper evaluates a pilot design research intervention of 12-13 year old Secondary (Middle) students in Singapore constructing a virtual museum within an English Language (EL) curriculum which seeks to engage students through the infusion of authentic, rich multimodal stimuli. 78 students from two classes designed the layout of museum galleries based on their chosen themes, sourced and created multimodal artifacts, and presented their proposals and galleries to an imagined external audience and their peers. The research design and methodology, processes and factors driving the design and implementation of the project are described. Feedback from teachers and students on the benefits and limitations of the study are elicited through semi-structured interviews, survey and questionnaire forms. Recommendations to overcome problems identified are proposed.

1. Introduction

Interest in learning in museums, art galleries and science centres has gained over the years (Jackson & Adamson, 2009; Hawkey, 2004; Prosser & Eddisford, 2004) with advanced creative and meaningful developments in digital and interactive technologies (Sherman, 2009; Song et al., 2005). This has drawn attention to the role of such institutions in supporting and enhancing learning in informal learning environments with formal classroom learning and in promoting lifelong learning (Chung, 2010; Albany Institute of History & Art, 2008-2010). The provision of authentic learning opportunities mediated through various forms of technological platforms offers a challenge to educators, researchers and designers in the design and construct of such dynamic learning environments, particularly in this 21st century of learning.

In this age of rapidly increasing change and development in a globally digitized economy, 21st century skills are acknowledged as critical for individuals to thrive in the workforce (Metiri Group, n.d.). These skills of critical thinking and problem solving, communication, collaboration, and creativity and innovation have been identified to become even more important to organizations in the future (Lang, 2010). In line with the New Literacies movement that extends beyond traditional, print-based notions of literacy to the 'design' of meaning-making in multimodal ways, museum-based learning can be seen to offer informal, experiential learning through media rich experiences facilitated by authentic objects and structured into inquiry-led learning (Vavoula et al., 2009). Essentially, these work towards 'new forms of literacies that emphasize the various modes of meaning-making' (Tan, Bopry & Guo, 2010, p.15) through a range of semiotic resources (Kress, 2000). Multidimensional learning is encouraged within a dynamic and engaging learning environment (Johnsson, 2003) where learning is activated through engagement with various stimuli (audio, visual, spatial) through specially created museum platforms.

Our study drawn from a larger investigation (Ho, Nelson & Mueller-Wittig, 2008) involves Singapore teenage students in conceptualizing, designing and constructing museum galleries including the design layout and artifacts for a virtual museum which best expresses their self, culture and interests as a community of young people. This involves exploration in the creative, adaptive use of audio, visual, video input, three dimensional virtual and/or augmented interactive, digital resources in the process of multimodal composing of their virtual museum constructs. The student-generated, self-directed virtual museum construction based on students' choice of themes, use of a mix of semiotic resources with opportunities for 'hands-on' exploration, discovery and display of rich, authentic objects, support a learning approach of active inquiry and engagement.

This paper describes our research study and evaluates the pilot intervention carried out with two EL classes. We begin with a literature review of museum-based studies in technologically-mediated contexts before presenting the theoretical underpinnings of the study and the pedagogical principles informing the design. Information on the research design and methodology then follows. The strengths and drawbacks arising from the intervention are discussed with feedback from teacher and student participants. We conclude with the implications and recommendations to overcome problems identified.

2. Literature review

Studies of virtual museums in various contexts have encompassed a range of technologically-mediated interventions with the development of various tools and resources to support learning. Barak et al.'s (2009) MOSAICA web 2.0 based technologies aimed at the preservation and presentation of cultural heritage resources (photos, documents, video, sound, etc.) from Israel, France, and Poland through an interactive, educational experience. Findings indicated benefits in terms of knowledge and positive attitudinal gains towards diverse cultures, ease of use, and attractiveness through hypertext narratives. Vavoula et al.'s (2009) Myartspace mobile phone service for web-based, inquiry-led museum-based learning supported pre-, during- and post-visit learning activities in the museum and the classroom. The potential and effectiveness of the service for enhancing learning between classrooms and museums were examined on a micro level concerned with issues of usability, meso level which examined educational effectiveness in terms of learning breakthroughs and breakdowns, and a macro level which evaluated the impact of the new technology on school museums visit practice. The service proved effective for students' museum information gathering for subsequent classroom construction and reflection. Concerns included structuring museum visits, issues of viability and costs on a regular service and on a wider level. De Almeida & Yokoi's (2003) development of interactive, virtual tour guides to online exhibitions establishes a customized, person-to-person dialogue while guiding users through virtual exhibitions. Attention was focused on design of motivational structures, emotional and personality traits and behavior control systems for characters to perform in context-specific environments, with well-defined goals and social tasks. Preliminary results with university students yielded positive gains in general, motivating students to explore the exhibition through the audio and gestural responses of the tour guide, providing adaptive guidance for engaging storytelling and promoting users' participation throughout the virtual tour.

While these studies on museum-based learning mediated through technological platforms and specially created tools and resources have shown potential for yielding positive

benefits on participant learning and involvement, there remains a dearth of investigations into documented research in educational contexts which involves student-generated design and content for virtual museums constructed primarily by, for and with young people themselves as a multimodal representation of youth culture with the attendant ideals, beliefs, values and perspectives. This study fills a gap in current educational research in the local context and region.

3. Theoretical underpinnings

The study is anchored within the multiliteracies perspective of the New London Group (1996) in extending beyond the constraints of conventional written and spoken language to tie in with the culturally and linguistically diverse landscapes and the multimodal texts traversing these landscapes. As a multiliteracies-oriented project, it seeks to draw on students' prior knowledge, background life experiences, lived memories and cultural forms of representation in order to project student voice and identity. Meaning-making is thus seen against specific cultural, social or domain-specific contexts. Further, given the characteristic nature of new information and communications media, meaning is created and conveyed through increasingly multimodal representations—written modes of meaning interfacing with oral, visual, audio, tactile and spatial patterns of meaning, and particularly those typical of the new digital media (Kalantzis & Cope, 2008). Virtual museums as learning environments can serve to unlock the semiotic potential of multimodality in promoting students' attention to meaning through sounds, music, image, movement and text with a focus on writing as a multisemiotic resource to construct meaning and project identities.

The study in facilitating a constructivist (Bruner, 1993; Von Glasersfeld, 1987,1995; Jonassen et al., 1999) learning environment through the use of different modes of knowledge representation and interactive digital media, engages students in an active exploration and co-construction of participants' own knowledge, beliefs, interest and perspectives. At the same time, as an inquiry-driven (Kuhn, Black, Keselman & Kaplan, 2000; Dewey, 1938,1991) form of learning, students direct their own investigatory activity as they formulate questions, plan their activity, and draw and justify conclusions about what they have learned' (Kuhn, Black, Keselman, & Kaplan, 2000, pp. 496–497).

4. Research design and context

This study adopted a design research (Cobb, 2001; Collins, 1992; Collins, Joseph & Bielaczyc, 2004) approach with researchers working closely throughout the study with project officers from a specialist computing background and classroom practitioners in designing and implementing the project within a school language curriculum over a specified period of time.

The study is timely in supporting the Singapore Ministry of Education (MOE) 2010 English Language (EL) syllabus, specifically with regard to a focus on its multiliteracies component. It reinforces the EL syllabus philosophy 'A strong foundation and rich language for all' (MOE, 2008, p.13) as it works towards 'enriching the EL curriculum through infusion of authentic, rich texts at all levels' with 'extensive opportunities to engage in creative and sustained writing and integration of information and media literacies at all levels' (MOE, 2008, p.9). The use of technologies developed around a virtual museum is aimed at enhancing students' creative capacity for designing meaning in digitally-mediated contexts.

The three phases of the intervention comprised the pre-project, main intervention and the post-project phases. Prior to the main intervention, a guided one and a half hour museum visit to a local cultural museum in Singapore was specially arranged for the students. This was aimed at exposing students to a real-life physical museum, raise awareness and stimulate interest in the purpose, design and artifacts of an actual museum. This was followed by preparatory workshops comprising three three and a half hour sessions. The primary purpose of this workshop was to orient student participants to the nature and goals of the project. Discussions and activities were carried out to sensitize students to the types of multimodal literacies required for meaningful 21st century communication.

The ten-week main intervention integrated the content of the school EL curriculum in terms of the language skills required. Formal report writing skills, for instance, was taught to students in the regular EL lessons *prior* to the project task of writing a formal letter to the Museum Director with their proposed museum gallery proposal. Project tasks and activities were aimed at reinforcing the regular EL curriculum and not viewed merely as additional tasks with no relevance to the curriculum.

The post-project phase comprised final student and teacher interviews reinforced by survey forms and writing tasks in line with the curriculum focus. A combined sharing of presentations of the final museum galleries from both classes was scheduled.

5. Methodology

5.1 Study Site

The pilot study was conducted in the third term of the school year with the consent of the Principal, English Head of Department and 2 staff from the English Department who were teaching 2 Lower Secondary EL classes. The school was a 'Special Assistance Plan' (SAP) school in Singapore with a bilingual immersive environment where both English and the mother tongue were taught at first language¹ level. It was also identified as a Lead ICT school which sought to spearhead information and communication technology (ICT)-mediated pedagogic initiatives in various subjects. The students, prior to the period of the pilot intervention, were introduced to different software such as Flash, Adobe Photoshop and ULEAD Video Studio through school-based workshops. The entire intervention for two classes of triple EL periods of one and a half hour weekly sessions over ten weeks was held in two of the school computer laboratories where each student had access to a desktop computer wired to the Internet.

5.2 Subjects

Seventy eight 12-13 year old male and female students from two classes (thirty eight and forty students in the two classes respectively) participated in the study. The majority of the students came from a predominantly middle to lower socio-economic background with an average to above average academic level. Students, parents and teachers involved were informed of the nature of the project and its objectives, and provided signed written consent prior to the implementation. Each of the two classes was divided into eight groups of four to five students each to ensure maximum participation and engagement. A total of sixteen groups of students from the two classes worked on their museum galleries based on selected themes of their own.

A pre-project survey was administered to students to determine their background and exposure to museums and various forms of technology. 84.6% of students have visited at least one museum in the real world before the onset of this study, with the main National Museum of Singapore leading the pack with 80.3%. Of these, 86.7% indicated that they enjoyed their museum visits and found them meaningful as they learned more about the local culture and history. With regard to students' technology exposure and access, 84.6% of students owned a personal computer/laptop/notebook and Internet access at home. The top three IT-related activities for students were Web-Surfing, Internet Chat and Online Gaming.

6. Feedback from participants

The instruments used to elicit participants' feedback comprised questionnaire and survey forms, and semi-structured, face-to-face interviews. The pre- and post-project teacher interviews focused on their initial concerns and benefits gained from both their and their students' participation in the study.

6.1 Benefits for teachers

Multimodality and EL curriculum

Over the ten weeks of collaboration, the teachers felt they progressed from having no prior knowledge of incorporating multimodality into the language curriculum to having the opportunity to be directly involved through a personal classroom experience in using various semiotic resources with their students to enhance their level of understanding of multimodal literacy and engagement.

Interpersonal awareness of students

The teachers felt the project increased their interpersonal student awareness as they became more engaged with students and gained understanding of their students' interests and presentation skills. During the different phases of group work, teachers also learned more of their students' group dynamics on intra- and inter-group levels.

6.2 Concerns

Structure and organization

Tighter structure and organization with more explicit instructions and procedures, particularly in the written format for students were recommended. Graphic organizers for the design of detailed and structured plans were recommended with more guidance from teachers and facilitators, and the availability of planning folders prior to lessons conducted with more time for exploration could be built in during the conceptualization and construction phases.

Teacher preparedness

Teachers faced initial anxiety and insecurity in the early stages of the implementation, given their lack of exposure to design research of this nature and also the technical competency to work with specific design software required, particularly for the three-dimensional (3D) modeling required.

6.3 Benefits for students

Awareness of and sensitivity to multimodal expression and meaning-making

Students showed an awareness of multimodal ways of expression and meaning-making. For a group working on Japanese comics, visual and audio effects were cited as critical:

‘Like when you combine audio with a picture, it may actually tell a different story to just a picture. Maybe the audio is something about.. talking about the characters, talking about the other side of the character, like the picture don’t show the good side of the character so the audio will actually give the visitors a different idea of what the character thinks.

This was further reinforced by the role of moving visuals with audio in videos for representing the Music theme:

‘Video clips because it will be like most interesting to the target audience. They don’t have to read and they can watch the moving images, see the pictures and also hear at the same time like listen to the audio’.

There were emergent signs of students displaying sensitivity to the impact of various semiotic resources for specific purposes and contexts. For instance, text was favored for content-description of Korean dramas:

‘I think text is also easy to understand because it is the basic way where people try to communicate. Because sometimes for pictures, people might have different feelings towards the visuals’.

but when it came to the specifics of attractions from the Seven wonders of the world, visuals and color were recognized to play a significant role:

‘Because text is so boring. It is only black and white in color but then pictures have colors because different colors you can convey different emotions to our visitors; for example like white, black and grey are emotions of sadness, and red and pink of joy.. different colors convey different emotions to our visitors so this is more interesting than reading text- black and white text is so boring which cannot attract the teenagers because teenagers don’t like to read’.

For a group working to display aspects of the Youth Olympic Games hosted by Singapore:

‘A person might not be able to imagine, like let’s say for example a person scores a goal and then he is very happy but sometimes words might not...might not also describe how happy he is but a picture can show his expressions and maybe how he reacts.’

Language choice and preference

When it came to the choice and distinctions between EL and Mandarin, some students showed a preference for where their strengths were:

‘I mostly speak Mandarin to my friends so maybe I will be able to explain things better using Mandarin’ Likewise, another said that Mandarin was better to explain things and also being

closer to her heart in terms of cultural and the theme that they were working on. Perhaps familiarity with the language helps to breed the confidence in the application of the language.

This contrasted against students who showed awareness of an audience beyond themselves when they felt that museum visitors who may not be conversant in Mandarin will prefer English:

‘Not all visitors to the museum know Mandarin so English is still the best to help them understand what our gallery is all about’.

These students displayed understanding of the functional role and purpose of each language which accounted for their choice in relation to the perceived wider audience and targeted museum context.

Gains from group work

The positive benefits of group work over a sustained period ranged from teamwork and collaboration, learning more of their peers, exploring different perspectives, communication skills, time management, emotional support. With regard to teamwork and collaborating in a group, students generally felt that they benefited from working with each other:

‘Because each of us has our own ideas right, so when we combine it, it will become like one great idea. So it is like, actually like add more ideas to get a greater one. So for us to accomplish this idea right, it takes more ideas for it to work.’

and learning more about their individual classmates:

‘I got to learn more about my team mates and found out that besides being humorous and full of novelty ideas, he actually possessed the qualities of a leader from the way he moved us together to complete different objectives during this project’.

Further, it allowed them to explore different perspectives and broaden the scope of their responsibilities in mixed gender groupings:

‘Yea I think interacting with the opposite gender tend to be where some sparks will fly and there will be like quarrels and wars so yea war but not really on that scale, but in the end, it will always be back to the normal situation where we’ll work together again. And so it is like he said, we can foster good friendship yeah’.

Communication skills and time management were also cited as gains for students as they learnt to work together efficiently in various areas for their research and take responsibility for specific tasks within their individual groups:

‘One advantage is that actually can divide the work so one person can concentrate on one movie in that area so we don’t have to waste a lot of time to look for irrelevant resources or maybe we are not familiar with the movie and we have to find the pictures of the movie and we ended up finding something else.’

7. Recommendations

Recommendations for addressing problems identified focused on the technical aspects of the implementation, curricular and pedagogical issues.

7.1 Technical issues

The nature of the technology platform adopted, be it virtual or augmented, requires appropriate modeling with adequate sampling from the computing staff right from the initial stage of the intervention. Students could be encouraged to source for and identify actual realia or real-life input relevant to their group's theme which could serve as a platform for the computing staff to develop the bridging of the real life input with the virtual and augmented reality.

Given the nature of this project with the use of specific software and technological tools and resources, student groups could be assigned to the respective computing staff right from the beginning (e.g. four groups in one class to one staff). This deliberate, strategic allocation of students to specialist staff is to ensure targeted and focused assistance over a sustained period so that students could seek advice, even during the initial stages of gallery floor plan design and multimodal resource selection for their galleries. Regular monitoring also ensures students are kept on task during the development phase of their gallery construction.

7.2 Curricular issues

Pre-project and main intervention links

The pre-project visit to the local cultural museum could be more tightly integrated with project curricular goals in the main intervention for greater reinforcement and support. Students could be briefed prior to the actual museum visit on what to look out for (e.g. museum floor plan; artifacts arrangement and display; interactive components, descriptive captions of exhibits). This extra step will be helpful to students when it comes down to the actual planning, design and construction of their museum galleries.

During the pre-project workshops, more sample galleries and artifacts could be showcased. In addition to the sample artifacts from the computing staff to show concrete realizations of the specific forms of technology adopted, display of the better quality student-generated museum galleries and artifacts from the pilot study would be invaluable input for the next round of intervention.

Multimodal skills, self and critical reflection

Building in more time and providing clearer instructions for students with samples provided through teacher modeling of what is expected would facilitate students' writing tasks as in the descriptive captions of their museum artifacts. This would enhance their awareness and deepen their understanding of image-text relations in multimodal constructions.

Regular and periodic students' self reflections in the form of a blog entry during the third, sixth and ninth weeks of the study are recommended. To facilitate easy access and posting to the project portal, student folders for online uploading of their work could be made available by the school technical support staff prior to the intervention. More time could also be built into the

intervention to facilitate individual students' critical reflections and evaluations of each others' museum galleries and artifacts towards the end of the intervention.

8. Conclusion

This paper focuses on a pilot intervention of teenage students' engagement with multimodal meaning-making through constructing a virtual museum within a language curriculum. Museum galleries are designed based on students' choice of themes with design layout and artifacts created in an attempt by young people to represent their selves, interests and culture. Preliminary feedback shows emergent signs of students' awareness of multimodality, attitudinal and motivational changes towards language learning, and the development of soft skills of teamwork and collaboration. Concerns raised include the initial technical aspects of the implementation, and the need for a tighter, closer integration of curricular and pedagogical issues with the technological platforms and tools adopted. The study has demonstrated the viability within real world classroom constraints of an exploratory technologically-mediated intervention to enhance multimodal language learning and literacy skills appropriate for the 21st century.

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Notes

¹ Since 1966 English has been a compulsory subject for all schools in Singapore and since 19987 it has been the medium of instruction for all subjects. English is designated the First language (L1) in the national school curriculum although the majority of Singaporean children may not have English as their first language in their home environment. In SAP schools which were well-established Chinese-medium schools in the past, the ethos and environment of SAP schools enable the pupils to be effectively bilingual in both English and Chinese, and inculcate in them traditional values in a Chinese school environment with students taking Mandarin at a Higher Chinese level (MOE, 2010) equivalent to English at First Language level.

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