Constructivist Learning and Mantle of the Expert Pedagogy
A Case Study of an Authentic Learning Activity, the "Brain Game", to Develop 21St Century Skills in Context

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Abstract: Making new meanings and relating them to existing knowledge and systems is at the heart of the constructivist approach to learning. Authentic learning builds on this by exploiting the power of information and communications technology (ICT) and is often delivered as a project based learning experience. Authentic learning aligns well with the 21st Century (21C) approach to teaching and learning which emphasises the development of key skills, such as problem solving, creativity and collaboration, along with the mastering of curriculum content. Against this backdrop this study seeks to explore a particular approach to technology mediated, authentic, project based, constructivist, 21C teaching and learning which uses the "Mantle of the Expert" pedagogy from drama education as a way of structuring an innovative learning experience. Mantle of the Expert learning explicitly uses role-play in which, within an imagined context, learners take on the role of experts within an enterprise and work together to solve a problem. The "Brain Game" is a model activity that immerses learners within an authentic context, collaborating with peers to manage a project within deadlines. Technology is a central element of the intervention as it provides a means for learners to engage in role-play through email, researching information online and producing deliverables. 144 students aged 13-14 from 11 schools participated in an exploratory case study involving two one-day workshops. The findings of the study suggest that a technology mediated approach was effective in developing students' 21C skills and that "Mantle of the Expert" is an appropriate pedagogy to use in designing authentic learning experiences.

1 INTRODUCTION

Constructivist learning theory argues that students can learn effectively when engaged in project based learning, connecting knowledge and ideas while guided by a teacher in a facilitating rather than direct teaching role.

Authentic and Project based learning are two strategies that resonate with Constructivist learning. Authentic learning is characterised by activities based on real-life, complex problems without binary solutions (Lombardi, 2007). Herrington, Oliver and Reeves (2003) propose that ten unique elements of design make for authentic learning. These elements are a broadly defined as: a challenge with real-world relevance, collaborative learning, reflection, integrated assessment, an investigation sustained over a period of time, multiple information sources, interdisciplinary content, provision for learners to openly interpret outcomes and a deliverable product.

Project Based Learning (Thomas, 2000) involves complex tasks, based on a problem or challenge that engages students in problem solving, decision making or designing, allowing students to work with a degree of independence that leads to a deliverable outcome (Jones, Rasmussen, and Moffitt, 1997; Thomas, Mergendoller, and Michaelson, 1999). Additional features of Project Based Learning include the use of authentic content within the project, teachers as facilitators (Moursund, 1999), and co-operative learning (Diehl, Grobe, Lopez, and Cabral, 1999). The Project Based Learning approach lends itself to the acquisition of 21st Century Skills, such as collaboration, problem solving, etc. (Bell, 2010).

Although a body of literature can be found on constructivist, authentic and project based pedagogy and the perceived gains of their application for learners, translation of these theories to tangible activities for educators to implement with their students could be further explored. This study

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presents one such activity model the "Brain Game" that could be applied to a range of topics to explore content knowledge and to promote skills development. This research also considers ways in which technology and the drama pedagogy Mantle of the Expert, both integrated in the design of the activity model, can enhance learning activities that are constructivist by nature.

The "Brain Game" can be based on any real-life challenge or project a learner faces. In this study a school leadership project provided a context for the activity. 144 students participated in the research project as part of their involvement with an action research project focusing on changing school culture (see www.tcd.ie/ta21). A core element of the project is a "Leadership through Service" activity in which, to help develop student leadership skills, each participating school is required to carry out a community service project, with the students leading the venture. Each of the 144 students involved participated in two training workshops of one day each, in the Bridge21 learning space on the authors' university campus.

2 LITERATURE REVIEW

2.1 Authenticity in Learning

Lombardi (2007) proposes that students become more motivated to learn when learning tasks simulate their real-life counterparts, as this gives a sense of authenticity and relevance to learning. A broadly-defined or ill-structured problem with numerous possible solutions and interpretations can mirror the complexities and facets of problems one encounters in life (Hong 1998). Furthermore, approaching ill-structured problems has been identified as a crucial skill for educators to develop with students in their schools (National Research Council, 1996). Using multiple sources of information to solve a problem is an element of authentic learning practice that requires learners to critically evaluate and compare different sources of information. This could help to develop information literacy, a skill which has become a growing interest for educators (Bruce, 1999; Eisenberg, Lowe and Spitzer, 2004), and is a component of the Partnership for 21st Century Learning's "Information and Media Literacy" subset (Kay, 2010).

Thomas (2000) offers five criteria to be considered as key elements of Project Based Learning.

1. Projects take a central, not an ancillary place in exploring curricular content.
2. The project is driven by a question or ill-defined problem.
3. There is a process of constructive investigation in which new skills and new understanding are assimilated by the learners.
4. Projects are notably student-driven, allowing for independence and some degree of choice.
5. Projects are authentic and not "school-like".

It can be seen, that these criteria for Project Based Learning share common elements with Authentic Learning as defined by Lombardi (2007). Of particular interest is the element of authenticity. Thomas (2000) elaborates on this potential for Project Based Learning to be authentic; by the context of the project work, by the involvement of real-world collaborators within the area of study and authentic deliverables or the use of a real-world criteria for assessing the projects. From his review of research on Project Based Learning, Thomas (2000) observes that students can find the challenge of self-directed projects rewarding, particularly in such areas as time-management and using technology effectively.

Another method of creating authenticity within learning could be to actively engage learners and teachers in role-play. Although role-play´s potential as an aspect of project-based or authentic learning remains to be fully explored, benefits of role-play in learning have been long established (Blatner, 2013). It is suggested that when engaged in role-play, learners can apply content in a relevant context, engage in decision making by adopting a new persona and see the relevance of their learning for handling real-world situations.

2.2 Mantle of the Expert

Mantle of the Expert is an inquiry based approach to teaching and learning from the field of drama studies (Heathcote, 1994). Students reach learning outcomes by assuming roles as "experts" within an imagined enterprise to solve a problem. It is proposed by Heathcote (1994) that by taking on roles as experts, children can experience the kinds of responsibilities, challenges and problems that adults do in the real word. In Mantle of the Expert learning, problems are framed as professional tasks so that learning has a relevant and immediate purpose (Aitken, 2013).

Abbot (2007) considers the crucial role of the teacher in Mantle of the Expert learning - teachers must structure tasks effectively. In this way teachers are positioned as enablers of knowledge rather than givers of knowledge (Heathcote and Herbert, 1985).

As well as presenting the context, the teacher's role is to maintain an element of tension by facilitating further problems to be addressed as part of the main task. These problems can either occur naturally as discovered by the learners through their interactions or can be strategically introduced by the teacher. This element of tension and problem solving adds authentic depth to the task, and furthermore scaffolds students to realise the complexity of learning in the real world (Aitken, 2013).

The Mantle of the Expert pedagogy proposes more than just role play: learners are given status as experts and this expert "mantle" of leadership, knowledge, competency and understanding will grow around the child as they work in an imagined context (Aitken, 2013). For the development of skills and acquisition of knowledge to occur successfully, the teacher must prepare the ground carefully, combining the core elements of Mantle of the Expert.

Although the Mantle of the Expert approach is validated by studies of its application across the primary level curriculum (James and Lewis, 2012), there is vast potential to explore its viability as a pedagogy for second level. Moreover, the use of technology as a tool within Mantle of the Expert has yet to be considered meaningfully. Integration of technology with Mantle of the Expert could be an interesting development of the pedagogy for the 21st Century.

3 RESEARCH FOCUS

This study explored the potential for developing 21st Century skills within the context of a Mantle of the Expert inspired, technology enhanced intervention, called "Brain Games". The approach fostered critical thinking, collaboration, digital literacy and communication. The activity involved: collaborative working, real world information sources, authentic deliverables, role play through email, ill-defined problems, sustained pressure to meet deadlines, critical thinking, digital literacy and communication.

The intervention was carried out using the Bridge21 model of team-based technology-mediated learning in a purpose designed learning space on the authors' university campus (Lawlor, Conneely and Tangney 2010). The Bridge21 model has been shown to be suitable for: fostering intrinsic motivation (Lawlor, Marshall and Tangney 2015); promoting the development of the 21st century skills of collaboration, communication etc. (Johnston, Conneely, Murchan, Tangney 2015); supporting peer learning (Sullivan, Marshall, Tangney 2015) and delivering curriculum content (Tangney, Bray and Oldham 2015, Wickham, Girvan and Tangney 2016). With its emphasis on teamwork, use of technology and fostering skills Bridge21 offers a very suitable pedagogical framework, and learning space, in which to implement the "Brain Game" activity.

Within the study, the following questions were addressed.

- How did the use of technology enhance the Brain Game intervention?
- Which distinct skills were addressed and developed in the intervention?
- How authentic was the experience for participants in relation to the real community projects they faced?

4 RESEARCH DESIGN AND METHOD

144 students aged 13-14 from 11 schools attended two stages of "Brain Game" workshops in the Bridge21 learning space on campus as part of their training for implementing community service projects.

Stage One workshops introduced the participants to the nature of community or school service projects. After icebreakers it was explained to the teams (4 students per team) that for the remainder of the day they would be taking part in an activity designed to simulate the process of planning, researching and developing a school based community service project. As such projects typically happen over a number of months the 2 hours dedicated to the activity during the workshop reflected two months of real time with approximately 30 minutes in the "Brain Game" correlating to a month. It was explained to the participants that each "month" had a number of deadlines - such as gaining permission from the Board of Management for their project, and submitting monthly progress reports. Teams were instructed that all communication they needed to make during the activity should be done through emailing "The Brain" which provided all outside world contact such as school staff, sponsors, potential guest speakers etc. Each team had two desktop computers at their disposal to send emails and research any information required online. (Teachers fulfilled the role of the "Brain").

At the end of the "Brain Game", teams presented on their experience to their peers, highlighted what they had managed to achieve and the challenges they had encountered.

The Stage Two workshops were held two months later. In that time the school groups were encouraged to discuss and explore potential projects they would like to take on. The depth of this exploration varied between schools but all school groups arrived at the stage two workshops with chosen topics for their projects and these were the focus of planning for the day.

Following the initial ice-breakers and team building exercises, the participants were again divided into teams of four. Participants were reminded about how the "Brain Game" worked, which was similar to Stage One except this time each team was responsible for their own activity and regularly communicating with their larger school group. The inter-team communication was facilitated by "monthly" school committee meetings with representatives from each small group meeting to compile a progress report to send (via the "Brain") to the board of management. The sub-committee design of the stage two "Brain Game" was introduced to offer the participants some experience of managing an expansive workload by breaking into smaller teams, each responsible for a specific area of the project.

5 DATA COLLECTION AND FINDINGS

Data collection was structured as follows: direct observation during the workshops; post workshop questionnaires following both workshops (n=100 and n=123 respectively) and focus group interviews (n=2) following the implementation of the participants´ community service projects. This provided an opportunity for each data collection stage to influence the design of the next as illustrated in Figure 1.

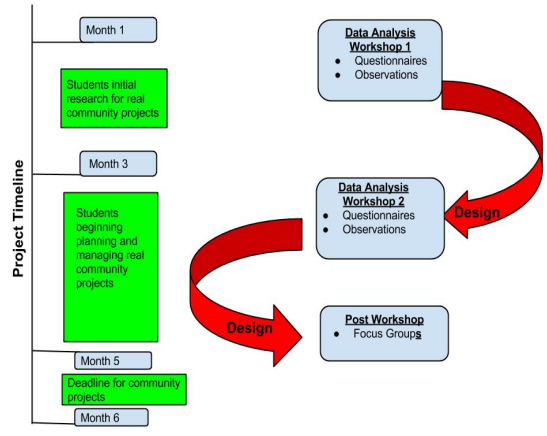

Figure 1 : Data Collection Timeline.

Questionnaires were comprised of statements with Likert scales and open response spaces to justify or comment on Likert choices. An open coding process was used to extract codes from these open responses and grouped by four emergent themes;

- ICT skills development.
- Intervention being realistic or life-like.
- Relevance to actual community service projects.
- Other skills development.

5.1 Participants Perceived Value of Experience

When asked to indicate their perceived value of the experience of the “Brain Game” intervention in both workshops students gave a significantly positive response (n=123) with 118 responding with “Very Valuable” or “Valuable”. When asked why they answered as they did, 94 participants provided responses. 36 referenced working on a team with students from another school being worthwhile. 28 mentioned reality or real-life and how they felt that this workshop had prepared them for either the reality of the community project they faced, other named projects or generally coping under pressure. Although these two reasons emerged as the most commonly shared amongst the participants, there were a variety of other reasons students found this experience valuable including the use of technology. It was also mentioned that the workshops were fun or enjoyable.

Open responses speaking to this theme included the following.

“Great questions by brain like real life.”

”It helps you to be a better leader, to communicate with others and to organise things”.

5.2 Participants Perception of Technology in Intervention

When asked how useful they considered the application of computers in both workshops, 111 participants chose “Very Useful” or “Useful” (n=123). The most prevalent theme that emerged from the open responses was the beneficial use of email within the intervention. This could reflect both the basic act of emailing and the more challenging skill of using email as a means of formal communication. What the researcher considers to be a more relevant issue is that at beginning the workshops participants did not display experience in using email as a means of formal communication. Teacher and mentor observations as well as the researcher’s analysis of email exchanges at Stage One

workshops noted the participants' lack of understanding on how to structure a formal correspondence in email. For example crucial pieces of information were omitted, text-speak and inappropriately casual language were used. It was conveyed in the focus group interviews that participants' were using email with some degree of success in communicating with stakeholders in order to implement their real community service projects, which could suggest a transfer of some formal communication skills. Participants said:

"It helped me organise things like emails for events."

"It´s how you communicate with companies"

"Because we got some questions from teachers and gave us ideas".

Other responses on the use of computers mentioned how they could access online information during the intervention using the computers:

"We had access to a lot of useful information and we could make better decisions with this"

"We needed to estimate the prices of things we needed to get."

From focus group interviews there was some evidence that participants were accessing information online to research and develop their real community projects.

5.3 Potential for Skills Development

The analysis of stage one data suggests that the students perceived themselves as has having developed four main skills: teamwork; leading projects, using computers to help plan and organize projects and presenting ideas to others. In stage two questionnaires, the participants were asked to indicate on a Likert scale to what extent they felt they had developed each of these skills.

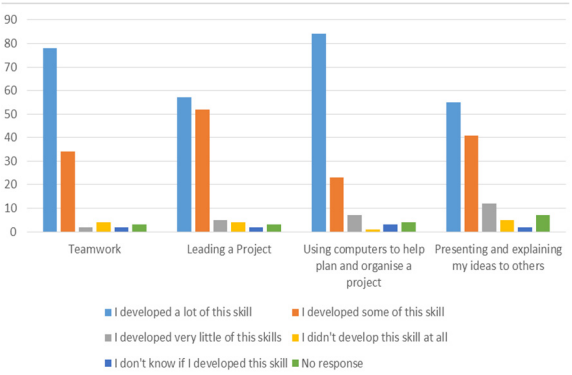

Figure 2 : Participants perception of skills developed during the workshops.

In the "Brain Game" intervention, participants' were working together towards a shared outcome, sharing responsibilities by taking on roles within the team and supporting one another. Therefore, it was unsurprising that participants' self-reporting of developing skills in collaborative working emerged strongly from the data. This was further supported by the results of the Likert scale shown in Figure 3 above. Regarding communication skills, it is not absolutely clear whether participants meant that they gained experience from the internal communications of their team within the workshops, their communications with the "Brain" or by presenting their ideas and experiences to others. The authors suggest that it likely to be a combination of all three. In the two focus groups participants mentioned instances of communicating either with their peers or with external stakeholders to implement their real community projects and related this back to skills and experience they had gained from the workshops.

Two focus group interview, with small groups of students, were conducted by the researcher two months after the stage two workshops. These interviews provided an opportunity to further explore the finding of the stage one and two questionnaires. During this time the interviewees were engaged in implementing their real community service projects. The interviews were semi-structured and focused on participants' experience of the intervention and implementing the real projects. Emergent themes from the interviews included a perceived transfer of skills from the intervention to the real projects and how realistic they felt the "Brain Game" was as an activity:

"It helped us in my opinion really much because we got advice and how to work as a team and how to plan and organize stuff."

"*You felt like you were actually proper working in an office."*

"It makes you feel like really grown up or something."

6 DISCUSSION

Based on analysis of data collected, the authors contend that the "Brain Game" intervention provided a valuable authentic learning experience for participants. Findings suggest that through their experience of the workshops the participants evidenced increased confidence in their ability to implement their community service projects, in working in collaboration with their peers and had a greater sense of independence. There was also strong

self-reporting that they had developed skills in collaborative working, communication skills, critical thinking and digital literacy, through their engagement with the ”Brain Game”. Some evidence suggests that for at least the focus group participants that these skills transferred to their work on the community service project.

6.1 Use of Technology

A consistent theme, throughout the data collected at all three stages, was the participants' perception that they had gained skills in using computers – c.f. Figure 2. This acknowledgement of developing general ICT skills was not always elaborated upon by the participants but data suggests that this is related to the summation of all ICT experience encountered by the participants during the workshops including emailing, researching information and other skills in document editing etc.

Arguably, the most significant contribution technology made in the intervention was to enable an authentic role-play through email. An issue, strongly emerging from qualitative data, was that the intervention was “realistic” therefore allowing participants' to immerse themselves in the simulation. An “imagined context” to develop authentic skills and knowledge is at the core of the Mantle of the Expert teaching pedagogy (Heathcote and Bolton, 1994) in which learners adopt the role of experts within an enterprise to solve a problem framed and sustained by their teacher. The research suggests that this element of belief or investment in the simulation on the part of the participants could not have been as strong without email providing a platform for role-play exchange between the participants and their teachers.

A significant theme from the qualitative data is that participants felt that they had gained experience in emailing as a result of the workshops. This could reflect both the basic act of emailing and the more challenging skill of using email as a means of formal communication.

Participants suggested that they had learned how to send an email and this is supported by observations during the Stage One Workshops where a number of participants initially had issues with attaching documents and sending mail. Although not a question asked directly of participants in questionnaires, this suggested that the many of participants were unfamiliar with the basic procedures of email. This echoes the findings of (Bennett, Maton and Kervin 2008) that young people are not always the technically sophisticated “digital natives” they are sometimes assumed to be. Aside from knowledge of the mechanics of email, the participants' lack of skill and experience in structuring formal correspondence emerged as an interesting finding from the study and suggests that the typical protocols which adults apply to the use of email may not map to adolescents, as participants tended to initially transfer a style of language used in communication technologies familiar to them such as texting and social media messengers to formal email correspondence. Van Der Meij and Boersma (2002) caution that pre-adolescent understanding and perception of using email is removed from its typical adult business usage. A further study could isolate and give further consideration to the components of formal communication skills developing in relation to the intervention.

Exchanges with the “Brain” prompted students to seek out information online, with participants' engaging in tasks such as quoting prices of materials they would need for their project or finding out the opening hours of venues. Observations of participants at the Stage One Workshops implied that although certainly capable of searching for information online, participants lacked the higher order skills to assess and consider which sites would be more relevant, appropriate or helpful. The mentors, who helped the teams during the workshops, provided some support in this regard by suggesting types of websites to participants. From the focus group interviews, participants acknowledged the transfer of the skill of finding information online in the workshops to the implementation of their real community projects, asserting that it was something they could do “for themselves”. It also empowered learners to actively seek out information, rather than rely on a teacher to provide it. This kind of autonomy and self-direction, through which internet access can empower students, has been identified by (Mitra and Dangwal, 2010) as having powerful potential in learning.

In a further study, this aspect of developing digital information literacy could be investigated to a greater extent.

6.2 Skills Development

At all stages of data collection, the participants made reference to skills that they perceived they had gained of as a result of their participation in the intervention. These skills were referred to in the context of general personal awareness of a rise in confidence and personal reflection on the sense of attainment of these skills.

6.2.1 Collaborative Work

Collaborative working is considered a key "learning and innovation skill" within the Partnership for 21st Century Skills framework (Kay, 2010) and is a core element of the Bridge21 learning model. Following the use of technology, teamwork was reported by participants as the second greatest area of skills development. In addition to acknowledging the development of collaborative working skills, many participants also offered reasons why they thought this skill was important to develop in relation to work and college. An interesting point to note was that the students mentioned the future beyond school and not school itself when recognising the need to develop the skill of working collaboratively. This may point at a lack of opportunity as perceived by students to work collaboratively at school, and also the participants' own understanding of the ability to collaborate as a life skill.

6.2.2 Communication Skills

The "Brain Game" intervention afforded participants' an authentic opportunity to develop their communication skills in the areas of interpersonal communication, presentation in public and formal writing. In both Stage One and Stage Two post-workshop questionnaires there was self-reporting on the development of these skills. There was also some evidence of the transfer of these skills from the workshops to the participants' implementation of the real community service projects as reported in the focus group interviews The researcher contends that a further study could isolate and examine the different opportunities for developing communication skills that the intervention affords, in particular the concept of formal correspondence.

7 CONCLUSIONS

The findings of this study suggest that the "Brain Game" intervention was perceived by participants as a valuable and engaging learning experience. Furthermore, participants self-reported the development of key constructivist skills including, collaboration, communication, and digital literacy. While follow up focus group interviews suggested that the "Brain Game" served as an impetus for putting these skills into practice with the real community projects. But the workshops were more than a practice run. Fundamentally, the "Brain Game" immersed students in an authentic context within a team of peers to solve a problem. This immersion scaffolded the development of skills and knowledge needed for their real project by the learners through their engagement with the task. While this implementation can be considered as a positive endorsement of the "Brain Game", an advanced exploration of the method applied to a number of learning contexts would give greater validity and reliability to the findings. Within the bounds of this study, the "Brain Game" is presented as an innovative model for authentic learning, greatly enhanced by technology as a means of role-play, sourcing information online and working within deadlines to produce deliverables. Students both enjoy and value learning of this nature as they can gain greater confidence to manage projects and develop necessary skills for 21st Century Society.

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