

“Brain Games”- An Authentic Learning Intervention for Exploring 21st Century Skills Development

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Declaration

I declare that the work described in this document is, except where otherwise stated, entirely my own work and has not been submitted as an exercise for a degree at this or any other university.

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"Mol an óige agus tiocfaidh sí"

(Encourage a young person and they will thrive)

-old Irish proverb

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Abstract

The paradigm of the 21st Century Learning Skills has gained considerable attention in the educational lexicon over the past decade. Both educational and industrial stakeholders alike have called for schools to consider the development of key skills such as collaboration, critical thinking, digital literacy and communication as a priority for their students. According to the supporters of the 21st Century Learning Skills, schools must answer this call in order to prepare their students for the nature of learning and employment beyond second level education.

Certainly, this viewpoint is not without challenge, an arguably valid apprehension being that such skills should not be taught in detachment or indeed to the detriment of curricular content. The Partnership for 21st Century Learning have in part addressed this by including a core subject element in their framework.

Both authentic learning and project based learning have been suggested as theories that could provide more tangible models for 21st century teaching. Authentic learning activities involve real-world problems, open ended inquiry directed by learners and social learning. Similarly, project-based learning involves real-world problems, greater student control over projects and collaborative learning, but furthermore emphasises the facilitating role teachers play in the learning activity (Barron & Darling-Hammond, 2008; Thomas, 2000). Another teaching pedagogy to consider as a model is Mantle of the Expert (Heathcote and Bolton, 1994), in which teachers create realistic scenarios or challenges for students, allowing students to assume roles of experts in the imagined context so that they may develop generalisable skills while acquiring knowledge.

This work, through a learning intervention called the "Brain Game", applies features of authentic learning, project-based learning and Mantle of the Expert to a structured learning activity. The "Brain Game" is a role play simulation in which students work on planning an authentic task. Students assume roles of project managers within a team while a teacher assumes the role of a "Brain". The "Brain" represents all relevant stakeholders in a project and the team engage with them through email. The "Brain" is also briefed to respond to emails from the team of students in their stakeholder roles as professionally and true to real life as possible. (For example if the simulation involved planning an event the Brain will respond as if it were invitees; the facility provider; the printer of invitations etc.) An element of pressure is added to the intervention by compressing time with each project month equivalent to an half an hour in the simulation. The team work to real deadlines that require a number of digital artefact deliverables to be prepared..

This research is an exploratory case study involving 144 students who each took part in 2 one day workshops to explore the potential for developing 21st Century Skills through participating in the "Brain Game". A mixed methods approach (QUAL + quan) was utilised, with data collected immediately after each workshop and from a subset of the participants after they had the opportunity to put their skills into practice in a real world project.

The "Brain Game" in this study's implementation simulated the process of managing a community service project run by students aged 13-14 prior to those students actually implementing such a project in actuality.

The findings of the study suggest that the students, as identified by themselves, perceived that

they developed the skills of collaboration, organising and communicating, during the "Brain Game". There is also evidence that students applied these skills to later work on real community projects. The findings also suggest that the intervention gave the students greater confidence in undertaking the real community projects.

Chapter One, Introduction

As advances in technology lead us into an “information society” (Castells, 2001) the nature of employment is changing from a system of information exchange to one of information understanding (Levy and Mundane, 2006).

The workforce of the information society will require a set of key skills that have been identified by a number of theoretical frameworks as collaboration, communication, digital literacy, creativity and critical thinking, these are generalised as the 21st Century Skills (Voogt and Roblin, 2010). A body of literature argues that systems of education should make the acquisition of these skills a priority when developing their curricula (Anderson 2008; Voogt and Pelgrum, 2005).

However, the drive to teach 21st Century Skills in schools is not universally accepted as the answer to preparing students for today’s society. Some critics of the paradigm suggest that the 21st Century Skills supporters prioritise skills development over content knowledge. These critics caution that by doing so this potentially isolates the acquisition of skills from context which holds limited value for students (Silva, 2009). Moreover, too great a shift in the balance between teaching content and innovative skills could have negative implications for the development of basic skills such as literacy (Hirsch, 2006).

What have been proposed as pedagogies to promote elements of 21st Century Skills development and engage solidly with curricular content are the practices of Authentic (Lombardi, 2007) and Project Based Learning (Thomas, 2000). These methodologies are constructivist by nature, as they involve learners constructing or co-constructing knowledge through a process of discovery. Authentic and Project Based Learning share a number of common characteristics such as presenting learners with an ill-defined problem to be analysed, co-operative or collaborative learning taking place, a degree of learner autonomy and problems having a real world relevance or degree of authenticity.

There is evidence to suggest that these methods can give rise to skills development in line with the 21st Century Skills paradigm and can improve subject knowledge in comparison to more traditional teaching methods.

Another constructivist pedagogy for learning that places a value on authenticity, is Mantle of the Expert (Heathcote and Bolton, 1994). Like Authentic and Project Based Learning, it presents learners with an ill-defined problem open to their interpretations and complex solutions. However, Mantle of the Expert learning explicitly includes role-play as an element of its model. Within an imagined context, learners take on the role of experts within an enterprise and work together within that enterprise to solve a problem. Though Mantle of the Expert has been established as a progressive and innovative pedagogy for teaching at primary level (James and Lewis 2012), research of its implementation for older students remains to be fully explored.

This research brings together elements of Authentic, Project-Based and Mantle of the Expert learning to the design of a technology enhanced intervention, the “Brain Game” designed by the researcher. The “Brain Game” is an activity that immerses learners within an authentic context, collaborating with peers to manage a project within deadlines. Technology is an integral element of in the intervention as it provides a means for learners to engage in role-play through email, research information online and produce deliverables, all giving greater

authenticity to the learning.

The “Brain Game” can be based on a real challenge or project the learners’ face. In this research implementation the context was a school leadership project in which 2nd year students research, plan and manage a community service project with a team of their peers. In this study the “Brain Game” intervention simulated this process of project management which the participants’ would go on to experience in reality. This implementation of the “Brain Game” provided an opportunity to explore both generalisable skills development and the transfer of skills to the real community service projects that the participants’ undertook.

The intervention was run twice over a two-stage workshop model. In both instances the participants planned, researched and began to manage projects within the simulated context. Participants assumed roles as project managers while their teachers took on the role of all relevant project stakeholders to be contacted through email. This not only provided teachers with an authentic opportunity to challenge students, but also gave an element of interactivity to the students learning experience.

Key findings of the study suggest that the “Brain Game” intervention was perceived as an enjoyable and valuable way for participants to develop skills in collaborative working, critical thinking, communication and ICT. Furthermore participants self-reported a sense of confidence and independence to take on the real community projects, with the skills and experience that they developed through the intervention.

1.1 Research Question

This study is an exploration of the potential for developing 21st Century skills within context with a technology enhanced intervention “Brain Games”; including collaboration, critical thinking, digital literacy and communication. The intervention was examined within the Bridge21 learning model and environment, with key elements such as collaborative working, a custom learning space, effective use of technology and use of adult mentors integral to the implementation.

1.2 Sub Questions

1. Which distinct 21st Century Skills emerged as developing during the study?
2. How did the use of technology enhance the Brain Game intervention?
3. Was there an indication of use of skills gained from the intervention (Brain Game) in subsequent real projects implemented by participants?

1.3 Dissertation Roadmap

In chapter two the literature review introduces the concept of the 21st Century Skills and presents some current perspectives on its validity as a paradigm. Chapter two also defines authentic, project-based and situated learning, and discusses their merit as constructivist learning practices. Some leading views on the state of technology use in schools, particularly from an Irish perspective are presented. Suggestions for how technology can support

constructivist learning is also reviewed in the literature.

Chapter three provides a description of the design of the intervention under investigation in this study. The first section of the design chapter shows key findings from the literature that informed the general concepts for the intervention. This section also presents the implications of particular findings that were considered for inclusion in design. Finally, the chapter details how these findings were actually implemented in practice, and provides a comprehensive account of the intervention.

Chapter four presents an argument for the research methodology: an exploratory case study that was chosen by the researcher. This methodology is defined and the rationale is given for its employment in the study. The strategies and tools for data collection and analysis that were employed in the study are also discussed and the reasons for the use of a mixed methods approach is summarised.

Chapter five is an outline of the main findings that emerged from analysis of the data collected. How these findings have addressed the research questions and to what extent are considered in a discussion presented in Chapter Six.

The final chapter of the dissertation summarises the conclusions from the work referencing the findings described the previous chapter. It also provides an assessment of the limitations of this study and proposes what future research could be done to further explore “The Brain Game”.

Chapter Two, Literature Review

This study explores how an innovative authentic learning experience, mediated by technology can promote the development of skills relevant to 21st Century learning, including: collaboration, digital literacy, critical thinking and communication.

In this literature review, ideas around 21st Century Skills, Authentic Learning, Project Based learning and Mantle of the Expert are examined and explored within the broader paradigm of constructivist learning theory.

2.1 The 21st Learning Skills

The term “21st Century Skills” has entered the lexicon of education in the past decade. It is an umbrella-term for a set of competencies that are recognised by educational, government and corporate stakeholders as key for learning and employment in the 21st Century (Voogt and Roblin, 2010).

Brown (2006) presents the idea that in the 21st Century most workers will have multiple careers over their life-time, continually learning new skills and concepts that they may not have encountered in school or third-level education. Therefore, this workforce must be capable of independent learning on some level (Brown, 2006). -The society of the 21st Century has been referred to as an “information society” (Castells, 2001), a progression from the industrial society, where employment increasingly depends on using information technology in creative and innovative ways.

Theoretical frameworks for 21st Century Skills include: Partnership for 21st century skills, En Gauge, Assessment and Teaching of 21st Century Skills, National Educational Technology Standards and the National Assessment of Educational Progress (Voogt and Roblin, 2010). These frameworks share a set of collective set of four common and generalisable skills: collaboration, communication, digital literacy, and social intelligences. In addition to this convergent set, many of the frameworks and additional literature also recognise creativity, critical thinking and problem solving as fundamental components of the skill-set (Voogt and Roblin, 2010).

Although there is much evidence from the literature among educational and industrial stakeholders for consensus around the 21st Century skills paradigm, there are some critics with reservations about the perceived hype. Silva (2009) reports that some commentators on the 21st Century concept and skills set have described it as a “meaningless” term and would even go so far as to warn that they could distract from the teaching of core content. It can be argued that labelling collaboration, critical thinking and creativity as proficiencies unique to the 21st century is disingenuous, ignoring earlier constructivist theorists (Dewey, 1938; Piaget, 1976; Vygotsky, 1980) who have espoused such skills. However, it could be contended that owing to developments in the nature of society, the new demand for such transferable skills above the place of fixed knowledge is a reality for 21st Century employment (Murnane and Levy, 2004).

One commonly held concern among the critics is that prioritising skills development at the expense of broad content acquisition will lower standards in literacy (Hirsch, 2006), with

literacy vital to broadening education and employment prospects. Initiatives such as *The Common Core* and *The Core Foundation* in the United States assert that knowledge content should be somewhat standardised for each school grade. Although these bodies do not absolutely decry the drive for 21st century skills acquisition, there is an implication that skills development taught in isolation from knowledge content is of little value.

2.2 Authentic Learning

Authentic learning as teaching methodology has been proposed as a model for developing the aforementioned 21st Century Skills (Lombardi, 2007). Authentic learning takes aspects from Bruner's theory of Discovery Learning. Bruner (1961) proposes that teachers should facilitate learning by providing opportunities for students to discover new concepts implicitly. Bruner suggests that this method affords more meaningful learning than activities that are teacher-led where content is simply presented to learners. Authentic learning also allows for the learners to discover concepts for themselves as part of a student-led process of inquiry.

Authentic learning is characterised by activities based on real-life, complex problems without binary solutions with learners assuming roles (Lombardi, 2007). Herrington, Oliver and Reeves (2002) propose that ten unique elements of design make for authentic learning. These elements are broadly defined as: 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. It is beyond the scope of this literature review to examine all ten elements in depth, however a relevant selection are elaborated on in brief below.

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 is presented and so is intended to 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 encourage 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).

Collaborative working is as integral to any authentic learning task as it is in dealing with many real-world tasks (Lombardi, 2007). This skill is included as a "Learning and Innovation Skills" in the Partnership for 21st Century Learning's model (Kay, 2010)

Hill and Smith (1998) report on an authentic learning study of high school students engaged in manufacturing technology projects. A key finding was that the students recognised and valued the aspect of learning within an authentic context. In a study at Massachusetts Institute of Technology, a technology enhanced active learning (TEAL) model was applied to an electricity and magnetism course and the course teaching was re-structured, from a reliance

on traditional lecturing methods to working groups of students building and experimenting with simulations to solve problems. Interestingly, student feedback was considered negative to the TEAL model in the pilot course, which was attributed to a number of factors, including the need to acclimatise students to collaborative learning and to provide additional training for teachers and the mentors who were intended to scaffold the students learning during classes (Belcher, 2003).

Although recognised as valuable, Authentic Learning has typically been a challenge to implement as certain tasks are too dangerous, difficult or expensive to be feasible within the constraints of the classroom (Lombardi, 2007).

2.3 Project Based Learning

Project Based Learning is a teaching model that organises learning around projects (Thomas, 2000) and lends itself to the acquisition of 21st Century learning skills (Bell, 2010).

In Project Based Learning, projects are defined as 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 also the use of co-operative learning (Diehl, Grobe, Lopez, and Cabral, 1999).

Based on a review of Project Based Learning research, 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 considered, 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 self-directed learning aspect of projects challenging, particularly in such areas as time-management and using technology effectively. However, Thomas also acknowledges a volume of research that endorses Project Based Learning in teaching the complex procedures of planning, communicating, problem solving and decision making.

2.4 Mantle of the Expert

Mantle of the Expert is a dramatic inquiry approach to teaching and learning (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 world. In Mantle of the Expert learning, problems are framed as professional tasks so that learning has a relevant and immediate purpose (Aitken, 2013). For example, to explore ancient roman civilization, a teacher may present a problem such as: ‘the classroom needs to be transformed into a museum space’ requiring that exhibits must be researched and chosen and a display created with text and photographs. In this situation the students assume expert roles within an enterprise such as museum curators, archeologists, historians etc. The students form the enterprise that will work to satisfy the demands of the task set. The enterprise’s motivation to solve the authentic problem presented in Mantle of the Expert teaching supports Lombardi’s (2007) claim that students are motivated to solve real-life problems when engaged in learning tasks.

Abbot (2007) considers the crucial role of the teacher in Mantle of the Expert learning, teachers must frame 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 also 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 can prompt students to realise the complexity of learning in the real world (Aitken, 2013).

It is acknowledged that the Mantle of the Expert pedagogy proposes more than just role play. It is role play where 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. Abbot (2007) suggests that it takes years for a teacher to become a competent Mantle of the Expert practitioner and that the sophistication of the method is something that could initially discourage teachers from trying it out. Moreover, although the Mantle of the Expert approach is somewhat validated by studies of its application across the primary level curriculum (James and Lewis, 2012), there is potential to explore its viability as a pedagogy for second level.

2.5 Potential for Technology to support constructivist learning practices

Increasingly, instructional technology is progressing from a behaviourist design perspective to constructivism and it is proposed that this development could bridge the perceived void between formal school learning and learning in context of the wider world (Herrington and Oliver, 2000).

In an Irish context, McGarr (2009) argues that technology is yet to incite major change in teaching and learning practices at second level education. While in general it is observed that technology continues to modify a volume of human practice in society, its effect is yet to be realised in the formal educational setting (Levin and Wadmany 2005; Conole, 2010). While

teachers lack of personal knowledge and experience is a factor (Donovan, Hartley and Strudler, 2007; Ertmer, 2005; Hennessy, Ruthven and Brindley, 2005; Levin & Wadmany, 2006) there is also a general reluctance to embrace Web 2.0 as a platform for facilitating discourse on classroom technology practices (Conole, 2010). McGarr offers the collective culture of Irish education and its practices as a key influence on the current status of technology integration in schools.

The application of technologies such as microworlds and simulations have been considered as legitimate platforms for situated learning to occur within the school setting (Herrington and Oliver, 2000). However, Hummel (1993) asserts that in true situated learning, the technology should not replace the authentic learning situation when providing a host for the learning environment. Furthermore, Tripp (1993) cautions that computer simulations alone do not provide an authentic learning experience without the learners being exposed to relevant “experts”. These approaches to situated learning could imply that by design, situated learning needs to use technology in an authentic transferable way and its manipulation should be an ancillary but not the main goal of the learning process. In their study involving situated learning mediated by a multimedia programme, Herrington and Oliver (2000) reported that it was for the more technology-discrete challenges such as software and equipment issues that teachers were approached for support by the students than the broader and more complex issues associated with the larger task. This study noted that although teachers did not explicitly set out to “scaffold” the higher order thinking of participants as occurred, its emergence occurred as a significant result in sound situated learning (Herrington and Oliver, 2000).

Wijekumar and Jonassen (2004) elaborate on the ways that computers can assist in solving ill-structured problems i.e. problems that are loosely defined and have solutions open to interpretation. (Reeves, Herrington and Oliver 2002; Wijekumar and Jonassen 2004; Lombardi, 2007). The computer may serve a variety of purposes in this way; such as: providing a source of information, a means of calculating figures, a tool for exploring viable solutions and a tool to develop justifications for solutions (Wijekumar and Jonassen, 2004). Perkins (1985) proposes that a learners sustained use of computer tools such as word-processors, calculators, spreadsheets and databases, could alter the way the learner views knowledge and approaches problems. This usage could also enhance the learner's to choose and apply appropriate computer tools in a variety of future situations (Perkins, 1985). In general terms, it has been claimed that the use of computer tools to support ill-structured problem solving can ease a learners cognitive burden (Salmon, 1990), allowing for engagement with higher-order thinking (Pea, 1985).

Effective use of technology, integrated with project based learning activities, can promote digital literacy for students and indeed make tasks more authentic and engaging (Bell, 2010). Students can gain experience in using the internet to access information relevant to their inquiries while taking into consideration the issues that can arise with reliability. Students can also use technology in a number of ways to communicate with others during the process, produce learning artefacts or to present their work. These are opportunities for students to explore the use of technology for a variety of purposes. The College Work and Readiness Assessment (CWRA) is a tool that measures student performance in relation to their integrated critical thinking, problem solving, analytical reasoning and writing (Dede, 2009). The students are presented with “real life” situations such as environmental hazards or public service challenges (Silva, 2009). They are given 1.5 hours online to research a specific problem using a collection of supplied online information sources such as reports, articles and

official documents. They must then must articulate a solution through an appropriate written task.

The Bridge21 model is an Irish learning initiative that includes both project based and technology mediated learning as elements of its design. Bridge21 presents a learning model to students and teachers that promotes the acquisition of 21st learning skills including collaboration, creativity, critical thinking and leadership (Conneely, Lawlor and Tangney, 2013). A number of themed projects for secondary school students have been developed and studied with the Bridge21 model, including mathematics (Tangney and Bray, 2013) and computer science (Tangney, Oldham, Conneely, Barrett and Lawlor, 2009). To facilitate implementation of the learning model Bridge21 gives conscious consideration to the design of their physical learning space, with small teams of 4-5 students occupying “pods” complete with two desktop or laptop computers with internet connection. This sharing of devices promotes discourse and collaboration between students with pods intended to promote the idea of a shared team space. Team reflection and presentation of created artefacts is a regular aspect of Bridge21 activity (Tangney, Oldham, Conneely, Barrett and Lawlor, 2009) which encourages personal and team accountability for project work. The Bridge21 model is an interesting example of an initiative that promotes many of the concepts discussed in this review: 21st learning skills, Project Based Learning and technology enhanced learning.

Summary

Consideration of 21st Century Skills development leads to a body of the literature that supports theories associated with the constructivist learning paradigm including: Authentic Learning, Problem Based Learning and Mantle of the Expert learning.

The practical application of such theories could be explored in greater depth not only with reference to current studies and initiatives such as the Bridge21 model for learning and the College Work and Readiness Assessment, but also in relation to broader issues in the domain of education and learning and particularly classroom practice. Such exploration is beyond the scope of this review however what has been discussed raises some interesting implications for the design of the intervention under investigation in this study.

Technology undoubtedly has long been perceived as, and continues to be considered as a catalyst for progressive and positive change in teaching and learning methods. Although it is beyond the scope of this literature review to examine the potential and challenges associated with technology and its application in a learning context as an impetus for change in formal education practice, it has identified by a modest body of existing theory and knowledge that relate to what is now generally referred to as 21st Century Skills.

Chapter Three, Design.

This chapter outlines the design of the Brain Game drawing on the central elements of Project Based Learning and Mantle of the Expert as an implementation of Authentic Learning directed to support and encourage the development of 21st Century learning skills. This chapter also outlines the implementation of the Brain Game learning intervention in this study.

3.1 Design of the Learning Intervention

As identified in the foregoing Literature Review Chapter, skills such as collaborative working, critical thinking, communications skills and ICT literacy have been identified as part of a proposed 21st Century Learning framework to prepare students for the demands of modern society. Whilst it is acknowledged that these skills are important to develop with students, as seen above, some literature cautions that providing appropriate contexts for skills development should also be given due consideration. Neglecting to do so potentially ignores the value of engaging with subject content and furthermore could isolate teaching skills from relevant contexts, detracting from the meaningfulness of their development.

As illustrated in figure 3.1 Authentic and Project-Based Learning may be considered as two overlapping subsets of constructivist learning practice that have been proposed as methods that combine the development of generalised skills and content knowledge within context. The two learning approaches share a number of common characteristics including providing learners with an ill-defined problem that holds real-world relevance. This authenticity of solving a real-world problem is considered integral to both methods as it can incite motivation from students to deliver on the task. The Mantle of the Expert teaching pedagogy takes the element of authenticity further, by proposing students actually assume roles as “experts” within an imagined enterprise and context to solve a real-world problem. All work on the problem is done in-role and through this the learners develop skills and knowledge of content.

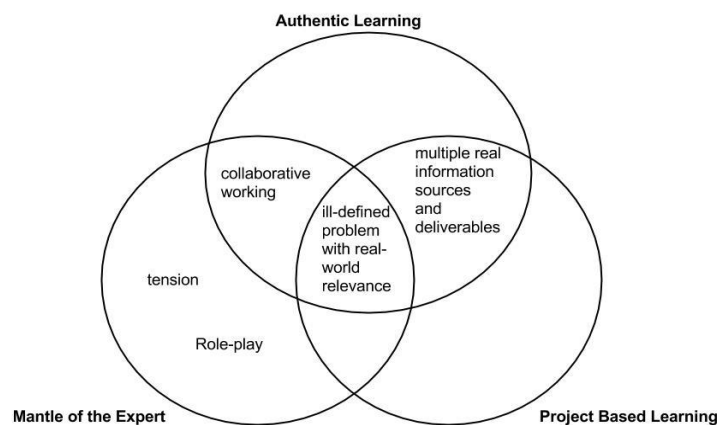


Fig. 3.1; Overlap of elements in Authentic, Project-Based Learning and Mantle of the Expert

Tables 3.1 and 3.2 below summarise the key elements drawn from the foregoing theoretical consideration. The table traces how the literature themes Authentic Learning (A.L), Project-Based learning (P.B.L) and Mantle of the Expert (M.o.E) inform the design principles and the implementation and predicts the expected outcomes.

Literature Theme	Design Principle	Implementation	Expected Outcome
Authenticity in the learning experience (A.L) (P.B.L) (M.o.E)	Students can be highly motivated to solve problems that have a real-world relevance.	Present students with an authentic real-life problem to solve.	Students may be motivated by the “grown-up” aspect of exploring a real-world problem.
The ill-defined problem (A.L) (P.B.L) (M.o.E)	An ill-defined problem that is open to multiple interpretations means learners can identify tasks and subtasks for themselves. An ill-defined problem can illustrate the complexities of real-life learning processes to students.	Present the authentic problem as ill-defined and afford students a degree of choice in how they approach it.	Students may employ critical thinking practices to deconstruct the bigger problem presented. Breaking a bigger task into sub-tasks could also encourage collaborative working towards the main goal or outcome.
Collaborative Working (A.L) (MoE)	Collaborative working is a key aspect of constructivist learning practice when employed effectively as learners can co-construct knowledge. Collaborative working in learning also reflects real-world practice.	Collaborative team-based working method is an integral aspect of the intervention. Support the teams to work collaboratively by considering resources, learning space and tasks.	Students can experience the benefits and challenges of working as part of a team to solve a problem. Students may gain confidence in collaborative working skills.

Table 3.1; Authenticity of Learning Experience, the Ill-defined problem, collaborative working.

Literature Theme	Design Principle	Implementation	Expected Outcome
Role-Play (M.o.E)	<p>By giving learners the status of experts in role, their knowledge and skills can develop through a process of dramatic inquiry.</p> <p>Role-play in learning can re-position the teacher-student dynamic to one of teachers acting as enablers rather than the providers of knowledge.</p>	<p>Situate the learners as experts in role as part of the learning intervention.</p> <p>Have teachers take on roles to interact with students within the intervention. This is done with email to facilitate a sense of authenticity and belief in the role.</p>	<p>The element of expert-in-role for students they can develop skills and knowledge in an authentic context.</p> <p>Teachers can guide the learning by their interactions in role with students. Email could give a viable platform for the roles to interact authentically.</p>
Using multiple, real-life sources of information to create real-life deliverables. (A.L) (P.B.L)	<p>Learners have an opportunity to develop information literacy when engaged in activities where they search for, analyse and use multiple sources of information to solve a problem.</p> <p>Using real-life resources can enhance the authenticity of a learning activity as can producing real-life deliverables.</p>	<p>Accessing real information online to solve the problem is integral to the learning experience.</p> <p>Deliverables from learners are also of an authentic nature, true to their real-life counterparts such as documents, reports etc...</p>	<p>The use of multiple, real life resources enhances the authenticity of the learning experience and could help to develop information literacy.</p> <p>Producing real-life deliverables could help to promote formal writing skills for learners.</p>
Pressure and Challenge. (M.o.E)	<p>Tension or pressure is a key element of any imagined context.</p> <p>Problems, both naturally occurring and strategically introduced by teachers give authenticity and depth to a learning activity.</p>	<p>Time is condensed for a project with approximately 30minutes intervention time equal to 1month In the “real-world”.</p> <p>Teachers challenge students where appropriate introducing additional problems during the learning activity.</p>	<p>A sense of time pressure is added to the intervention which could encourage students to be more motivated to produce deliverables.</p> <p>Learners could develop skills in critical thinking and problem solving.</p>

Table 3.2; Role-play, real-world information sources and pressure.

These six themes inform the design of the “Brain Game” learning intervention elements illustrated in figure 3.2. Role play through email, presenting learners with an ill-defined problem, sustained pressure and challenge, collaborative working, the use of real information sources and authentic deliverables. These six elements are elaborated on in the subsequent section.

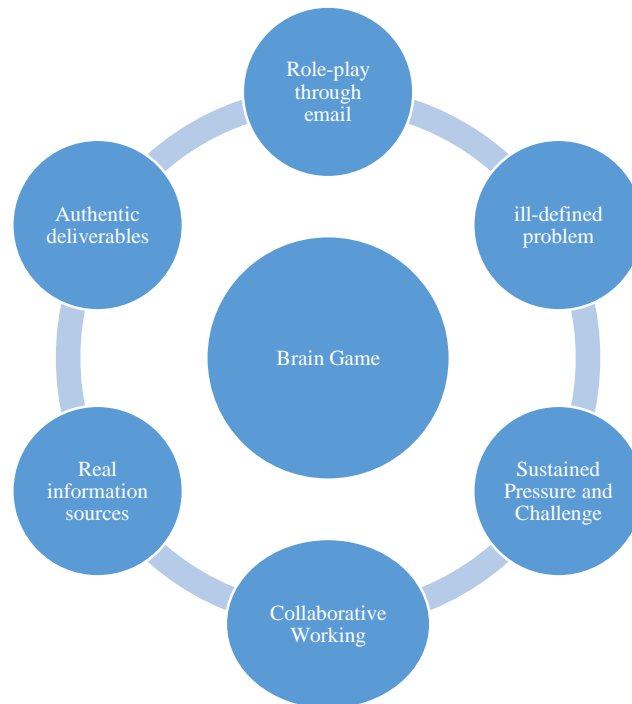


Figure 3.2; Elements of the “Brain Game” intervention.

Role-Play through Email

The effective use of role play for learning as established by Mantle of the Expert could be given greater authenticity by using email as a means to facilitate communication between roles. In particular this allows teachers to play multiple roles that the student “project managers” can contact in order to solve the ill-defined problem presented. This one-role fits call can be collectively known as the “Brain” and students have the freedom to choose what roles the “Brain” will play in assisting their enterprise. This concept is illustrated in figure 3.3, where students are involved in email exchanges with a “Brain”. In this example the students are trying to manage a project with the sub-tasks of acquiring resources from a sponsor, inviting guest speakers and reporting on their progress to the school Board of Management all simulated through their communication with a “Brain”. The teacher playing the “Brain” roles can challenge the students where appropriate by introducing new twists or drama to the activity.

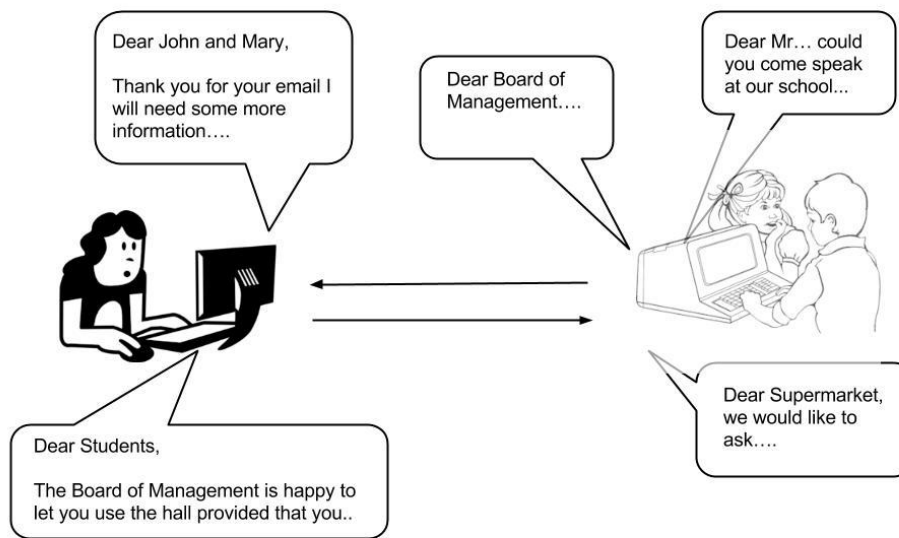


Figure 3.3: Role-Play through Email

Ill-defined Problem

Learners can openly interpret an ill-defined problem to deconstruct a bigger challenge into parts. This intervention presents learners with such a problem, giving them the power to choose how they will approach it.

Sustained Pressure

The intervention promotes an element of sustained pressure to give essential tension to the drama. This is done by condensing a time frame in which deliverables are produced by learners. For example 30 minutes time in the “Brain Game” intervention could correlate to one week or month of real time depending on the context. This added sense of pressure could also help students develop time-management skills and experience working under pressure.

Collaborative Working

The intervention uses team-based collaborative learning as an integral element. This allows the students to delegate aspects of a larger tasks to manage the project and co-construct understanding together.

Real Information Sources and Authentic Deliverables

Through online searching, participants have access to real information this can promote the development of information literacy skills. Similarly, by producing life-like deliverables, students can gain skills in formal communication and both elements add to the authenticity of the intervention.

3.2 Implementation

The implementation context of this study is an engagement between Trinity College Dublin and 11 secondary schools with designated disadvantage status. A programme called *College For Every Student* (<http://www.collegefes.org/>) is being implemented which among other strands involves 144 students from second year aged 13-14 taking on and implementing a community based project (Leadership Through Service). 144 students from these schools attended two “Brain Game” workshops in the purpose designed Bridge21 learning space on campus as part of their training for implementing their *Leadership Through Service* Projects.

Two stages of workshops are the focus of this study. Stage One introduced the participants to the nature of community or school service projects. Each team of 4 participants were assigned a topic and were instructed to research, plan and organise a community project based on that topic. Teachers assumed the role of the “Brain” which served as all outside world contact the participants needed to contact in order to progress their projects. In this stage teams were drawn from different schools.

The stage two “Brain Game” followed a similar pattern, however teams were made up of students from the same school. Students had to have participated in stage one to be eligible for stage two. The decision not to mix the teams for the second workshops was made with the intention to provide a more accurate reflection of how the students would be working when implementing their projects outside of the workshops. Furthermore, for the stage two workshops, teams were not assigned a topic, but were encouraged to explore the *Leadership Through Service* project(s) that their school group had decided to develop. Again, teachers from the same school as the students assumed the role of the “Brain”, so they could provide more authentic correspondence as they would have a vested interest in the project.

144 students and 12 teachers from 11 schools took part in the workshops. To cater for the large numbers, six instances of the workshops were run in each stage. Each workshop was approximately five hours in duration, made up of 24 students.

The subsequent sections will outline the details of the implementation. Section 3.2.1 describes the briefing, icebreakers and team building exercises that the students engaged at both stages of workshops. Sections 3.2.2 and 3.2.3 describe the implementations of the “Brain Game” intervention at Stage One and Stage Two workshops respectively.

3.2.1 Briefing, Icebreakers and Team Building Exercises

Stage One

The students were welcomed to the learning space and reminded of the reason for their invitation to the workshops; to be trained in skills for the *Leadership through Service* element of the *College For Every Student* initiative. The objective of the workshops was that they would gain experience of researching, planning and managing a school or community service project whilst developing some general skills in leadership and collaboration. Six teams were formed and some ice-breaker games with a focus on teamwork were played.

Stage Two

The Stage Two workshops were run two months later. The participants were briefed with an

outline of the day's activities and reminded of the reason for the workshops. An ice-breaker was run and they were then split into teams to brainstorm ideas on "What makes a successful school or community project?"

3.2.2 Stage One Brain Game Intervention

After icebreakers and games it was explained to the teams of students that for the remainder of the day they would be taking part in the "Brain Game" which was an activity designed to simulate the process of planning, researching and developing a school or community service project. As such projects typically happen over a number of months, the 2 hours dedicated to the activity reflected November-February with approximately 30 minutes in the "Brain Game" correlating to a month of real time. 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. They were also 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. A guide sheet for teams was provided, see appendix E.

To facilitate communication between "The Brain" and teams, a number of Gmail accounts were created for the duration of the workshops; Three "Brain" and six team email account were created so that one teacher would act as a "Brain" to two teams of students. All accounts were opened with a password prior to beginning the exercise to prevent student accessing the accounts outside the workshops. Teams were instructed to email a particular "Brain" and to indicate who the email was intended for by simply writing "Dear X" depending on whom they wished to contact. Teams were advised to use appropriate formality with the language in their correspondence. Teachers were also briefed in their role as "The Brain", and were encouraged to press teams for details of their projects and to be as realistic as they deemed possible in their replies. A guide sheet was provided for teachers, see appendix F.



Fig 3.4 Teachers acting in the role of a "Brain"

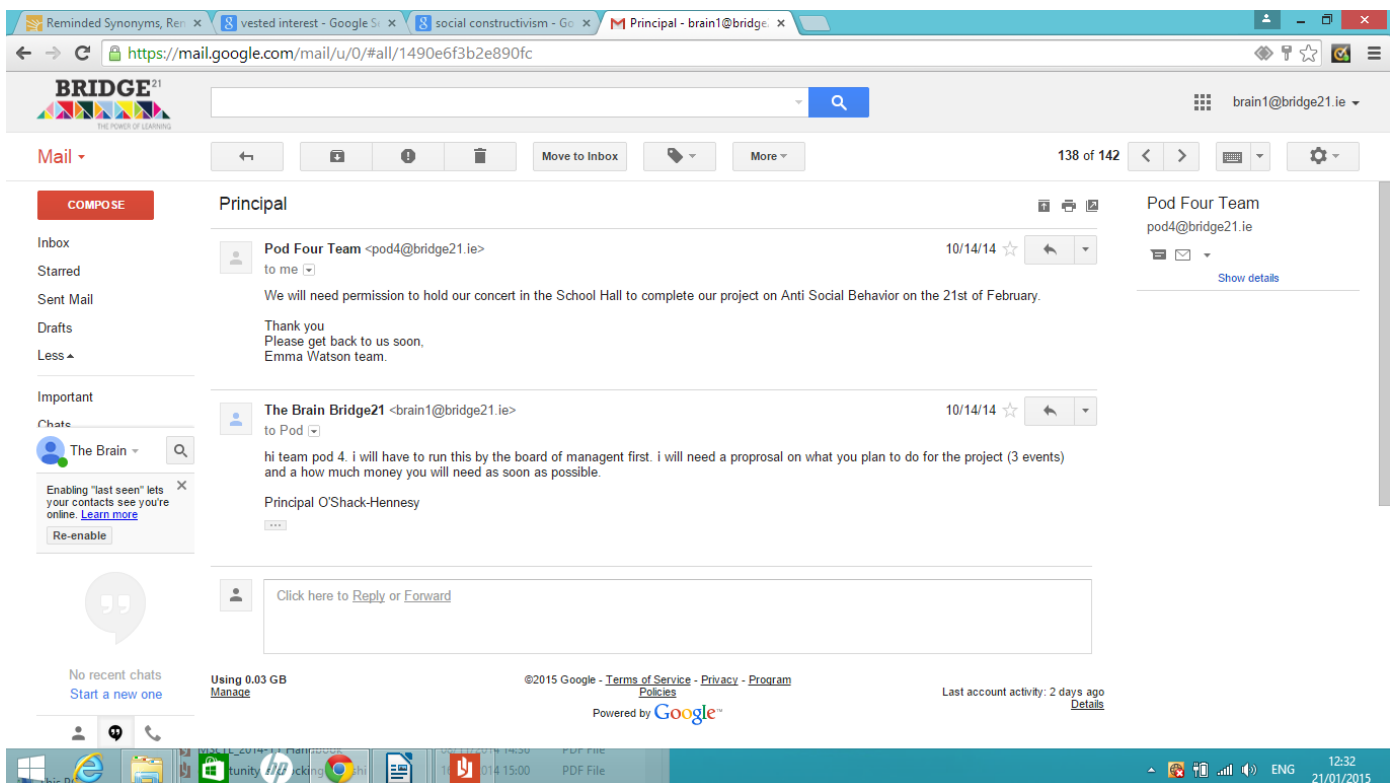
Each team was given a topic from the following list

1. Anti-Social Behavior
2. Helping the Elderly

3. Healthy Living

They were instructed to decide on three specific activities they could run based on that topic and to focus on researching and planning these activities during "The Brain Game". An instructional sheet was also provided to each team with the deadlines for each month outlined. 15-20 minutes was dedicated to allow the teams to brainstorm on the topic and choose the three activities to focus on before "The Brain Game" began.

Fig 3.5 Example of an email exchange between a "Brain" in role as a school principal and team.



The teams would begin email exchanges with the "Brain" appropriate to their team, based on the requirements of their projects. Examples of these exchanges can be seen in figures 3.5 and 3.6. above and below.

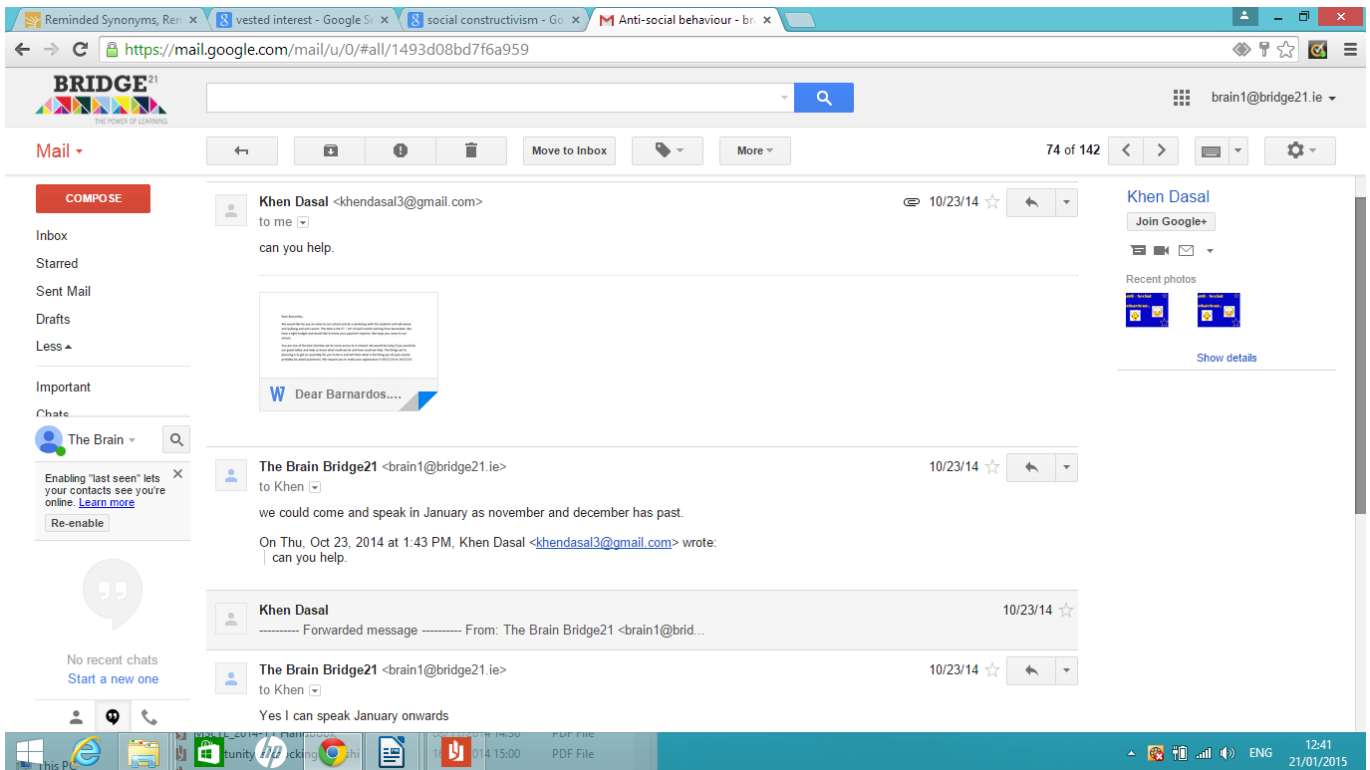


Fig 3.6 Example of a team sending an attached letter to "The Brain" acting as a guest speaker.

The teachers playing the “Brains” and the student teams worked in two separate rooms. In the student room a number of adult mentors were available to support the teams. This was done by making suggestions when asked as to who they could email, which websites might be useful for finding information and also by helping with the discrete use of technology; making posters, attaching documents etc. The element of mentoring to support learning activities is integral to the Bridge21 model of learning, by contrast to direct instruction the teams are guided in a non-intrusive way by mentors.



Fig. 3.7 Mentor with a team during the "Brain Game"

After two hours (which correlated to the end of February in real-world time). The teams were asked to stop and present their work to the larger cohort. This included a description of what they felt that had managed to organise, any actual artefacts they had made; posters, Facebook pages etc. They also discussed what challenges they had faced during the "Brain Game". This was an opportunity for the participants to reflect on their experience, hear suggestions from their peers for their future projects as well gaining experience in for presenting.

3.2.3 Stage Two Brain Game

The stage two workshops were held over two months after stage one. 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, and all schools arrived at the stage two workshops with chosen topics for their projects.

Following the initial ice-breakers and team building exercises, the participants were invited to break into teams of 4. Each team was to choose an activity or section related to the larger school project (this varied slightly from school to school). The teams spent approximately 5-10 minutes deciding on an activity or section and discussed amongst themselves why they had chosen that particular activity or section of the project and the logistics for its' organisation regards equipment, permission, funding etc...

A "Market-Place" activity was then run, with each team split to allow two members act as visitors to two other teams at their tables, whilst two members would remain to explain their idea to visitors to their table. Visitors would ask for a description of their chosen activity, the rationale behind the choice and also discuss any potential challenges they saw in organising that activity. This exercise was designed to open up an active discussion on all ideas brought to the workshop, affording participants to hear alternative viewpoints from their peers. It also provided an opportunity for participants to consider adapting ideas they had in preparation for the "Brain Game". An activity sheet that supported this activity can be seen in appendix G.

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 a representative from each small group meeting to compile a progress report to send on via the "Brain" addressed 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.

Once again, adult mentors supported the teams during the "Brain Game" activity in the student room. Three "months" of the "Brain Game" over 1.5 hours were run in each workshop, at the end of the third month teams were asked to stop and come together as their school groups. The school groups were instructed to prepare a short presentation in which they would discuss what they had achieved during the "Brain Game" and also, what they identified as the action points for continuing their projects. In some cases, as the projects were chosen by the school groups, the participants could identify any work done that was of practical use to the real projects, for example prices checked for materials or Facebook pages that were created as part of campaigns.

Summary

The "Brain Game" intervention as part of this implementation was an activity designed to simulate the process of researching, planning and managing a school or community project. The intervention allowed for participants to become immersed in an authentic context, by assuming their roles as part of a project manager committee and contacting the relevant stakeholders through email. The role of these stakeholders was played by teachers who gave authentic correspondence that they deemed true to real-life. The activity was conducive of teamwork, constructivist learning and the development of technology skills in a genuine context. A study of the "Brain Game" intervention in relation to its impact on the participants experience of running their projects in reality could provide an opportunity to examine the 21st Century Learning themes that emerged throughout the research.

Chapter Four, Research Methodology.

This study examined the potential for developing of 21st Century Skills within the context of an authentic learning experience "Brain Games". Areas of research included; critical thinking, collaborative learning, project based learning, ICT skills learning, role-play and collaborative learning. This chapter outlines the research strategies used in the study, details of how the study was implemented and also a description of the data collection process employed.

4.1 Research Strategy

The research strategy was approached as an exploratory case study. The case study is not in itself a research method but is an approach to the study of a singular occurrence which may involve a breadth of data collection and analysis methods (Willig, 2008). Case studies can involve the collection of qualitative and quantitative data (Kitchin and Tate, 1999). Qualitative data collection can take many different forms; open responses to written questions, interviews, observations and examination of artefacts (Creswell, 2013). A triangulation of data can greatly enrich case studies as it allows the researcher can approach the case from a number of different perspectives (Willig, 2008).

If there is not already substantial empirical research around an issue of interest, then an exploratory case study can be considered as a logical first step (Yin, 1994). In this way case studies can facilitate the generating of theories, allowing the researcher to form insights around the issue rather than confirming an expected outcome (Mayer and Greenwood, 1980). Either a detailed exploration of a single case or the comparison of multiple case studies can be considered as research strategies (Willig, 2008). Yin (1994) proposes that the use of multiple case design can enhance the findings of a study, as with each new case further theories can emerge to be considered with what has been collected in the previous cases.

A multiple case study was initially considered as a strategy for this study, however a detailed analysis of multiple cases was not feasible within the time-frame. Therefore, the cohort of 144 research participants were treated as a single case unit. This research did not seek to verify a theory conclusively but rather sought to explore certain issues within a context. These issues were explored through the use of a mixed methods design (QUAL + quan) with some quantitative data supporting a strongly qualitative lead (Creswell, 2013). Mixed methods data collection involves the collection and analysis of open-ended and closed ended data which that is merged, connected or embedded by the researcher (Johnson, Onwuegbuzie, and Turner, 2007).

4.2 Ethical Considerations

The School of Computer Science and Statistics has granted ethical approval for this study under the set procedures for TA21 research projects, this study has satisfied the criteria to be considered as such a project. As the participants were all aged under 18 years, both parental consent and participants consent to participate in the study was sought and received.

4.3 Participants Profile

144 students participated from 11 schools. Approximately 12 students from each school took part. These students were invited to participate in the research project due to their involvement with the College for Every Student (CFES) initiative, a partnership between their respective schools and the Trinity Access Programmes (<http://www.collegefes.org/>). A core element of the CFES initiative is the Leadership through Service award to promote skills in leadership for its' students. To help develop this skill, participating schools are required to implement a community project, with the students leading the venture.

4.4 Researcher Bias

As an assistant programme coordinator at Bridge21, the researcher declares the potential for bias that could impact the validity of the study. Whilst exploratory case studies can provide a wealth of data, this data is not easily cross-checked thus allowing for issues of subjectivity and bias to effect the data analysis and findings drawn. To address this in part, some observations were taken by teachers during the workshops. None of the participants in the study were of prior personal or professional acquaintance to the researcher.

4.5 Data Collection

Data collection instruments used in this study included post-workshop questionnaires for Stage One and Two workshops, observations, participant focus-group interviews supported by a consideration of small sample of artefacts produced. Both qualitative and quantitative data was gathered consistent with a QUAL + quan approach as described above (Creswell, 2013). The data collection occurred over three stages in conjunction with the participants' implementation of their community projects. This is illustrated in figure 4.1. This gave an opportunity for the previous stage of data collection to influence the design of the next.

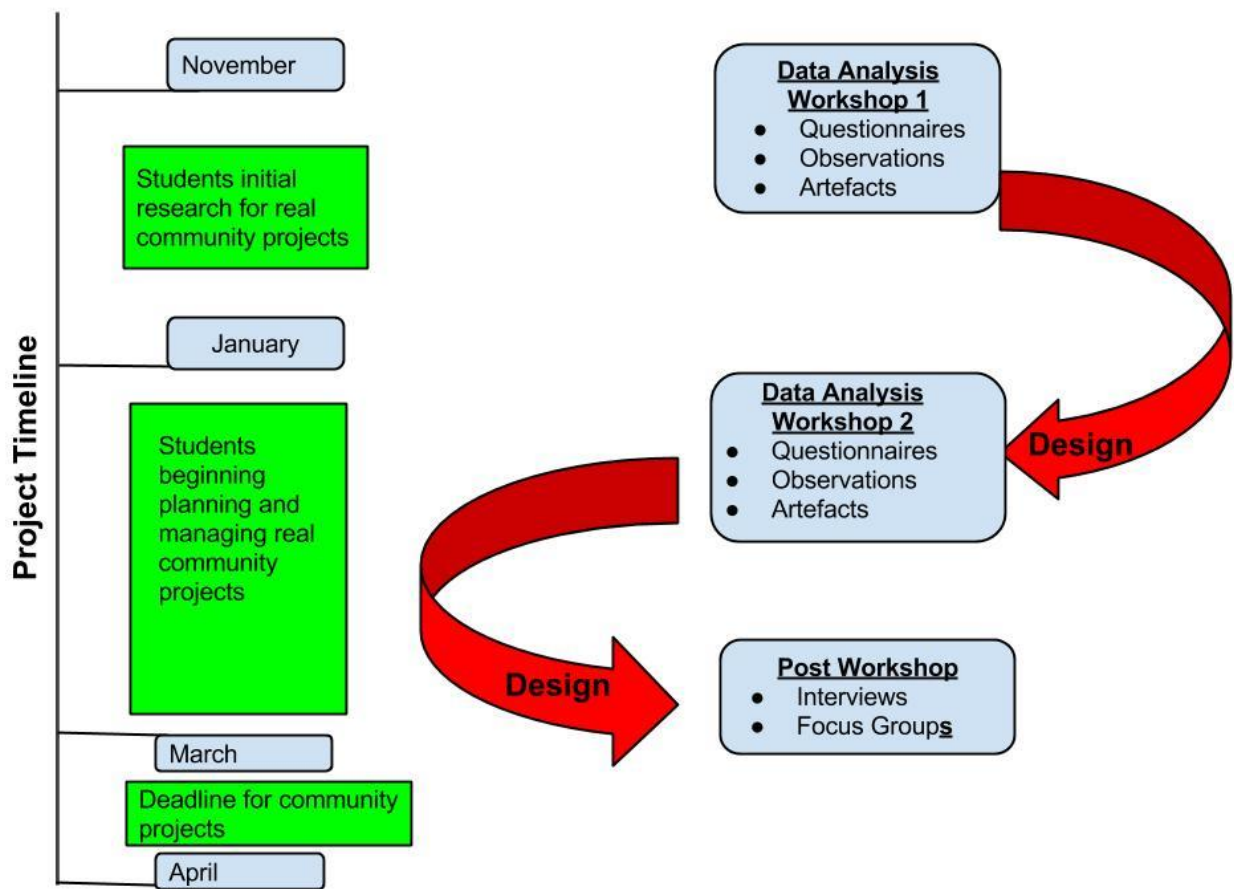


Fig.4.1; Process of Progress of the Case Study

4.6 Questionnaire Design

Post Activity Questionnaires were used in both Stage One and Stage Two Workshops. The questionnaires were designed to surface the perceptions of the participants around their experience of the learning intervention to address the research questions.

Both sets of questionnaires featured open questions so as to stimulate comments supported by Likert style questions. Results from Stage One questionnaires informed the design of the Stage Two questionnaires. The Stage Two questionnaires were more specific in seeking insights into the possible development of the relevant learning skills.

In the questionnaires, quantitative data was gathered by asking questions supported by a Likert scale. The nature of these Likert scales were slightly altered for the Stage Two workshop questionnaires. One reason for this was that the inclusion of the word "neutral" on the scale appeared to cause confusion for some participants, given the nature of the responses that accompanied them, for this reason the word "neutral" was replaced by other phrases that implied a neutral stance depending on the question. The second change was the addition of "I don't know" in the Likert scale questions for stage two questionnaires. The researcher felt that this would provide an opportunity to participants to indicate if they had not understood the question, or if they were not sure how to answer. Under each Likert scale question there was an open space for students where they were invited to respond as to why they had made that

choice. These responses created the bulk of qualitative data for analysis. The questionnaires are provided in Appendices C and D below.

4.7 Other Supporting Data

Focus-group interviews (n=2x4 participants) with the participant students provided additional supporting qualitative data to the study. It is noteworthy that the focus groups were carried out with the participant students two months following their experience with Brain Game and while the participants were engaged in their “real world projects”.

Further additional supporting qualitative data was gleaned from observations and analysis of artifacts and particularly participants’ emails.

4.7 Research Questions Explored

There were a number of research questions that the study set out to answer, and the justification for the data collection approach was used in relation to each question is outlined below.

1. Which distinct 21st Century skills were evident as addressed and developed in the intervention?

This research considered the application of an authentic learning intervention as a tool to develop 21st Century Skills. A set of pre-determined skills were not targeted for measure by the design of Stage One data collection tools, but general questions about the value of the experience were designed to allow responses that elucidated the participant perceptions of specific skills development.

Analysis of Stage One data collection and the emergent themes from Stage One influenced the design of Stage Two questionnaires so that specific skills development, as perceived by the participants could be considered. These more directed findings from Stage Two data collection in turn informed the design of the focus group interview questions where the issue of specific skills development could be explored in greater depth and in conversation.

2. In what ways did a skills gain occur based on participant experience in the intervention in preparing the participants for the real community projects they would undertake in the school context?

This case study of the “Brain Game” intervention involved students going on to approach the task of managing of a community service project in reality in their school. This was undertaken after two instances of engagement with the intervention over two stages of workshops. Therefore, there was an opportunity for the researcher to explore the participant perception of skills gained from the workshops and their application in the real community projects.

As schools would complete the implementation of their real community projects at different times, some outside the timeframe of this study, it was not feasible to answer this question conclusively for all participants. What could be explored was the students’ perceptions of how they considered the intervention had prepared them to implement their real community projects. The focus group interviews at Stage Three also addressed this research question in greater depth and contemporaneously with the school work on their projects, as the

participants interviewed were all actively engaged in the implementation of their real community projects at that time.

3. How did the use of technology enhance the intervention?

This study examined an authentic learning intervention that used technology as an integral element of its design. Technology was to support role-play through email, provide a means for learners to access information online and produce digital artifact deliverables using a number of software tools.

This research question was addressed primarily through questionnaire responses at Stage One and Stage Two Workshops, focus group conversations and observation. Additionally an examination of sample artefacts, namely email exchanges between the "Brain" and the participants assisted in understanding the role of technology in enhancing the intervention.

Summary

This chapter explained that an exploratory case study approach was taken during the study and has given some information about the participants. It also contained a consideration of the research question and the sub-questions being explored and the data collection methods are being used. The next chapter contains analysis and discussion of the data collected

Chapter Five, Findings

This chapter outlines the sources of data employed in the research and then details the process by which the data was analysed. The findings are then discussed in relation to the research questions and the literature reviewed in Chapter Two.

5.1 Data Sources

A variety of data sources were used in this research with the intent of providing a triangulation of data. These sources include:

1. Participant post-workshop questionnaires from Stage One (n=100)
2. Participant post-workshop questionnaires from Stage Two (n=123)
3. Focus group interviews with participants two months subsequent to Stage Two Workshops (n=2x4 participants)
4. Direct observations of participants by teachers and mentors (n=9)
5. Sample artefacts created by students from Workshops

The researcher was present throughout all workshops and took informal observation notes during the activities.

5.2 Data Analysis and Findings

As pointed out by (Stake, 1995) the process of data analysis is extensive and should begin with the researchers initial responses, continuing until the final conclusions have been drawn from the available data. The researcher can get a general sense of the body of data from exploring all that is available to them in the earliest stage of the analysis. This initial reading or viewing of the data affords the researcher the opportunity to immerse themselves in the data, reflecting on its meaning and considering what further steps to take in its organisation (Creswell, 2013). In this study the researcher's notes taken during workshops and this initial read-through of the data scaffold the development of early theory forming and the identification of patterns that emerged from the data.

5.2.1 Stage One Post-Workshop Questionnaires

The post-workshop questionnaire employed in the Stage One workshop was designed to explore the participants' general attitudes towards the value of the workshop they had experienced, if they felt it had prepared them for the specific community projects they would undertake, if they felt it had prepared them for any other non-specific "real-life" experiences and if they felt it would encourage them in the future to work with others and/or act as leaders of their peers. It was also intended that the results from Stage One workshop questionnaires would inform the design of the not only the Stage Two workshop questionnaires but the workshops themselves. The questionnaires were hand-written by the participants, this raw data was then inputted to Microsoft excel spreadsheets by the researcher for sorting, arranging and calculating the quantitative data collected with Likert scales. Answers to open questions were read, coded and themed respectively. 100 questionnaires were collected.

Value of the Experience

In the opening question on the Stage One questionnaires the participants were asked to rate how valuable over all they had found their experience at the workshop. They were provided with a Likert scale consisting of five choices; "Not valuable at all", "Not very valuable", "Neutral", "Valuable" and "Very Valuable".



Fig. 5.1 Participants perceived value of experience in Workshop One

The response to this question was significantly positive, suggesting that the participants' had considered the workshop valuable. When asked why they answered as they did, 94 participants provided responses. 36 made reference to the aspect of working on a team with 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 managing under pressure. Although these two reasons emerged as the most commonly shared amongst the participants, there were a variety of other reasons given including the use of technology, specifically emails and the fact they had never used it before, it was also mentioned that the workshops were fun or enjoyable.

"Because it is helping us work more and better. It is getting us ready for reality. I found it basically worth my time."

"It shows what the real world is like under pressure and trying to get things done with team work"

"I felt this was very valuable because it's preparing you to be able to work as a team and cooperate with other people and work together which is useful in everyday life"

"Great questions by brain like real life"

"I found this valuable because it felt like it was actually going to happen I could picture it all in my head."

Perception of how helpful participants felt the workshops prepared them for undertaking the real community projects

As the workshops were designed to provide a context for the students to prepare for planning, researching and executing community service projects, the next question asked how helpful did they feel the workshops were to them in this regard. Another reasonably positive response was demonstrated with 42 answering "Helpful" and 45 answering "Very Helpful".

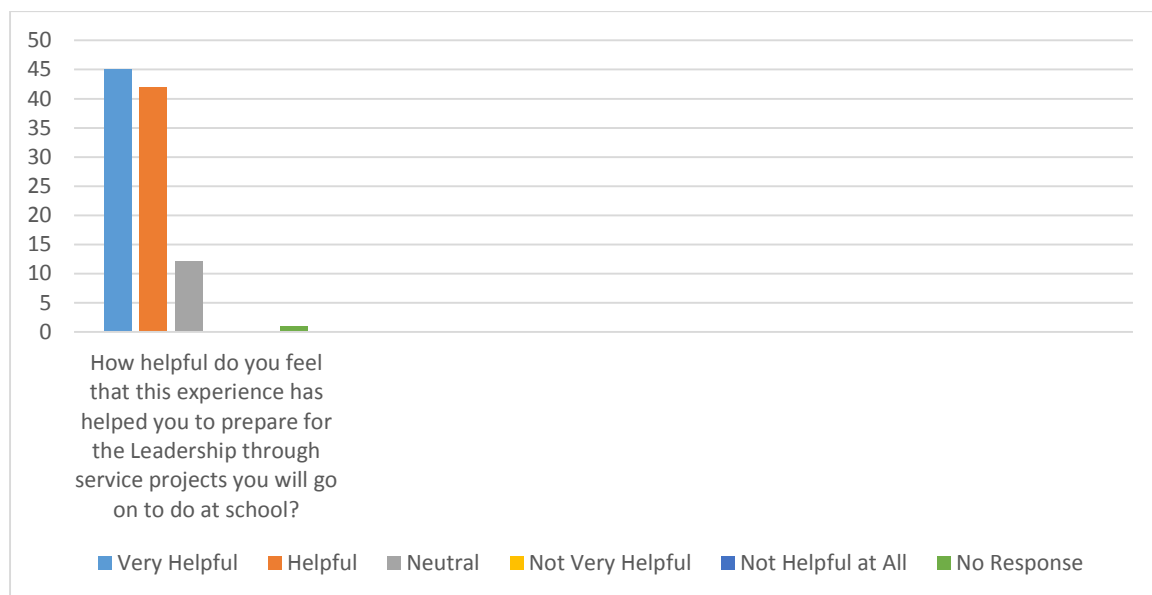


Fig. 5.2; Perception of how helpful participants considered Workshop One in preparing them for real community projects

25 either wrote that now they felt greater confidence in their ability to undertake the project or that they now knew what they had to do, possibly indicating improved confidence. 21 mentioned either team-work or working with others as helpful. 11 noted the "real-thing" or "reality" and how this workshop had helped them. 9 made direct reference to the workshops helping their leadership skills. 6 mentioned the experience they had sending emails.

"I think it has gave me a good experience because now I feel I can actually do it"

"Because we have had this training and we know what to do but others don't so we can help them and listen to what they have to say."

"This experience really taught me to step up for my team and ideas to get the job done"

"I learnt something that most people in my class don't know about yet and I can definitely show them how to do this."

"I feel it will help me in the future projects with time plans and stuff like that."

"I feel like it prepared me for emailing others about serious matters and for using a computer to research a person or company."

Encouragement to act as a leader of other students at school

This question asked participants whether their experience at the workshop encouraged them to act as a leader of students back at their school. This question was included in the Stage One questionnaire design as it was intended to facilitate a deeper exploration of a specific 21st skill of leadership within the intervention and was relevant to the community service workshops that provided a context to implement the "Brain-game".

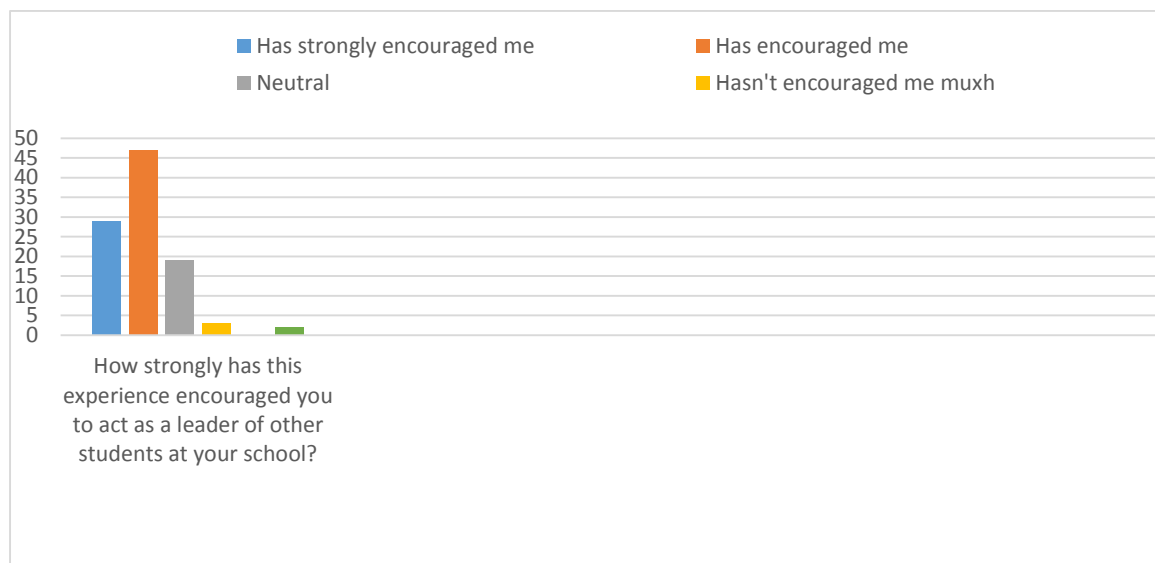


Fig. 5.3; Perception of how strongly Workshop One encouraged Participants to act as leaders

98 of the participants that answered questionnaires gave a Likert response. Given a choice of "Has not encouraged me at all", "Has not encouraged me much", "Neutral", "Has encouraged me" and "Has strongly encouraged me", 47 answered "Has encouraged me" and 29 answered "Has strongly encouraged me".

Why asked why they chose their Likert option, 22 answers indicated an increase in confidence as a reason for their encouragement, some citing how talking to others helped and others the element of public speaking. 10 acknowledged that their experience of working with others during the workshop had encouraged them to be a leader at school. 10 expressed that the workshops had given them some experience of leadership and what was required of them. 7 mentioned their school or community and a wish to help either when they returned. 4 mentioned their own resilience and hard work. 2 listed their experience of "taking charge" as a positive factor for continuing to their leadership at school.

"This has encouraged me because, I never thought of being a leader before but now I feel that I would make a very good leader and it encouraged me to do better."

"Because I've realized the amount of work I can get done and how I can help others too."

"I feel like I have a high potential to become a leader."

"I have been encouraged to tell students what was the problem instead of just going ahead with what anyone else would say."

"We will know what to do when doing this project so we will be able to tell the other students what to do."

"I learned how important it is to take charge of the project sometimes."

Did the participants feel the experience prepared them for other real-life challenges?

This question sought to explore any links that the participants made with the simulated challenges encountered during the workshop and other challenges they could encounter in life. The Likert choices "Has not prepared me at all", "Has not prepared me much", "Neutral", "Has prepared me" and "Has prepared me greatly" were offered as answers to the question "How do you feel that this experience has prepared you for "real-life challenges and obstacles?"

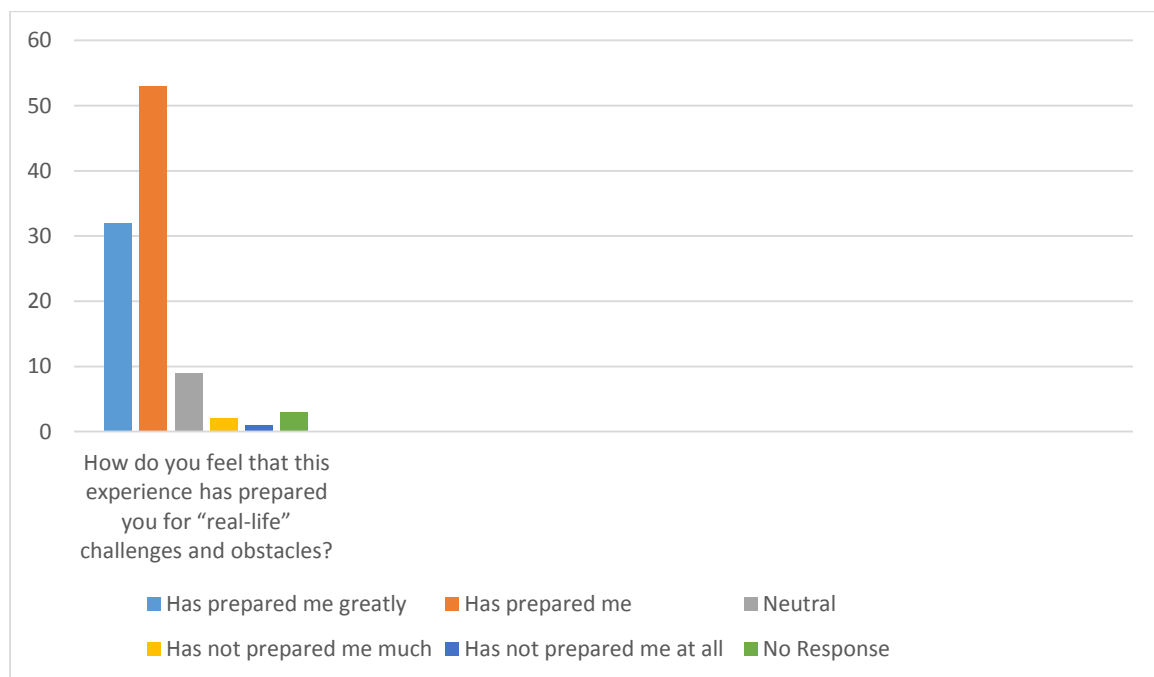


Fig. 5.4; Perception of how Workshop One prepared participants for "real-life" challenges

93 participants' questionnaires gave a response through the Likert scale. 53 chose "Has prepared me", and 32 "Has greatly prepared me", indicating a generally positive response from the cohort.

36 participants made reference to the "real-life" nature of the task in the open answers. Some gave examples of the general skills they had identified the development of;

"Because in this way of preparing me it gave me a positive on looking at stuff and I learned to be a last minute thinker"

"I know what it would be like to work".

Others made more direct references to the specific task and similar tasks ahead of them;

"Because it taught me how to set up activities or fundraisers"

"I feel I am ready for when I have to create an event in my school"

"Has prepared me to help the elderly and to raise money for charity and fairs."

"Because in 4th Year we have a TY mini company were we sell ideas we come up with. It has prepared me."

9 selected "Neutral" with 3 open responses indicating that the respondents did feel so about the question asked;

"I feel neutral as real life challenges can be unpredictable and very different to what we learned."

Did the participants feel more encouraged to collaborate with others after their experience?

As ability to collaborate is generally cited as a core skill for 21st Century Learning and indeed is relevant to the real community projects that the participants would be undertaking in teams, the question "Do you feel encouraged to collaborate/work with others after your experience today?" was asked. Another Likert scale with five choices was offered; "Not encouraged at all", "Not encouraged much", "Neutral", "Encouraged" and "Strongly Encouraged". 97 out of the possible 100 responded to the Likert with a prevailingly positive response. 41 chose "Encouraged" whilst 38 chose "Strongly Encouraged".

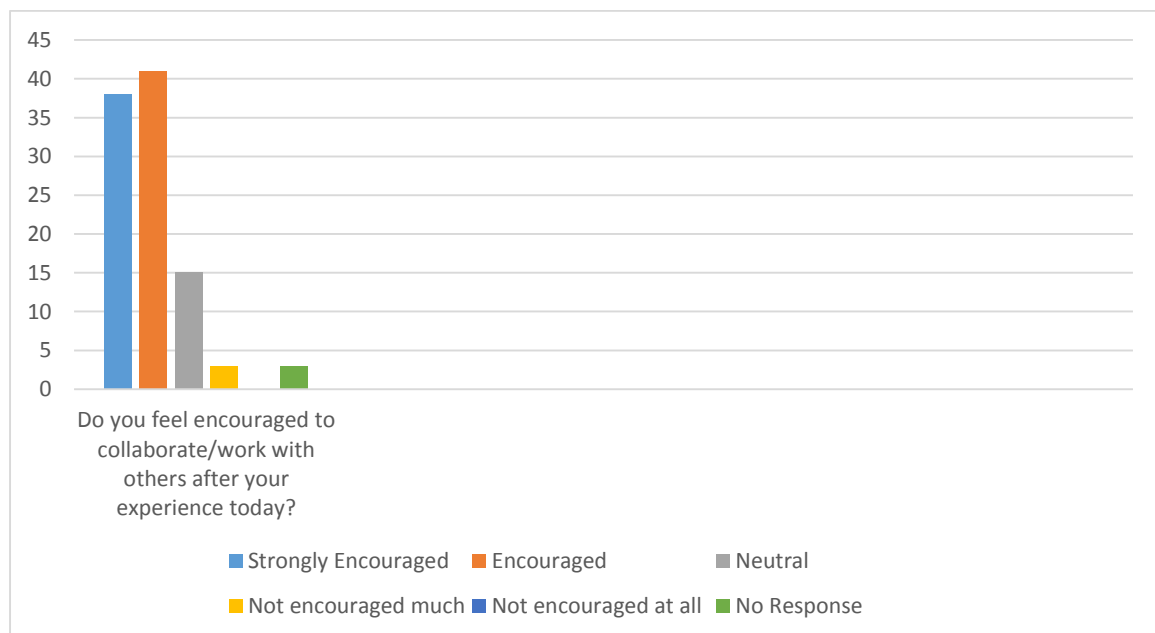


Fig. 5.5; Perception of how Workshop One encouraged participants to collaborate

13 open responses mentioned the aspect of working on a team with students they didn't know or meeting new people as a reason why they felt encouraged or strongly encouraged.

"Because we don't need to know each other to work and do great but we only need to trust people so this is why I'm strongly encouraged."

"Yes, because I feel comfortable working with people I don't know."

"It is important to help your teammates even if you don't know them"

9 answers made reference to the delegation and sharing of work as why they felt encouraged to work with others.

"I am encouraged because I saw that when people work together everything works better"

"It's easier to do things when you work together."

8 students commented on the sharing or exchange of ideas within the teams as beneficial;

"Different ideas combined are stronger."

"Because some people may have better ideas than you so then your projects become better."

Another 8 responses mentioned the participants' increased confidence to work on teams in the future, some further mentioned that they could show others what to do.

"Yes because I can teach others what I learned and I can collaborate"

"Because I know what to tell them."

5.2.2 Teacher and Mentor Observations at Stage One Workshops

Broadly scaffolded observation sheets were provided to teachers and mentors acting as "The Brain" during the stage one workshops. These observation sheets were introduced in the third workshop and in total 9 were collected. The sheets comprised of three parts. Part 1 on how a team were working and general observations of a specific student on that team. Part 2 was a space to record observations on the teams work during their email exchanges with the "Brain" and Part 3 was to record observations on the team during their presentations to describe their project and the challenges they faced with the "Brain".

An emerging theme throughout the observations was the students' lack of skill, perhaps through lack of experience, with sending email;

"Email not well structured-not clear"

"Not appropriate emails. Short text version initially."

"Some emails hard to read due to nature of their presentation."

However, some observations noted that the students' email exchanges improved over the course of the activity;

"E-mail communication seemed to improve with practice."

"Mature formal emails, professional for age group."

"Their emails were clear and to the point"

"Lots of detail, time and places improved as time went on"

There were also a number of observations that noted the development of team dynamic during the activity;

"Much more like a team at the end than at the beginning."

"Disengaged person became more engaged."

"Did improve as time went on."

5.2.3 Stage Two Post-Workshop Questionnaires

Following analysis of the data collected in Stage One workshops, the post-workshop questionnaires for the stage two questionnaires were designed to explore the relevant learning development. Four topics emerged from Stage One data analysis through an open coding of qualitative data collected. The topics emerging were:

1. Intervention is realistic or like real-life
2. The intervention's relevance to participants' undertaking Leadership through Service community projects
3. Developing ICT Skills
4. Developing 21st Century Skills

Stage Two data was analysed under these four topics. Table 5.1 below shows the sub-topics that emerged from the data collected from Stage Two.

Intervention is realistic or like real-life	Intervention's relevance to leadership through service project	Developing ICT Skills	Developing 21st Century Skills
Role play	Practice Run	Email	Collaboration
Pressure	Increased Confidence	Document editing skills	Communication
Challenge	Feeling Prepared	Finding Information	Problem Solving Organisation

Table 5.1: Topics and subtopics from Stage Two data collection

Overall how did participants find experience of the “Brain Game” intervention at both stages of workshops?

Participants were asked to indicate on a Likert scale how valuable overall they had found the experience of both workshops. The scale provided a choice of “Not valuable at all”, “A little, but not that valuable”, “Neither valuable nor not valuable (neutral)”, “Valuable”, “Very valuable” and “I don't know”.

There was a considerably positive response, n=123, with 69 participants indicating “Very Valuable” and 49 “Valuable”. This is a similar outcome to the response to the question “How valuable overall was your experience at the workshop” asked in Stage One questionnaires, n=100, where 40 answered “Valuable” and 48 answered “Very Valuable”.



Fig. 5.6; Participants perceived value of “Brain Game” in both workshops

118 participants provided a response to justify their Likert scale choice. Those responses which were relevant were coded against the four described topics (emergent from Stage One) as per Creswell (Creswell, 2013) presented as shown in the table 5.2 below, with response instances correlated to sub-topics enumerated in brackets.

Intervention is realistic or like real-life	Intervention's relevance to leadership through service project	Developing ICT Skills	Developing 21st Century Skills
Challenge (4)	Practice run to prepare us for project (28)	Email (3)	Collaboration (13)
Pressure (3)	Increased Confidence (4)	Document editing skills (3)	Organization (11)
			Generalized skills (9)
			Leadership (7)
			Communication (3)

Table 5.2; Topics and subtopics in relation to participants perceived value of intervention

What emerged as the most prevalent code from open response answers was that the workshops were seen as a “practice run” or preparation for the leadership through service projects;

“I feel this way because it is a good experience to simulate your experience.”

“Because it gives you an idea of what you actually have to do.”

“It helps us to get an idea on how to go ahead with all of this.”

29 responses indicated the participants’ view that they had developed skills in a general sense, or named skills such as collaboration, organization, leadership and communication that fall under the paradigm of 21st Century Skills.

“Today taught us some small lessons in organization, teamwork and time management.”

“It helps you to be a better leader and to communicate with others and to organize things.”

7 responses made reference to the realistic nature of the workshops, noting that being put under pressure or challenged within the intervention was representative of reality.

“It showed us how stressful things can get in reality”

6 responses mentioned ICT skills that they felt they developed as a valuable aspect of the workshops.

“Because I now know how to properly write emails and formally.”

“Because I typed up all the information and I felt very computer-smart and that I could actually manage the financial accounts of my project.”

Did participants feel the experience of the first stage workshops influenced how they worked in the second stage?

The participants were asked whether they felt that anything they learned from the Stage One workshop affected how they worked in the Stage Two workshop. They were presented with a Likert scale ranging from *“Not at all”*, *“A little, but not much”*, *“Affected somewhat”*, *“Affected greatly”* and *“I don’t know”*.

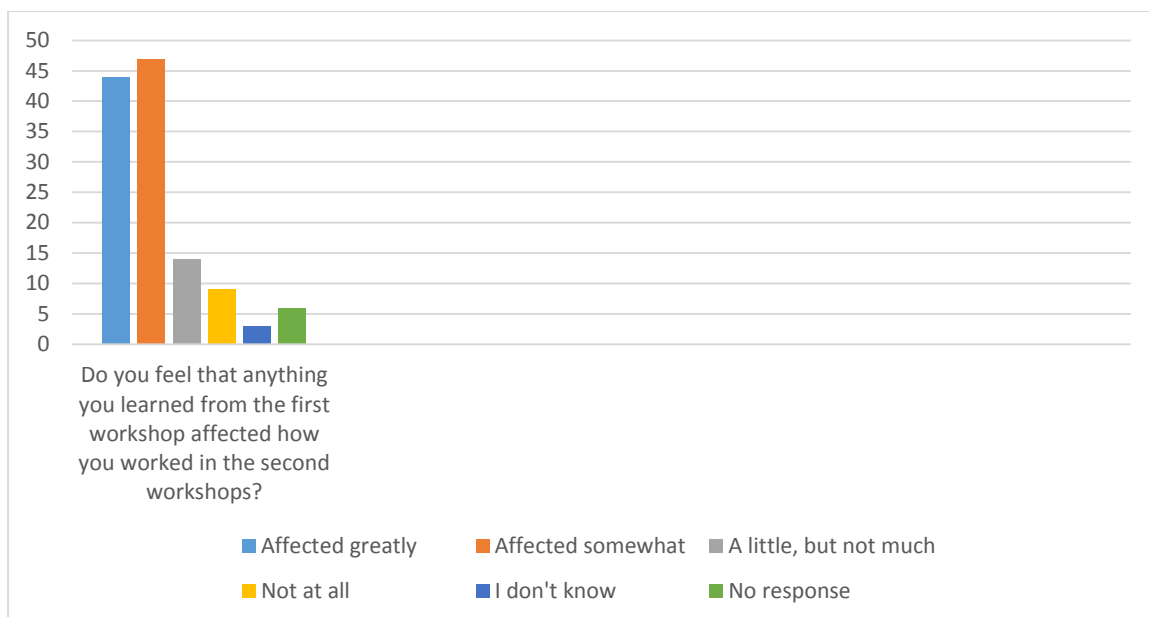


Fig. 5.7; Participants perception of Stage One workshop influencing Stage Two Workshop

The greatest number of responses were “*Affected somewhat*” (47), and “*Affected greatly*” (44). 109 gave reasons for their choice in the open box section following the Likert question. The following topics and codes were found in the open box responses shown in table 5.3 below.

Intervention is realistic or like real-life	Developing ICT Skills	Developing 21st Century Skills	Workshop/Intervention Style
Pressure (1)	Email (6)	Collaboration (8) Communication(4)	Knowing what to expect/what was expected (61) Comparing two stages of workshops (5)
		Generalized skills (4) Organization (1)	

Table 5.3: Topics and subtopics in relation to participants’ perception of Stage One workshop affecting Stage Two

61 responses indicated that they had gained experience from the Stage One workshop which either prepared them for knowing what to expect in the second stage or for what was expected of them as participants.

“The first time we didn’t have that much experience but we learned and got more confidence from the first time.”

“I felt this because I kind of knew what to expect and I had more understanding of the tasks”

“Because now I know what is wanted from me and how I can do this.”

Suggestion of skills development from the Stage One workshops also emerged with 8 responses that expressed the progression of collaborative working skills; “*Because I learned*

that working in teams is better than alone.”, *“I knew what it was like working with a team.”* There was also a mention of general, unspecified skills development; *“I learned new things”*, *“I have learned many things from the previous workshop.”* and three instances of communication mentioned; *“Because I communicate more.”*

6 participants mentioned that they had gained experience in emailing as a result of the Stage One workshop *“You knew how to be more formal and how to email.”*

Did experience from first workshop influence work on real community projects?

At the time of the Stage Two workshops, some schools had begun initial work on their real community service projects. This question was asked to get an idea of whether and how the participants referenced their experience with the Stage One workshop in their real community service projects. In general terms schools had not begun to implement the community projects at any considerable level as reported by their teachers, but arrived to the Workshops with a project topic to explore.

The participants answered a Likert scale with a choice of “Not at all”, “A little but not much”, “Affected somewhat”, “Affected greatly” and “I don’t know”.

Interestingly, the volume of answers for those who answered the Likert (103) was split more evenly across the scale than previous questions with 11 choosing “Not at all”, 5 “A little but not much”, 29 “Affected somewhat”, 43 “Affected greatly” and 11 “I don’t know” choices.

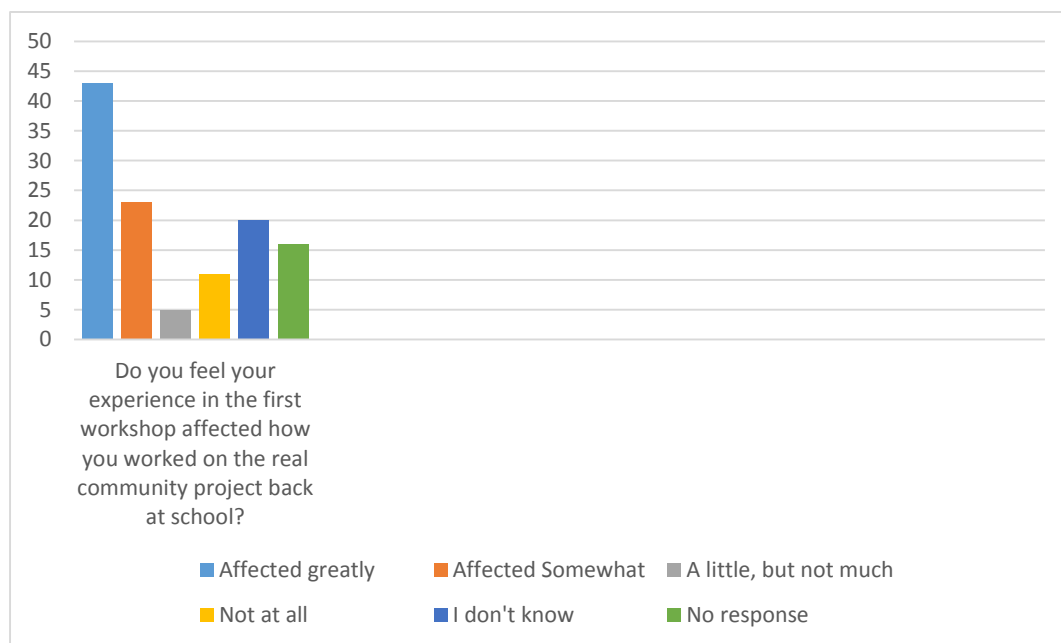


Fig. 5.8; Participants perception of Workshop One affecting work on real community projects

Table 5.4 below outlines the topics and codes that emerged from the 96 open box responses given in answer to the question.

Intervention's relevance to leadership through service project	Developing 21st Century Skills	Intervention is realistic or like real-life
Practice run to prepare us (15)	Organization (6)	Challenge (4)
Increased Confidence (5)	Collaboration (5)	
Project not considered to be in development yet (14)	Communication (4)	

Table 5.4: Topics and subtopics in relation to participants' perception of how Workshop One affected work on real community projects.

14 responses indicated that the leadership through projects had not yet started. 15 indicated that they felt that the stage one workshops had prepared them in some way or provided a way to practice for the real projects;

"We have an idea what it's like to work on a community project",

"Because it helped me learn about what to do".

5 responses suggested an increase in confidence with regard to taking on the project following the stage one workshops;

"I was very encouraged to do the project."

"Yes I do because I am now able to be excited to start the project up and running."

The skills development topic was also apparent in the open response data. 5 responses mentioned collaboration; *"I think because of this I had a greater knowledge of how to work on a team."* 6 responses mentioned organizational skills gained; *"It showed me what I had to do to organize it", "It's good to plan before going and doing it"*. Another 4 responses indicated communication skills; *"Yes because I could talk about more stuff"*.

There were 4 responses linked to how the Stage One workshop had demonstrated how challenging or difficult the project could be;

"I know how hard it really is."

"It showed me how hard it is to do this kind of stuff".

Did participants feel use of computers at both workshop stages was useful?

This question was put to the participants with a Likert scale choice of "Not useful at all", "A little but not that useful", "Neither useful nor not-useful (neutral)", "Useful", "Very useful" or "I don't know". Of 116 responses to the Likert questions, the overall result was positive with 76 answering "Very useful" and 35 answering "Useful".

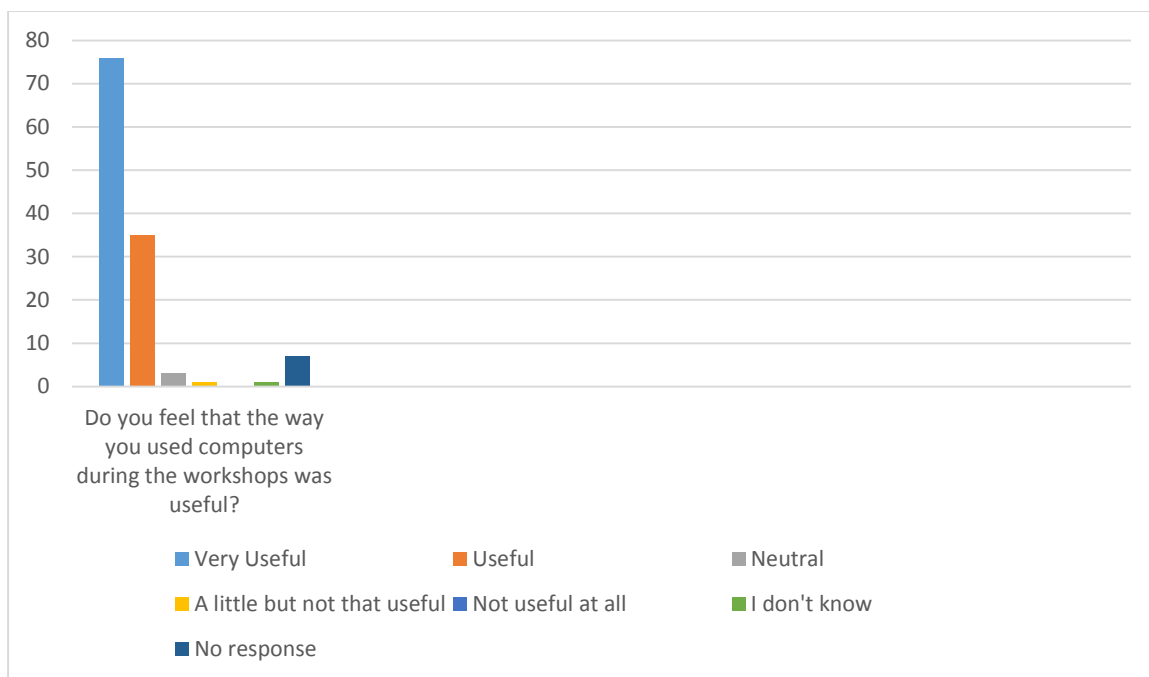


Fig. 5.9; Participants' perception on relevant use of computers in both workshops.

Developing ICT Skills	Intervention's relevance to leadership through service project	Intervention is realistic or like real-life
Email (28)	Practice run to prepare us (6)	Role play (3)
Recognizing ways that using ICT could be a tool to help manage project (27)		
Finding Information (16)		
Developing general ICT skills (3)		

Table 5.5; Topics and subtopics relevant to participants' perception of how useful the use of computers were in the workshops.

The prevalent topic that emerged from the 108 open box responses was the development of ICT skills. There were 27 comments considered the use of emails within the intervention. Some responses elaborated on why they considered this useful;

"It helped me organize things like emails for events"

"It's how you communicate to the companies"

"We had to use good language when writing emails."

Recognizing ways that ICT could act as a tool to support their project was a code that

emerged in this section. 26 responses given mentioned the increased speed at which things could be done with computers, how they generally made the task easier or even suggesting that the task could not be done without relying on computers.

“It was fast and easy to organize dates and venues”

“Because we can get more done”

“We wouldn’t be able to do it without computers.”

“Without computers we would be struggling a lot and the use of computers helped us a lot”

There were 16 responses that described how the computers were a valuable source of information the participants could access during the intervention;

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

“If you didn’t know something instead of just not doing it I could look it up and find out.”

“We need to estimate the price of things we needed to get”

There were also 3 responses that did not name specific skills they developed, however still indicated they felt they gained some skills in ICT through their experience at the workshops;

“Because I learned somethings I didn’t know about computers.”

There were 6 responses that mentioned the use of ICT as appropriate concerning the leadership through service projects;

“Yeah it was useful because we will have to email people during the real deal”

“It made me think of how I would use mine and it was easy to send emails and look up things for the project”

There were 3 responses that noted the role-play aspect that the teachers engaged in over email that was useful;

“Because we got to say what we wanted to say from computer instead of face to face”

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

Participants’ perception of discrete skills they developed throughout the workshops

Through analysis of Stage One qualitative data, four skills areas were identified as emergent and provided potential areas of exploration for evidence of skills development in Stage Two. These skills generally feature in the accepted 21st Century Skill set.

To further explore the findings in Stage One the following set of questions were asked in Stage Two:

“To what extent do you think you may have developed the following skills during the workshops?”

- Teamwork
- Leading a project
- Using computers to help plan and organize a project
- Presenting and explain my ideas to others

For each skill, the participant was presented with a five choice Likert scale; “I didn’t develop this skill at all”, “I developed very little of this skill”, “I developed some of this skill”, “I developed a lot of this skill”, and “I don’t know if I developed this skill.”

Figure 5.10 below illustrates the findings of 123 participant responses to the question.

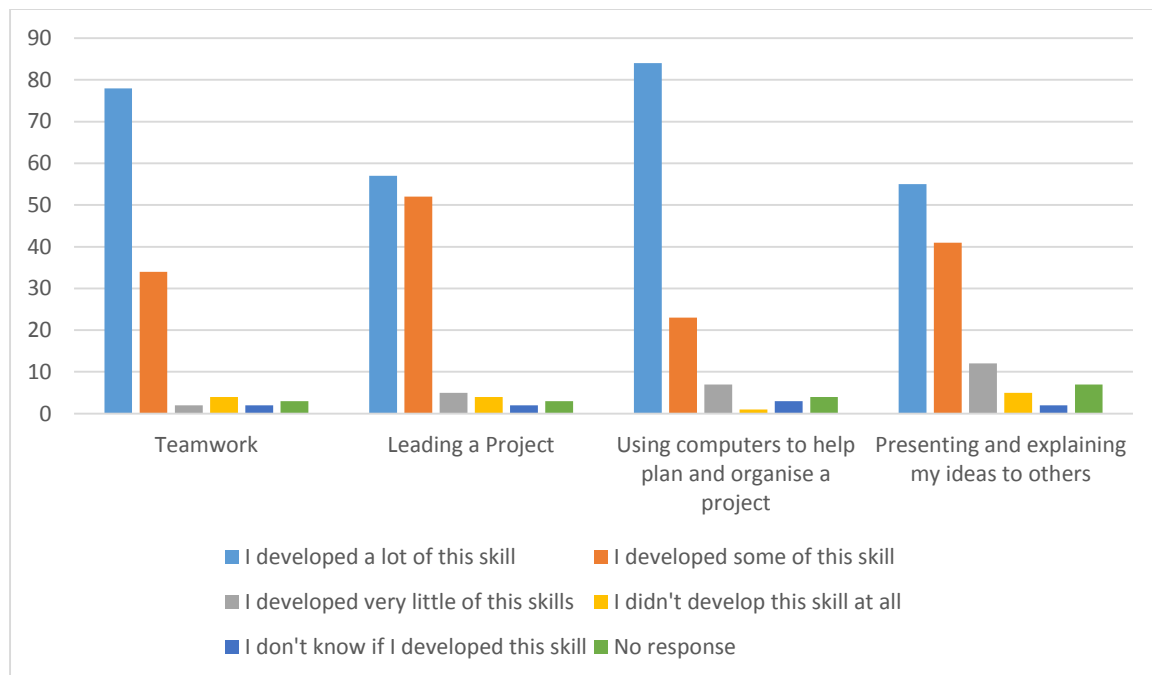


Fig. 5.10; Participants perception of discrete skills developed

The participants were also invited to comment on any additional skills not mentioned in the question that they felt they had learned.

Of these responses, 23 mentioned skills in communication;

“How to effectively communicate with groups to organize a group project”

“I was able to share my ideas with others to listen and hear what I had to say”

There were 7 comments indicating that skills in organization were developed;

“Leadership, organisation, listening to others, being creative, answering questions better, talking to other people and being more confident”

5.2.4 Focus Group Interviews

Two focus group interviews were conducted by the researcher two months after the Stage Two workshops and during the time that the participants were implementing the real community service projects. Two schools were selected according to their availability and four participants were selected from each school. The four students were chosen for interview at random by their teachers in each school.

The focus-group interviews were semi-structured and conversational with four participants in each talking with researcher in a relaxed open discussion with the researcher using prompting questions. The topic areas for discussion were as follows.

- The participants' experience with planning the real projects.
- The participants experience of the workshops.
- Participants perception of acquisition of skills and experience from the workshops that could be applied to planning the real projects
- The participants' experience of the Brain Game
- The participants' views on how technology was used in the Brain Game

The interviews lasted approximately 20 minutes in each of two different schools. All names were changed post-interview including any mentioned by participants to ensure privacy. The interviews were transcribed and comments were sorted under the following headings:

- Experience planning the real projects
- Experience of the workshops
- Transfer of skills from workshops to planning real projects
- Technology in the workshops.

Experience planning the real projects

The students were first asked to talk about their experience with planning the real project. One school was undertaking a sports day to promote student fitness for years 1-3 and the other was undertaking a number of sub-projects; sports day, putting on a show for an elderly care home and an anti-social awareness campaign;

"We made a survey and we just printed it out and gave it to the class then they had to choose which sports they would like to do"

"We were trying to give advice to people in our school about health and fitness and how they can improve and have fun also"

"Me and Seán are working on helping the elderly and in our group we're going to host a show, a variety show in our local old folk's home and we actually rang them up at our last meeting and we got all the info that we need and we're going to email them and tell them dates that we can do it on and what we'll be doing"

Some participants mentioned some of the challenges that they had encountered whilst planning their projects including other students not turning up to committee meetings, funding for project equipment and contacting stakeholders;

"Yeah I'm working on the advertisement for the sportsday and the old folk's home so I could make the posters and a web page but I have to ask Miss Byrne (principal) for permission and like some people in my group are not showing up so it's difficult for me to do it all by myself"

"For some sports we need insurance like archery so it's gonna be a hard problem to get it of course as well as money so...insurance money is our biggest problem."

"I still need to talk to her (teacher) but because she's like running around the place you never really get time to talk to her and as well she doesn't give you her email because like obviously it's a private thing to her like she doesn't want to give you her email so I need to talk to her about everything, so it's been a challenge trying to come up with something but then being like is she actually going to allow this, am I gonna be able to do this..."

Despite the challenges mentioned there were many comments indicating that the participants were finding the experience positive for a number of reasons.

"...you interact with people and you get to know them very well and you just have a lot of fun and you hope for the best when it comes out."

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

Experience of the workshops

The participants were asked to think back to the workshops they had completed and to comment on their experience of them, the response was generally positive with participants mentioning aspects of the workshops they enjoyed. This question was intended to give depth into what students had considered to be valuable about their experiences as communicated in the qualitative questionnaire data to begin the conversation.

"You get your own little space."

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

Transfer of skills from workshops to planning real projects

The participants were asked did they feel that they developed any skills in the workshops. The participants named a number of skills most notably organization, teamwork and critical thinking.

"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 like that."

"We learned critical thinking because some people can't find what to look for so some people compromise..."

"I think a huge part was organizing"

"Obviously teamwork was a big part because we had to work together and got stuff done together and done rightly."

When asked could they name any occasions when skills learnt in the workshops helped them plan aspects of their real projects the participants gave the following responses;

"Teamwork was a major thing cause as Paul said earlier we divided into groups and we're giving out tasks nearly Friday and we're divided into groups of three so we have to work together for the next week in trying to work and finish the task"

"Critical thinking is when Steven tried to get a person but he didn't get that person so he asked his friend to get someone else"

"Planning for the dates and all, talking to principal....organizing"

"You focus on it, like you're not like going I want to do this or maybe I could do this..."

"Definitely helped with the emails the way we write our emails...instead of being all sloppy with punctuation and this all we actually made them formal and made them clear on what we want or whatever done."

Experience of the Brain Game

Participants in both focus groups were asked to openly comment on their experience with the Brain Game intervention in the workshops. Their responses conveyed that they found the experience enjoyable but and also acknowledged that being put under pressure was beneficial to their experience.

"You feel like you want to do it and you have to have it done."

"You were never like just doing nothing you were always working on an email or a poster..."

"Kind of like you wanted to show you were able to do it."

"It was kinda like a trial before we did the real thing."

"Sometimes if you can't finish it in the right time you kind of get worked up and you think you can't finish it but your team mate could help you."

Technology in the Brain Game

The participants were invited to comment on how technology was used in the Brain Game. The participants mentioned emailing, researching information and publishing software as technologies they had encountered in the game, when asked if they had continued to use these technologies in planning their real projects they gave the following responses:

"We're using the computers as well to look up the resources. We need like equipment and areas we need to do it on like the archery we looked up how much it cost."

"It's easy to look up the bubble football we had to use and it's easy to find people who's actually ok with being the guest speaker"

The transcription below is two participants discussing how it's a good idea to research a number of charities before deciding which to donate project money raised to.

Laura: Because say if you wanted to, in your project say Mary if she wanted to donate to a charity you'd have to look up different charities and see which one suits you best

Mary: Yeah you can't just donate to a random charity that you don't know about, you have to look into it

Summary

This chapter presented the data from the three stages of the collection process and the findings from that data. The following chapter is a discussion of those findings in addressing the research questions of this study i.e. which 21st Century Skills emerged from the data that could be considered as developing through the implementation, was there any reported transfer of these skills to the real project implementation and how did the specific uses of technology influence the intervention.

Chapter Six, Discussion.

6.1 Overview

Based on analysis of data collected, the researcher contends 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 the use of ICT, through their engagement with the “Brain Game”. Some tentative evidence suggests that for at least the small sub-group interviewed two months after the second workshop that these skills transferred to their work on the community service project.

6.2 Developing 21st Century Skills

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 two stages of the intervention. The skill set evidenced from the Stage One workshop questionnaires, as developed from open coding of qualitative data as self-reported by participants included: collaborative working, communication skills and critical thinking. 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.

Collaborative Working

Collaborative working is considered a key “learning and innovation skill” within the Partnership for 21st Century Skills framework (Kay, 2010) and identified as a core element of the Bridge21 learning model (Conneely, Lawlor and Tangney, 2013). In the “Brain Game” intervention, participants’ were working together towards a common goal, sharing responsibilities by taking on roles within the team and supporting one another. These behaviours are representative of collaborative learning as defined by Dillenbourg (1999) and are characteristic of any Bridge21 learning activity, with students positively endorsing this element as a key part of their programme experience (Conneely, Lawlor and Tangney, 2013). 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 a Likert question that directly asked participants whether they felt more encouraged to collaborate with others following their experience of the Stage One workshop with 40% noting “Strongly Encouraged” and 42% “Encouraged”. A further Likert scale in the Stage Two questionnaire (figure 5.10) gave further insight on how much they felt had developed the discrete skill of teamwork over both workshops with 63% of participants answering that they felt they had developed “a lot” of the teamwork skill.

In addition to acknowledging the development of collaborative working, 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.

Communication Skills

Communication skills are generally acknowledged as a core component of the “learning and innovation skills” for 21st Century learning (Kay, 2010). A participant perception of developing general communication skills was evident from qualitative data collected. It is not absolutely clear whether participants meant that they gained experience in this skill 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 researcher suggests that it likely to be a combination of all three as indicated by analysis of the qualitative data collected, particularly in evidence from the two focus groups, where 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. In addition to analysis of the qualitative data, in the Stage Two workshops questionnaires, participants were asked to indicate on a Likert how much they felt they had developed the skill of “Presenting and explaining my ideas to others” with 45% indicating “a lot” and 33% indicating “some”.

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. A further study could isolate and give further consideration to the components of communication skills developing in relation to the intervention.

Critical Thinking

Whilst there were a number of direct mentions of the term “critical thinking” surfaced in the qualitative data, there were insufficient instances to consider it as a code in itself unlike the stronger results yielded for developing collaboration and communication skills. Nonetheless, instances of what could be considered critical thinking behaviour and a strong presence of words related to critical thinking emerged from the data. This included thinking about a problem considering options, organising a plan and problem solving. When the participants were “organising” as described by themselves during the “Brain Game” they were regularly recognising problems that presented and seeking viable solutions options to these problems. Some participants described this as having a “Plan B”. This behaviour is representative of a definition of critical thinking as an ability to recognise and find workable means to solve problems (Glaser, 1941). During focus groups participants also offered a number of instances of their critical thinking in relation to the real community service projects in which they were engaged. These included; reconsidering funding options, choosing suitable dates for project activities, and prioritising tasks. The participants credited their experience of the “Brain Game” with preparing them to deal with those aspects of implementing their projects.

6.3 The Role of Technology in the Implementation

The use of technology was integral to the workshops. Email provided a means for teachers and students to engage in meaningful role-play at a distance. The teams of students could assume the role of project managers with the opportunity to contact any relevant stakeholder they could identify. In this way, technology provided an opportunity for authentic role-play where participants could develop both a set of generalisable skills as explored in section 5.3.1 and also transferable ICT skills such as emailing, finding information online and document editing.

Emailing as a skill in formal communication

A significant issue emergent 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 raises some questions for the digital natives argument (Prensky, 2001), as one would expect that students raised with ready access to computers would have some level of experience with the ubiquitous ICT service of email. The finding certainly supports one counter-argument of the digital natives theory, that there is a spectrum of ability to consider and “not all digital natives are equal” (Shah, 2009), particularly taking into account economic circumstances (Golding, 2000). It is pertinent to remember therefore, that participants in this research were all students of DEIS status schools, which are schools considered to be in disadvantaged and under-resourced communities.

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. Van Der Meij and Boersma (2002) caution that pre-adolescent understanding and perception of using email is removed from its typical adult business usage. Teacher and mentor observations as well as the researcher’s reading of email exchanges at Stage One workshops noted the participants’ lack of understanding on how to structure a formal correspondence in email. For example they left out crucial pieces of information, used text-speak and typically used inappropriately casual language. This finding was interesting as it 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.

It was this requirement to structure formal correspondence that the participants’ identified as “emailing skills”. As noted by the teachers in their observations, formal communication appeared to improve significantly over the duration of the Stage One Workshops. This progression was also reflected in participants’ answers to how they felt the Stage One Workshops had affected how they worked in Stage Two with many acknowledging the use of email. It might reasonably be inferred that it was the higher level skill of formal communication through email that was being developed as evidenced in these responses. 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 community

service projects, suggesting a transfer of some formal communication skills.

Finding Information Online

The participants' use of computers to research information online was another issue that emerged from the data. Information literacy is considered a component of the 21st Century Skills Framework under the umbrella of Information, Media and Technology Skills (Kay, 2010). In their brief, participants were encouraged to use the two computers at their disposal to research any relevant information that could help them manage their projects during the "Brain Game".

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 through "googling", participants lacked the higher order skills to assess and consider which sites would be more relevant, appropriate or helpful. Mentors 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". The researcher considers that participants finding real information online added to the authenticity of the "Brain Game" in that arguably one would do exactly the same when researching a real project. 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 (Mitra and Dangwal, 2010) as having powerful potential in learning.

Other or non-specific ICT Skills

A consistently running theme throughout the data collected at all three stages was the participants' perception that they had gained skills in using computers. This acknowledgement of developing general ICT skills was in many cases left without definition by the participants.

In figure 5.10, the participants' perception of how much they developed skills in using computers to plan and organise a project over the course of the two workshops is evident. 68% indicated that they felt they had developed a lot of the skill. The researcher 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. Role-Play through Email

Arguably, the most significant contribution technology afforded the "Brain Game" interventions was to enable an authentic role-play through email. A strongly emergent issue from qualitative data collected 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 researcher 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. It was noted during the Stage One workshops that many participants either did not initially realise it was their teachers who

were emailing them during the “Brain Game” or were surprised it was not more than one person emailing them in the roles. Some students were also recorded as asking whether the emails were “real” or whether it was “real people” that they were emailing. Before beginning the “Brain Game” exercise, teams were given an email address to contact as their “Brain” and although not stated explicitly, it was reasonably evident that their teachers would be playing this role, for example they could see their teachers through the window of the next room. What was interesting was that given their age (13-14 years) the participants were so willing to become immersed in their own role as project managers and accept the multiple roles played by a “Brain”. The researcher does not suggest that the participants thought that they were contacting real people all along, but that they felt they had. In addition to this, even if participants had been “tricked” into believing for the Stage One workshops, upon realising this it is likely that the premise for the “Brain Game” in the Stage Two Workshops would have been negatively affected. This did not appear to happen as evidenced by comparing the perceived value of the workshop from Stage One questionnaires in figure 5.1, with 40% answering “very valuable” and 48% “valuable”, to the perceived value of the “Brain Games” in both workshops asked in the Stage Two questionnaires (figure 5.6) with 59% answering “very valuable” and 40% “valuable” and a strong emergence of the “realistic” issue from the qualitative data in both instances. The researcher sought to further explore this finding in the focus group interviews, with participants conceding that the exercise would not have been as realistic without the use of email, and also that being put under pressure made the experience feel more real to them.

In Stage One and Stage Two Questionnaires the element of being put under pressure was seen as a valuable aspect of the “Brain Game” intervention, In the Mantle of the Expert approach to teaching it is argued that without tension there is no drama (Heathcote and Bolton, 1994; Aitken 2013). Tangible pressure was added to the intervention by asking teams for deliverables within deadlines inside a condensed time frame, 1 month=30 minutes, accelerating a sense of urgency and accountability. Furthermore both natural (discovered by the participants themselves) and external (deliberately introduced to participants by a “Brain” role) problems arose during the intervention, for example venues being overbooked, or guest speakers cancelling, which added to the complexity of the task. Aitken (2013) proposes that when teachers make provision for such obstacles or challenges to be encountered by learners during activities the learners develop resilience, and perhaps more crucially remain engaged and interested in the task.

6.3 Limits of this Study and Further Work

In this research evidence of participants’ developing skills or having a greater ability to take on the implementation of their community projects was surfaced in their own perceptions and admissions. Pre and post intervention independent objective assessments to measure the skills of collaborative working, critical thinking and communication were not considered within the scope of this study. Further work could consider a formal assessment of the attainment of these skills perhaps with a longitudinal study. Such a study would need to consider other issues also beyond the scope of this research such as classroom culture and extra-curricular activities. What could also add greater insight would be the addition of teacher interviews both to report on skills development in relation to the students’ implementation of the community service projects and in students other work within school. Another potential measure of interest would be to create a standard assessment rubric for the real community projects that the schools would implement, and conduct a series of these assessments. One potential challenge to the validity of data collected is that the study involved students aged 13-14 years spending two separate days out of school in the Bridge21 learning space at

Trinity College, Dublin. This could bias the emergent results to be more positive, as participants could understandably be enjoying a “day off”, from a usual school day’s activities. The Bridge21 learning space itself is also considerably different to a typical classroom with its attractive furnishings and décor supporting a dynamic learning environment (Lawlor, Conneely and Tangney, 2010). However the participants’ references to learning carried back to school do suggest that the skills developed and the experience gained had lasting impact.

The “Brain Game” intervention is an authentic learning activity with six elements: role-play through email, a condensed time frame, deliverables, online research, teamwork and the affordance of choice to participants. In this study this intervention was framed in the context of community service projects that the participants’ would be implementing in reality. A further study of the intervention could consider applying the “Brain-Game” model in other contexts and over a longer timeframe.

Summary

This research presents the “Brain Game” as an exemplar model of authentic learning activity. This study has found that the “Brain Game” intervention, implemented over two stages of workshops, instilled confidence in students aged 13-14 in running real community service projects. It also facilitated the development of 21st Century Skills including: collaborative working, communication skills, critical thinking and ICT competency.

The authenticity and real-life nature of the “Brain Game” was significantly enhanced by teachers playing roles through a correspondence of emails with teams of students, real online research and an atmosphere of healthy pressure to deliver within the deadlines of a structured timeframe. Students both enjoy and value this type of learning, as they gain greater confidence to manage projects, and start to develop the skills necessary to succeed in 21st century society.

Chapter Seven, Conclusions.

This study set out to explore the potential of an authentic learning intervention the “Brain Game” as a tool to promote the development of 21st Century Skills in context. Elements of Authentic, Project-Based and Mantle of the Expert learning activities were combined, and their authenticity accelerated by the use of technology to enhance role-play and to access, synthesize and present information.

The findings suggest that elements of the “Brain Game” as an intervention; role play-through email, an ill-defined problem, collaborative working, use of real online resources, sustained pressure and the production of authentic deliverables all contributed to the what participants perceived to be a valuable and innovative learning experience. Participants’ acknowledged the authenticity of the intervention as something that both challenged and intrigued them, which in turn led to their sustained engagement in the learning activity.

Participants also self-reported on their perception of the development of skills in the areas of collaborative working, communication, critical thinking and ICT literacy through their engagement with the intervention. These are all skills within the 21st Century Learning set that emerged as themes from the data collected.

In this case study, the researcher had the opportunity to examine a potential transfer of skills and experience from the “Brain Game” implementation, to their application in real community projects that the participants went on to implement in reality. Many of the pre-requisites for the success of these real community projects had certainly been offered as learning opportunities in the “Brain Game”, these included an ability to engage in formal communications, managing time, working under pressure, teamwork and a flexibility in thinking to solve problems that arise. There was testimony from participants that such a transfer did occur and that their experiences within the “Brain Game” was offered as the impetus for putting this learning into practice.

While this can be taken as a positive endorsement of the “Brain Game” the researcher considers that this implementation was more than a read through or practice run for the participants’ community projects. It was a learning activity that pushed students to take responsibility. Students were immersed in the authentic context of a real-world challenge to be addressed with a team of their peers. This immersion allowed for skills and knowledge to be constructed by the students, as and when skills and knowledge were needed within in their task.

For a further examination of this theory, and an advanced study that applied the “Brain Game” intervention to a number of learning contexts could be usefully carried out. Once a learning task can provide an authentic context for a real-world problem, there could be an opportunity to implement a “Brain Game”. What could also be given consideration for a further study is the physical learning environment and resources offered to support students in such tasks. This study took place in the Bridge21 learning space which is custom designed to encourage collaborative working with technology. There were also sufficient teachers and adult mentors present to act as “Brains” and be within range of students to support where appropriate. In this study these aspects of human and physical resources played an important role in framing the learning.

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Appendices

Appendix A: Participant Information Sheet and Consent Form

TA21 Participant Information Sheet

Dear Student,

You are invited to participate in a project called Trinity Access 21. The overall aim of the project is to develop a model of teaching and learning suited to the needs of students in the 21st Century, and to support schools in preparing students for college and the workforce.

The project will take place during school time throughout the school year. During the programme, training workshops and activities will be provided for some students. These activities will focus on the development of teamwork and technical/computer skills, leadership through service and college awareness. There will also be a closely monitored college focused mentoring scheme.

These programmes will take place either in school or in a purpose designed learning space in Trinity College. During the programme you will be involved in different learning experiences and researchers from Trinity College may collect information about your views on those experiences.

Interactions between you and your classmates working together may be observed. Interactions between you and your teacher may also be recorded. You may also be asked to complete questionnaires and feedback forms at different times during the programme. You may also be selected to take part in an interview with a small group of your classmates.

From time to time, we may also record video footage and images of you and your classmates and teachers at work – this will be used in communications and promotional/marketing material about the TA21 project. Use of video footage and images will be strictly in accordance with best practice in Child Protection policies and guidelines. Your name will not appear alongside any images/video.

Research Participation

During class activities, interactions between students working together and between teachers and students may be video or audio recorded. Students and teachers may be asked to complete questionnaires, feedback forms or reflections at various intervals during the programme and some students and teachers will be asked to participate in interviews and focus group discussions.

All information that is collected by the researchers will be anonymized and stored in accordance with the Data Protection Act at Trinity College, Dublin. In the unlikely event that information about illegal activities should emerge during the study, the researchers will follow the school's Child Protection policy and inform the relevant authorities.

If there are any articles or presentations made using information gathered during this project, the students and school will not be identified. All TCD staff involved in the research undergo Garda Vetting procedures to receive clearance to work with minors.

Voluntary nature

Participating in this project is voluntary. You may change your mind and stop at any time. You may also choose to not answer any questions asked of you for any reason. We hope that this project will result in the improvement of schools preparing students for college and the workforce and help students in developing 21st century learning skills. We also hope it will be fun and an opportunity for you to make new friends from other schools.

Risks and discomforts

Answering questions about one's experiences may be uncomfortable. You can choose not to answer any question at any time. You may withdraw from the study (ask to leave the project and have your work given back to you) at any time without penalty.

Confidentiality

We plan to publish the results of this study. Our report will not include any information that would identify you by name. To keep his or her information safe, we will move the audio file from the recorder to a password-protected server. We will remove or change names in the interview transcripts. We cannot absolutely guarantee confidentiality because the students will share information in front of each other during the interview.

If you have any questions, please do not hesitate to ask your teacher or myself.

Kind regards,

If you have any questions, please do not hesitate to ask.

Grace Lawlor

2nd Year Student in Technology and Learning M.SC

Trinity College Dublin

lawlorgr@tcd.ie

Participants Consent

By signing this document, you _____ are agreeing to be part of the TA21 project. Your participation in this programme is completely voluntary and you may change your mind and decide to leave the programme at any time.

Your parent/guardian must give their written consent for you to participate, they have also been provided with an information sheet outlining the programme and how information is gathered and handled. They may also change their mind and ask that you leave the programme at any stage.

You should feel that the questions you have asked about the study have been answered and that you understand what you will be asked to do.

I would like to participate in this project.

Signature _____ Date _____

I give my permission to be recorded on video or audio (voice) and photographed during this project

Signature _____ Date _____

Appendix B: Parental Information Sheet and Consent Form

TA21 Project Parents Information Sheet

Dear Parent/Guardian,

Your son/daughter/child under your care is invited to participate in a project called Trinity Access 21. The overall aim of the project is two-fold. It is to develop a model of teaching and learning suited to the needs of students in the 21st century, and to support schools in preparing students for college and the workforce. The principal investigators are Cliona Hannon and Brendan Tangney.

The project will take place during school time throughout the school year. During the programme, training workshops and activities will be provided for some students. These activities will focus on the development of teamwork and technical/computer skills, leadership through service and college awareness. There will also be a closely monitored college focused mentoring scheme. These programmes will take place either in school or in a purpose designed learning space in Trinity

During the programme your son/daughter will be involved in different innovative learning experiences and researchers from Trinity College may collect information about their views on those experiences. Interactions between them and their classmates working together may be observed. Interactions between them and their teachers may also be recorded. They may also be asked to complete questionnaires and feedback forms at different times during the programme. They may also be selected to take part in an interview with a small group of their classmates.

From time to time, we may also record video footage and images of them and their classmates and teachers at work – this will be used in communications and promotional/marketing material about the TA21 project. Use of video footage and images will be strictly in accordance with best practice in Child Protection policies and guidelines. Their name will not appear alongside any images/video.

Research Participation

In order to demonstrate the effectiveness of the programme, researchers from Trinity College will collect information about the students' learning experiences at various stages during the school year. During class activities, interactions between students working together and between teachers and students may be video or audio recorded. Students and teachers may be asked to complete questionnaires, feedback forms or reflections at various intervals during the programme and a sample of students and teachers will be asked to participate in interviews and focus group

All information that is collected by the researchers will be anonymised and stored in accordance with the Data Protection Act at Trinity College, Dublin. In the unlikely event that information about illegal activities should emerge during the study, the researchers will follow the school's Child Protection policy and inform the relevant authorities. There may be lectures, Ph.D. theses, conference presentations and peer-reviewed journal articles written as

a result of this project, however the students and schools will not be identified. All TCD staff involved in the research undergo Garda Vetting procedures to receive clearance to work with minors.

Participating in this project is voluntary. Your child may change his/ her mind and stop at any time. He/she may also choose to not answer a question for any reason.

We hope that this project will result in the improvement of schools preparing students for college and the workforce and aid students in developing 21st century learning skills.

Risks and discomforts

Answering questions about one's experiences may be uncomfortable. Your child can choose not to answer a question at any time. You may withdraw them from the study at any time without penalty.

We plan to publish the results of this study. Our report will not include any information that would identify participants by name. To keep his or her information safe, we will move the audio file from the recorder to a password-protected server. We will remove or change names in the interview transcripts. We cannot absolutely guarantee confidentiality because the students will share information in front of each other during the interview.

If you have any questions, please do not hesitate to ask.

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Parental Permission TA21 project

By signing this document, you are agreeing to allow your child....., to be part of the TA21 project. Your child's participation in this programme is completely voluntary. If you allow your child to be part of the project, you may change your mind and withdraw your approval at any time. Your child may choose not to be part of the project, even if you agree, and may refuse to answer focus group question or stop participating at any time. By signing, you acknowledge that you have not been promised anything in exchange for your child's participation in this study and that your child has the right to withdraw his/her participation at any time.

You will be given a copy of this document for your records and one copy will be kept with the study records. Be sure that the questions you have asked about the study have been answered and that you understand what your child will be asked to do.

I..... give my permission for my child to participate in this project.

Signature_____Date_____

I give my permission for the interview with my child to be recorded by audio or video

Signature_____Date_____

Participant Questionnaire Leadership through Service Workshop TA21

As a participant of this TA21 project today you are invited to answer this questionnaire as part of on-going research based on your school Leadership through Service projects.

Your name is required in this questionnaire so that you can be identified at a later stage in the research and/or if you wished to have your questionnaire removed from the research and returned to you at any stage. You will not be identified by name in any documents or reports arising from this research

Participating in this questionnaire is voluntary, you may change your mind and stop at any time. You may also choose not to answer a question or parts of questions at any time. You should feel free to ask to have any questions explained to you at any time.

In the unlikely event that illegal activities are reported in this questionnaire the researchers must follow Bridge21 child protection procedures and inform the relevant authorities.

Yes, I would like to answer this questionnaire

No, thank you. I would not like to answer this questionnaire

1. Some information about you.

Your Name:

Date of Birth:

School Name:

2. Overall how valuable did you find your experience today

	Not valuable at all	Not very valuable	Neutral	Valuable	Very Valuable
Please tick relevant box					

Why do you feel this way?

3. How helpful do you feel that this experience has helped you to prepare for the Leadership through Service projects you will go on to do at school?

	Not helpful at all	Not very helpful	Neutral	Helpful	Very Helpful
Please tick relevant box					

Why do you feel this way?

4. How strongly has this experience encouraged you to act as a leader of other students at your school?

	Has not encouraged me at all	Has not encouraged me much	Neutral	Has encouraged me	Has strongly encouraged me
Please tick relevant box					

Why do you feel this way?

5. How do you feel this experience has prepared you for "real-life" challenges and obstacles?

Please tick relevant box	Has not prepared me at all	Has not prepared me much	Neutral	Has prepared me	Has greatly prepared me
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Why do you feel this way?

6. Do you feel encouraged to collaborate/work with others in school after your experience today.

Please tick relevant box	Not encouraged me at all	Not encouraged much	Neutral	Encouraged	Strongly encouraged
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Why do you feel this way?

7. If there are any other comments you would like to make you can write them in this space.

Thank you for answering this questionnaire :)

Participant Questionnaire 2 Leadership through Service Workshop TA21

As a participant of this TA21 project today you are invited to answer this questionnaire as part of on-going research based on your school Leadership through Service projects.

Your name is required in this questionnaire so that you can be identified at a later stage in the research and/or if you wished to have your questionnaire removed from the research and returned to you at any stage. You will not be identified by name in any documents or reports arising from this research

Participating in this questionnaire is voluntary, you may change your mind and stop at any time. You may also choose not to answer a question or parts of questions at any time. You should feel free to ask to have any questions explained to you at any time.

In the unlikely event that illegal activities are reported in this questionnaire the researchers must follow Bridge21 child protection procedures and inform the relevant authorities.

Please tick one of the boxes below.

Yes I would like to answer this questionnaire.

No thanks, I wouldn't like to answer this questionnaire.

1. Some information about you

Name:

Date of Birth:

School:

2. Overall how valuable did you find your experience during the “Brain Games” in both workshops?

Please tick one box.

Not valuable at all	A little, but that valuable	Neither valuable or not-valuable (Neutral)	Valuable	Very Valuable	I don't know

Why do you feel this way?

3. Do you feel that anything you learned from the first workshop affected how you worked in the second workshops?

Please tick one box.

Not at all	A little, but not much	Affected somewhat	Affected greatly	I don't know

Why do you feel this way?

4. Do you feel your experience in the first workshop affected how you worked on the real community project back at school?

Please tick one box.

Not at all	A little, but not much	Affected somewhat	Affected greatly	I don't know

Why do you feel this way?

5. Do you feel that the way you used computers during the workshops was useful?

Please tick one box.

Not useful at all	A little, but not that useful	Neither useful nor not-useful (Neutral)	Useful	Very useful	I don't know

Why do you feel this way?

6. Which of these skills do you think you may have developed (got better at) during the workshops?

Choose a box to tick for each row.

Skill	I didn't develop this skill at all	I developed very little of this skill	I developed some of this skill	I developed a lot of this skill	I don't know if I developed this skill
Teamwork					
Leading a project					
Using computers to help plan and organise a project					

Skill	I didn't develop this skill at all	I developed very little of this skill	I developed some of this skill	I developed a lot of this skill	I don't know if I developed this skill
Presenting and explaining my ideas to others					

Are there any other skills you think you have learned or developed during the workshops?

7. Any other comments?

Thank you for answering this questionnaire! :)

Appendix E: Sample Team Guide-Sheet for the Brain Game

You and your team mates must plan and manage a community service project including budget, communication with teachers, parents and students etc...

You have 4 months to do this. Each month is equal to roughly 30 minutes of real time, you should try and complete the tasks prescribed for each month (or you'll have to catch up on it the next!!) All communication should go through "The Brain" that is all teachers, parents, sponsors, guest speakers etc.. .using the email address provided.

Your project theme is "Anti-Social Behaviour"

November

By the end of this month you should...

- Decide on three actual activities (concerts, parades, guest speakers, other events) that will happen in this project
- Decide on a budget for your project
- Write a project proposal to the Board of Management with information on the above **(A word document)**

December

By the end of this month you should...

- Contact the relevant people who you need to get involved with your project (teachers, guests, etc..) **(Use email)**
- Write a parental consent form for all students involved with the project giving details of activities **(A word document)**
- Decide on dates and venues for your activities and check this out with relevant people **(Use email)**

January

By the end of this month you should...

- Make a poster for your school building using Paint or similar **(Email file to Brain)**
- Write a progress report to Board of Management **(A word document)**

February

By the end of this month you should...

- Prepare a presentation of your project (Using the guide questions provided)

Appendix F: Guide-sheet for teachers in a “Brain” role

November

By the end of this month the team should...

- Decide on three actual activities (concerts, parades, guest speakers, other events) that will happen in this project
- Decide on a budget for your project
- Write a project proposal to the Board of Management with information on the above **(A word document)**

Brain should...

- Provide a reply from B.O.M requesting a progress report in January and pick up any holes you might see in their plans, also address budget issues by suggesting they run a fundraiser or find a sponsor (don't give them all the money)

December

By the end of this month the team should...

- Contact the relevant people who you need to get involved with your project (teachers, guests, etc..) **(Use email)**
- Write a parental consent form for all students involved with the project giving details of activities **(A word document)**
- Decide on dates and venues for your activities and check this out with relevant people **(Use email)**

Brain should...

- Give realistic replies to emails requesting your involvement, mention date clashes etc.. and offer extra support where appropriate (lending equipment etc..)
- Be a concerned parent asking for extra information

January

By the end of this month team should...

- Create a promotional Facebook page for their project **(Email link to Brain)**

- Make some posters for their school building using Paint (Email file to Brain)
- Write a progress report to the Board of Management (A word document)

Brain should...

- Give a reply from B.O.M
- Be a sponsor sending some more money or equipment on the condition they mention you somewhere (on posters or in presentations for example)

February

By the end of this month they should...

- Prepare a presentation of their project (Using the guide questions provided)

Appendix G: Pre-Brain Game Market-Place Activity Sheets

The Project Market-Place

Two members of the group will visit 2 tables from the other school. Ask some questions about their activity and fill in the template below. After you've visited all 3, go back to your table and come up with 3 things you like about each activity and 3 possible challenges or problems that they might have with their activity.

Group:

WHAT is the activity?	Describe what they want to do:
WHY do they want to do it?	Why have they chosen this activity in particular?
HOW are they going to do it?	What equipment will they need? Will they need money?

Things we like about their idea	Problems/Challenges we think they might have with this idea

Appendix H: Screenshot of ethical approval granted for study

