Technology, Teamwork and
21st Century Skills in the Irish Classroom

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1. Introduction

Ireland is not unique in the fact that despite at least a decade of attempting to integrate ICT into the classroom, the truth of the matter is that the traditional model of the Victorian classroom still predominates, particularly at second level. A new model of classroom practice and a paradigm shift in teaching and learning is required to allow creativity, peer-learning, thematic learning and problem solving, i.e. the skills commonly deemed necessary for the knowledge-based society of the 21st century, to flourish in second level schools. At the heart of any such revised model lie collaboration and teamwork. Yet, despite almost a century of research and wide support in the research community for Vygotskyian ideas on the social construction of knowledge, and the availability of ICT, whose prime affordances are collaboration and creation, classroom practice remains inherently individualised in nature.

Over the past four years the authors have run an initiative, known as Bridge21, in which more than 3,000 students have participated in out-of-school, team-based, technology-mediated workshops. These workshops typically ran for 3.5 consecutive days and took place during the school day in a purpose-designed learning place on the university campus. In the course of that time, a very particular model for ICT-enabled group learning has emerged, which has the potential to engender the development of the 21st century skills listed above (Lawlor, Conneely & Tangney, 2010).

This chapter gives an overview of the model and reports upon the main themes which have emerged from an analysis of data gathered over the four year period. The chapter then goes on to describe an ongoing action research project, involving a number of second level schools, to explore how the model can be adopted in classrooms to deliver the mainstream curriculum. We argue that the model provides a pragmatic and concrete methodology which can be used in Irish second level classrooms to deliver the curriculum, through embracing collaborative, ICT-mediated, project-based learning. It is only by embracing such a radical overhaul of the model of teaching and learning in schools that the power of ICT will be unleashed, to create truly inspiring learning environments in which, as the poet Gibran put it, the teacher "*does not bid you enter the house of his wisdom, but rather leads you to the threshold of your own mind*."

2. Background

2.1 Learning in the 21st century

The accepted wisdom among industry leaders and policy-makers is that the economic and social trends of the 21st century, largely due to advances in information and communications technology (ICT), have transformed the global economy and its work practices, from one based on material goods and services, to one based on information and knowledge (National Research Council, 2001; Claxton, 2008; CISCO, Intel & Microsoft, 2009). As a result of these changes, the 21st century workforce are required to have a higher level of cognitive skills, encompassing the ability to "respond flexibly to complex problems, to communicate effectively, to manage information, to work in teams, to use technology, and to produce new knowledge" (CISCO et al, 2009, p. 4). However, while such dramatic transformations have taken place in the global economy and in society generally, many commentators argue that education systems have been slow to respond to the changing environment and still emphasise information transfer over the development of skills and capabilities. They claim that curricula, pedagogy, school organisation and assessment remain much as they were in the industrial era of the 20th century (ibid).

As long ago as 1873, Newman railed against the then emerging trend of 'teaching to the exam':

> *"..those earnest but ill-used persons, who are forced to load their minds with a score of subjects against an examination, who have too much on their hands to indulge themselves in thinking or investigation……….. having gained nothing really by their anxious labours, except perhaps the habit of application"* (Newman 1947).

In more modern times, this relentless focus on the ability to reproduce received information has led to many calls to move away from subject-based learning and focus on meta-cognitive skills, problem-solving and the development of the whole person (Collins, 2010). Claxton observed that there is a requirement to develop 'Learners' with positive transferable learning dispositions rather than 'Knowers' who can absorb and reproduce received information (Claxton, 2006). In order to better align formal education with the world outside of school and enable students to prepare for the demands of the 21st century information society and economy, Voogt and Pelgrum (2005) suggest a new balance of pedagogical approaches. Active learning should comprise *less* activity prescribed by the teacher during whole class instruction and *more* activity determined by the learners themselves working in small groups. For the development of creativity, there should also be *less* reproductive learning, where students apply known solutions to problems and *more* productive learning, with students encouraged to seek new solutions to problems (Voogt & Pelgrum, 2005).

2.2. ICT-enhanced Learning

ICT can be a powerful tool for teaching and learning, particularly in its potential to support and encourage the 21st century skills described above. Furthermore, there is little doubt of the potential of technology to act as a potential catalyst for change in education (McGarr, 2009; Claxton, 2008; CISCO et al., 2009). ICT presents a challenge to prevailing pedagogical practice in its capability to shape a more open, constructivist and constructionist approach to learning. However, while the development of the 21st century global knowledge economy has been, for the most part, enabled by the wide-spread innovative use of ICT, its potential to enhance teaching and learning remains underexploited, as pedagogical approaches in today's classroom remain largely didactic, passive, individualised and teacher-led (CISCO et al., 2009).

Formal education has shown itself to be resistive to change, as exampled by the corralling of ICT within the boundaries of a separate learning space, for example, the use of computer labs that are remote from the everyday classroom. Furthermore, much of what passes for constructivist e-learning is, in fact, often merely technology-supported didactic practice (Conole, 2004). Significant systemic changes must be made before there can be a more integrated use of ICT in schools (McGarr, 2009). McGarr's review of the historical development of ICT in Irish second-level schools reveals that the predominant focus has been on learning *about* technology rather than *with* it (ibid). The potential of technology in education can only be realised where there is an understanding of how it can be used effectively (Conole, Dyke, et al., 2004). It is suggested that in order to meaningfully integrate ICT across the curriculum, policies should be presented not as ICT initiatives, but as initiatives in teaching and learning (McGarr, 2009).

In order to fully exploit the potential of ICT, alternative approaches to pedagogy must be explored and new models of classroom practices embraced. For example, Resnick calls for an approach to pedagogy which involves "knowledge-based constructivism and effort-based learning" (Resnick, 2000). Flexibility and innovation in learning has been successfully applied in out-of-school learning contexts, where programmes have had the freedom to develop models of learning that encourage creativity, collaboration, problem solving and design skills, mediated by ICT. In the process they have liberated a groundswell of learner motivation (Wong, Packard et al. 2000). The Computer Clubhouse model devised at Massachusetts Institute of Technology (MIT) is probably the most widespread exemplar of such programmes[1].

2.3 Group-based learning

As outlined above, in order to fully exploit the potential of ICT, alternative approaches to pedagogy must be explored and classroom practices must be transformed. At the heart of any such revised model of learning lie collaboration and teamwork. The theories of Piaget (1928, 1959) and Vygotsky (1978) highlight the importance of the interaction between social, affective and cognitive states in a student's development and learning, thus providing a rationale for the use of groups in classroom settings.

There currently exists, however, a serious gap between theories of group-work and its practice in formal education. An underlying problem is the fact that individualised learning and assessment is so embedded in the formal educational systems as to prevent the advancement of group work in classroom practice (Galton and Hargreaves 2009). Despite the fact that it is generally accepted that a key indicator for success for a young person in education is positive relationships around their learning, current notions of pedagogy tend to focus on teacher-student relationships and fail to recognise the significance of peer-peer learning amongst students (Blatchford et. al, 2006b). Stifling the development of these relationships through a teacher-led, didactic paradigm impoverishes learning.

There appears to be a dissonance between espoused best practice with regard to group-based learning, as promulgated in teacher training colleges and on the ground practice in the classroom (Blatchford et al., 2003). It has also been observed that teachers hold onto consistent beliefs about teaching and

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[1] http://www.computerclubhouse.org/

learning throughout their careers against a background of shifting contexts driven by technical innovation and in the absence of a discourse on any new understanding of pedagogy (Hammond, Younie et al. 2009).

The SPR*in*G (Social Pedagogical Research in Group work) project attempted to address the wide gap between the potential of group work to influence learning, motivation and attitudes towards learning and relationships and its limited use in schools. Furthermore, it sought to address the concerns of teachers and students who were not reaping the benefits of group work in the classroom. The SPRinG approach is set apart from other research in the field of group-based learning in its relational approach (allowing students to develop collaborative skills over time through training) and its inclusive view of classroom groups that combined cognitive development, motivational and social cohesion approaches (Blatchford et al., 2003). A further key difference was that it stressed collaborative and autonomous learning processes rather than extrinsic rewards.

Findings from their 5 year study, involving over 4,000 students (ages 5-14) from 162 classes in primary and secondary schools across the UK, indicate that engaging in the SPRinG group work methods led to positive outcomes in relation to student learning/attainment, motivation and attitude towards schoolwork and classroom behaviour (student-student and student-teacher interactions) (Blatchford et al., 2006a; Blatchford et al., 2006b).

The SPRinG research did not address the use or role of ICT in group work. However, as ICT continues to make information widely and instantly available, and empowers students to engage in creative, constructive learning activities, (e.g. music composition, film making, computer programming etc) – heretofore the preserve of experienced practitioners – the traditional distinction between teacher and student, or expert and novice, is becoming blurred (Blatchford et al., 2003). The pedagogy relevant to today's classroom needs to evolve and be redefined in order to cater for the needs of 21st century co-learners and co-creators of knowledge.

2.4 The Irish Context

> *"Our second-level system is producing students who learn to the test; who in ever greater numbers are not learning to think for themselves; who receive spoon-feeding at second level and expect the same at third"* (Boland, 2009).

The Irish education system, particularly at second level, is characterised by rigid structures and traditional subject-based rote-learning and in recent times it has come under increasing criticism from educationalists, industry leaders and international corporate organisations. The criticisms are largely in-line with the broad 21st century learning agenda outlined above. In particular, it is argued that the nature of assessment and its central role in the second-level education system means that schools and teachers abandon creativity and innovation in favour of didactic teaching and rote-learning (Forfás, 2009, p. 67). This means that on entry to higher education students encounter serious difficulties with learning independently and with others, and have under-developed high order skills such as problem-solving, critical thinking and creativity.

The National Council for Curriculum & Assessment (NCCA) has recently undertaken a review of the Junior Cycle (years 1-3 in secondary school) and has highlighted a number of key areas to be addressed, namely: the inflexible, overcrowded, exam-focused nature of the curriculum; the poor

transition between primary and 2nd level education and a recent decline in literacy and numeracy standards. Steps are now underway for a major reform of the Junior Cycle with a move towards focusing on key skills rather than traditional examination of subjects. Any changes in this regard will pose an enormous challenge to schools, teachers, students and parents, but is unlikely to deliver upon its objectives if not accompanied by the type of transformation of classroom practice argued for above.

3. The Bridge21 Model for Teaching & Learning

For the past four years the authors have been engaged in a project which has developed a very particular model of ICT-mediated project-based learning (Lawlor et al., 2010). Initially targeted at Transition Year students, who were given time out of school to participate in 3.5-day workshops which focused upon projects not linked to the formal school curriculum, the model has also been used with participants ranging from primary school to postgraduate students. It has also been used to deliver computer programming workshops to 16 year olds (Tangney, Oldham, et al., 2010). For the past year, the authors have worked with a number of schools to adopt the model for use in school to deliver the mainstream curriculum, in a manner in which the students are also strongly encouraged to develop the 21st century key skills, as called for by commentators and advocated by the NCCA (NCCA, 2009). The details of the model are outlined below. Central to its rationale is that it is strongly team-oriented and the power of ICT is harnessed to support a structured collaborative learning environment.

3.1 Key Elements of the Model

The Bridge21 learning model is designed to release the potential of technology-mediated learning, through a structured move away from individualised, teacher-led learning. The essential elements of the model are as follows (Lawlor et al., 2010) (See also see *Figure 1* below):

- A structured **team-based** pedagogy influenced by the Patrol System learning method of the World Organisation of the Scout Movement (WOSM).
- A physical **learning space** designed and configured to support team-based learning.
- Adult support that seeks to **guide** and **mentor**, with teachers orchestrating and scaffolding team activities.
- Delivery of content through student-led **projects.**
- Technology-mediated collaboration.
- Incorporation of team and individual **reflection** as a regular part of the learning.
- **Cross-curricular thematic** learning.

Teamwork as a structure for learning is essentially alien to the predominantly didactic and individualised formal 2nd level classroom. Hence, it is the most distinguishing element of the Bridge21 model. It is a particular approach to teamwork, based on the model of small group working implemented via the Patrol System of the World Scout Movement, the world's largest youth organisation. Intrinsic to Scouting's approach is a reliance on young people to work together and learn from each other within an essentially Vygotskian peer-learning framework. Responsibility for action is vested in the team by means of a contract based on mutual commitment, trust and identification with a shared task or objective (Bénard, 2002). The relationship with the adult mentor or teacher is moderated through the team leader. This helps to bond the team and foster a team spirit. The team is self-managing and reaches decisions based on group consideration and consensus. Team stability is maintained to allow for team development and to further foster the team dynamic.
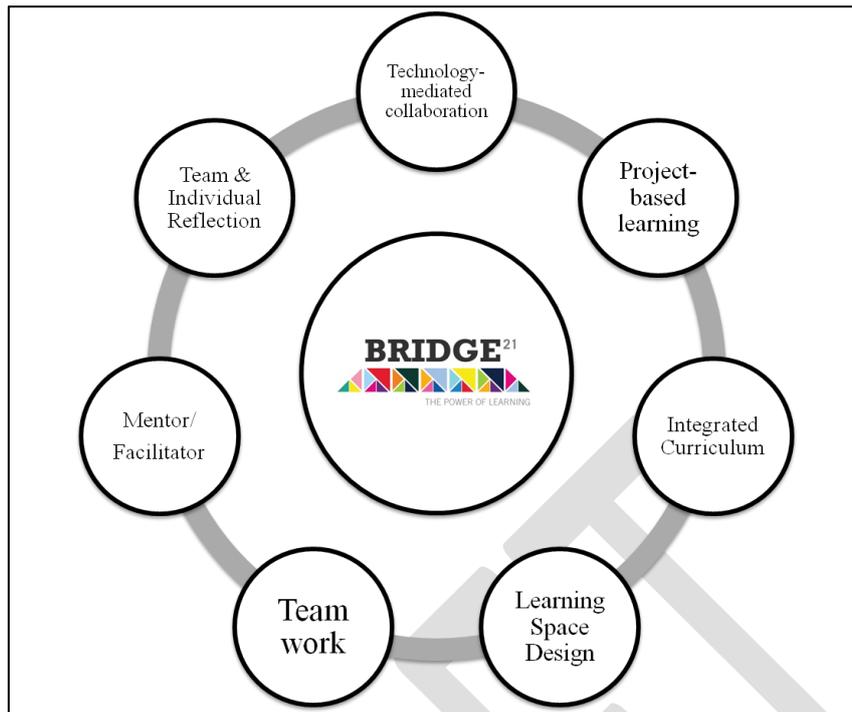
Figure 1: Bridge21 Learning Model

Individually the elements which comprise the Bridge21 learning model may be considered as common and well understood in their effect, but their combination and systematic application, particularly in formal education, is unusual. Bridge21 is distinguished from much of what is referred to in the literature as group work by the combination, focus and consistent application of the elements described above. Additionally the Bridge21 model is built on a strong belief in the strength of teamwork as a vehicle to transfer responsibility for learning to the learner.

4. Out of School Implementation - Bridge2College

The main deployment of the Bridge21 model has been as part of an out-of-school educational outreach programme with students from areas of social disadvantage in Dublin – entitled the Bridge2College. The programme was established in 2007 as a joint initiative of Suas Educational Development and Trinity College Dublin, specifically in collaboration with schools engaged in the Trinity Access Programmes (TAP[2]).

The core group of participants on the Bridge2College programme were aged between 15 and 17 years. In the outreach implementation the students were drawn from 15 TAP schools, whilst the computer programming workshop involved students from 55 schools nationwide. In both instances, students attended on block release from school, during term time and within school hours, for 3.5 days (22 hours). A maximum of 25 students attended per session, with participants working in teams of 4 or 5,

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[2] The Trinity Access Programmes work in partnership across the education sector and with students, teachers, families, communities and businesses to widen access and participation at third-level of under-represented groups. See http://www.tcd.ie/Trinity_Access/

of mixed gender and from different schools. The typical workshop format included day-long team-based projects, which required students to research and explore various topics, create multimedia artefacts (videos, blogs, podcasts, games etc.) and make presentations to their peers and adult mentors. A strict deadline was imposed on teams to deliver their work on time. Most students took part in one workshop but 20% of the cohort was given the opportunity to attend additional workshops or to participate as mentors for younger students.

4.1 Research Overview

The research is qualitative-led and data has been collected using a mixture of pre and post questionnaires, observations, and follow-up interviews and focus groups. The interviews have been used to elaborate upon the themes emerging from the questionnaire data and to introduce a longitudinal perspective to the analysis. Interviews have been carried out with students and their teachers up to 3 years after their initial involvement with the programme.

From analysis of the data a number of strong themes have emerged, namely: increased student motivation, an increased sense of personal responsibility for learning and improved propensity to self-directed learning; an improved attitude to technology and its place in learning; indications of skills transference to the school and other learning contexts; and a perceived gain in confidence. For the purposes of this paper, these themes will be outlined in brief.

There is strong evidence of a dramatic contrast in the way the young people viewed their learning during the Bridge 21 programme and their attitudes to their traditional classroom experience:

> *"You're knocking things up and you're learning different things from like just the internet and stuff as well. So it's not all just book, focus on the teacher, take down notes. It's learning differently".*

This attitude to the learning model is reflected in the students' motivation levels, particularly with those who display low motivation within the typical school environment:

> *"Learning can be fun instead of boring. In the Bridge 21 you have a choice, either sit back and don't speak up or, and you won't have any fun, or speak up and learn new stuff and enjoy it."*

Data analysis also indicates an increased perception of personal responsibility for learning and an improved propensity to self-directed learning. This is regularly evidenced in their reflections on the learning experience: *"It pushes responsibility on you."; "You're responsible for yourself and your own work."*

The positive impact of teamwork is also strongly referenced by the students. It should be noted that the majority of the students had little or no previous experience of any structured collaborative environment: *"I like working in a team rather than by myself."; "I learned how to interact with other people & work together"; "I learned how to work and cooperate in a group".*

In terms of the residual impact of the Bridge 21 learning experience, the research shows good evidence of assimilation of both 'soft' and technical skills and transference of the use of these skills to the school and other learning contexts. It is beyond the scope of this short paper to elaborate further

upon these themes, but they give considerable confidence to the appropriateness of adopting the model for use in formal schooling.

5. Bridge21 – In-school Implementation

Building upon the experience recounted above, and in response to the calls for change in classroom practice made by the NCCA and others, we have begun to pilot its adoption in the formal classroom with a view to exploring to what extent the model could form the basis for a learning innovation in mainstream schools. The goal is to create a pool of *early adopters* – students, teachers, schools and principals – who, through their concrete experience in technology mediated, group and project based learning in the classroom, will act as role models and reference points for the *early majority* as they too embrace change[3].

Bridge21 is based on an active partnership programme with schools that are committed to designing and building 21st century learning environments which are aligned with the development and reform of teaching and learning practices. The partnership approach allows schools to build on what already works well for teachers and students, while creating the space for innovation and change in classroom practice. It also allows schools to tailor planning, training, development and evaluation to their specific needs. Based on the core components detailed in *Figure 1* above, the learning model follows an approach to curriculum, ICT, classroom design and pedagogy that have the potential to transform current classroom practice and better equip students for the challenging world of the 21st century. It presents a shift in focus from narrow view of teaching individual subjects, to a wider goal of teaching of key competencies and skills through the engagement with curriculum material.

5.1 Options for Adoption

There are a number of ways in which schools can select to adopt the model (see *Figure 2* below):

1. The simplest approach is for subject teachers to adopt a version of the Bridge21 model and use it within a single subject within the confines of the regular timetable. Teachers are encouraged to implement the learning model in at least half of their regular classes every week. The learning objectives are specific to a single subject area, but also focus on key skills.

2. An alternative option is to create one or more integrated curriculum modules as part of the weekly timetable, during which the Bridge21model is used to support cross-curricular project-based learning. One way to create this space in the timetable is to take one period from each of a number of subject areas (2-3) and to amalgamate them together into one block (possibly along with the weekly allocation for CSPE) in order to create a dedicated contiguous blocked-off period in the timetable. Teachers timetabled during this block have the opportunity to develop and implement cross-curricular, team-based projects and facilitate sustained student engagement. Projects can vary in length from a purely in-class activity, confined to the duration of the teaching slot, to longer activities which span a number of weeks over the term.

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[3] The terms early adopter, early majority etc. come from Rogers, 1995.

3. A further option is to engage in thematic learning and teaching modules, for which a number of weeks are set aside during the academic year. Teachers develop and implement cross-curricular, team-based projects, which focus on an agreed theme. During the thematic week, students engage in a project utilizing learning from the different subject areas. The learning objectives include multiple subject areas, and also key skills.

For all modules, professional development workshops for teachers and a training programme for students is provided at the start of the school year, with an emphasis on planning, preparation and developing an understanding of the key elements of the model. Follow-up training sessions are delivered at intervals during the year.
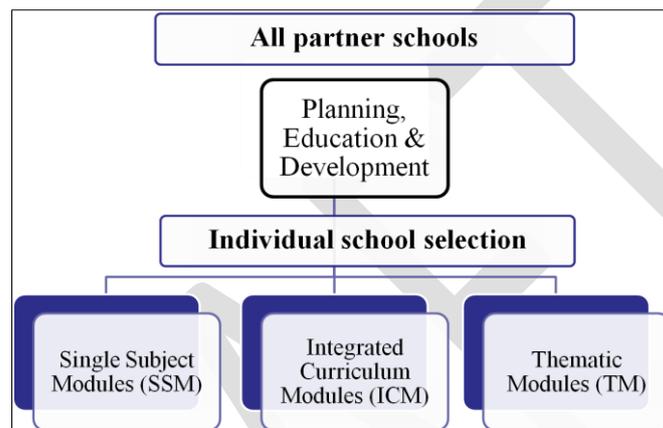

Figure 2: *Model of in-school implementation & options available to schools*

In terms of the day-to-day implementation of the Brdige21 learning model in the classroom, teachers can adapt a variety of generic team-based activities to their subject area. Teachers facilitate students to take an active lead in exploring topics and engaging with subject content through team activities, which range from discussion, brainstorming and problem-solving, to larger projects involving role play, design and multimedia production (videos, presentations, collaborative documents etc.) Each team member has a specific role to fulfil and technology resources (laptop computers, digital cameras etc.) are shared between team members to encourage collaboration. It is important for teachers to brief and debrief students before and after a team-based learning experience, to clearly outline the Group Task (what the team has to do and how members are expected to act together) and the Learning Task (the content to be learnt, discovered, investigated) (Hargreaves, 2009). The teacher's role is pivotal role in ensuring the effectiveness of the teamwork and orchestrating the students' learning.

5.2 A Active Partnership Approach

The adoption of the learning model into the formal classroom raises a number of very serious and profound questions and challenges including; the role of the teacher in team-based technology-mediated learning; the design of classrooms and other learning spaces; the timetable/organisation of learning and the assimilation of subject curricula and content, to name a few. It also points to a need for development and training of both students and teachers alike in a new pedagogy as co-learners. As already noted above, Claxton calls for the development of students as 'Learners' (Claxton, 2008).

Therefore, teachers, who, in traditional models of schooling are 'Knowers', are encouraged to become "paragons of learning" (ibid, p.155), by engaging with their students as co-learners and modelling best practice in 21st century learning skills.

The Bridge21 team works closely with partner schools in the areas of planning, teacher education and development. The programme requires active participation from teachers and principals at in-school workshops, residential courses, reflection & feedback meetings and academic symposia. The programme workshops are planned with a developmental sequence in mind, focussing on team-based teaching and learning skills, the creative use of ICT and the development of relevant necessary skills, and the development and delivery of a thematic/integrated curriculum. There is an emphasis on experiential learning, providing teachers with the opportunity to develop and transform their practice through experiencing the learning model first-hand. The sharing of resources and learning across the network of partner schools is also promoted and a community of learners is being cultivated. In accordance with the relational approach advocated by the SPRinG project, a training programme is also provided for students to develop teamwork and leadership skills. The training programme takes place both in school and in the Bridge21 learning centre and comprises a series of immersive experiences in the learning model.

The initial programme, or pre-pilot, which ran in 2010-11, involved 100 1st Year students (aged 12-13 years) from five secondary schools. The schools were from diverse socio-economic backgrounds across Dublin and included both mixed gender and single sex schools. A total of 25 teachers from 10 subject areas participated on a voluntary basis. In each school, teachers were led by the support of a strong, visionary principal and the approval of the Board of Management. The majority of schools and teachers chose to use the Bridge21 model within single subjects and the regular timetable (a 40-80 minute class). However, one school engaged in a number of thematic learning and teaching modules, for which a number of weeks were set aside during the academic year – projects included *Re-design the School Lunch Menu* (Subject areas: Science, Maths, English & Art) and *Produce a School Magazine* (Subject areas: English, Art, CSPE).

5.3 The Role of Technology

The design and implementation of Bridge21 technology-mediated learning experiences in the classroom has required teachers to carefully consider the purpose and role of technology. Teachers have been encouraged to leverage the technology to further enhance and encourage collaboration and peer-learning within teams. The technology must be deployed in such a way as to encourage students to work together, to trust, respect and listen to one-another, to communicate effectively and to plan, organise and evaluate their tasks and project. This is achieved in a number of ways:

- Extensive use is made of the internet with YouTube being the preferred source of information for students.
- Projects typically involve the creation of some sort of deliverable thus students act not just as consumers of information but as creators of digital content and it is through this process of creation that the pedagogical principles of social constructivism and constructionism are embodied.
- In the spirit of a classroom dynamic based on trust, sharing and peer-support amongst students, ICT Resources (laptop computers, digital cameras, microphones etc.) are shared between team members. For example, 1 or 2 laptops are shared between a team of 4-5

students. This goes against the one laptop per student model but our experience is that sharing promotes collaboration, student discussion and reasoning during project tasks.

- Online collaborative tools allow team members to co-create material (for example, documents, presentations and websites) both during school and, also, to continue their collaboration at home.
- Online collaborative tools also allows for teams to publicly and/or privately share work, which encourage co-operation and interaction between teams for larger-scale projects and presentations and is also a useful feature for assessment purposes, particularly peer- and self-assessment.
- Laptops provide flexibility to design the learning space and furniture layout according to the needs of individuals and teams.

5.4 Research Overview & Initial Findings

In order to determine the effectiveness of the in-school adoption of the model, an action research methodology is being followed, within which each partner school is treated as a single case study. The Bridge21 team are participant observers in the research, spending significant portions of time in partner schools delivering workshops, engaging with and supporting students, teachers and principals through the change process, whilst also directing the systematic collection of data in order to determine the effectiveness of the programme. The data is qualitative-led and draws on multiple sources: questionnaires, semi-structured interviews, focus groups and systematic observation.

An initial analysis of data from the pilot programme echoes many of the findings from the out-of-school implementation. Emerging themes include the positive impact of the learning model on student motivation, personal responsibility for learning and peer relationships. This is indicated by observations from teachers, such as: "*They're happier, they're more active, they're working harder – they like it more*" and "*An English project given to them recently… they just did it all themselves. They were able to work on their own and seem very self-motivated*". Comments from students have highlighted the positive impact of working with their peers in teams: "*I like working in teams because if you don't understand you can ask someone [on your team]*" and "*...because sometimes it's hard when it's just you, it's better with more than 1 brain*".

Systematic observations of teachers throughout the year have revealed ways in which their role in the classroom has changed. Team-based learning has yielded increased opportunities for direct and personal contact with students, either in a small group or on an individual basis. The role of the teacher has become more strategic, with different levels of involvement in student learning according to the needs of teams. Teachers are also aware of their role as a facilitator and orchestrator of the learning during a team-based activity: "*They seem to be able to choose their task much more quickly and just get on with it now. There are still a few who find it difficult, but there's definitely an increase…*"

6. Conclusion and Future Work

All the indicators are that the Irish secondary school system is entering into a time of profound change and that at least in the Junior Cycle years there will be a move away from the current prevalence of purely subject based teaching which is dominated by a terminal high stakes (written) examination. How change will evolve of the coming years is of course an open question but if the emphasis on the development of key skills is to have any meaning it is impossible to envisage a scenario in which

collaboration and ICT do not play a central role. To this end the Bridge21 project offers a pragmatic model of teaching and learning combined with an action research methodology which can help schools navigate through the uncharted waters which lie ahead.

Acknowledgements

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