

## 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, problem solving etc, i.e. the skills commonly deemed necessary for the knowledge-based society of the 21<sup>st</sup> century (21C), to flourish in second level schools. At the heart of any such revised model lie collaboration and teamwork. Yet, despite 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 individualistic in nature. This however may all be about to change as the current initiative to reform the Junior Cycle is a systemic attempt to move Irish classrooms towards a 21C model of learning. A major barrier to that reform process is the lack of exemplars as to what such a model of teaching and learning would look like in practice.

Since 2007 the authors have run an initiative, known as Bridge21<sup>1</sup>, in which more than 4,500 students have participated in out-of-school, team-based, technology-mediated workshops. These workshops typically ran for 3.5 consecutive days (22 hours total) 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-based learning has emerged (Lawlor, Conneely & Tangney, 2010), which has the potential to engender the development of the 21st century skills listed above.

This chapter gives an overview of the model and reports upon the main themes which have emerged from an analysis of data gathered between 2007 and 2011. The chapter then goes on to describe an on-going action research project, involving a number of second level schools, to explore how the model can be adapted for use in the classroom. We argue that the model provides a pragmatic and concrete

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<sup>1</sup> Bridge21 ([www.bridge21.ie](http://www.bridge21.ie)) is a joint initiative between Trinity College Dublin and Suas Educational Development. The authors wish to acknowledge the support of Social Entrepreneurs Ireland and other corporate and private donor sources that generously support our on-going work.

methodology which can be used in Irish second level classrooms to deliver the new Junior Cycle 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 puts 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 21<sup>st</sup> century**

The accepted wisdom among industry leaders and policy-makers is that the economic and social trends of the 21<sup>st</sup> 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; Dede, 2010 ). As a result of these changes, the 21<sup>st</sup> century workforce are required to have a higher level of cognitive skills and learning capacities (Scheuermann & Pedró, 2009). 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 20<sup>th</sup> century (Voogt & Pelgrum, 2005; Dede, 2010).

Criticism of excessive focus on content delivery is not new. As long ago as 1873, Newman, in his seminal treatise on liberal education (*The Idea of a University*), 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”.*

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 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 21<sup>st</sup> century information society and economy, Voogt and Pelgrum (2005) suggest a new balance of pedagogical approaches. Their view, which would be broadly supported by many other advocates of reform, is that 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 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 21C 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, or in collaboration with peers, and have under-developed high order skills such as problem-solving, critical thinking and creativity (Hyland, 2011; Smyth, Banks & Calvert, 2011; Forfás, 2009).

Since 2009, the Irish National Council for Curriculum & Assessment (NCCA) has been undertaking a serious review of the Junior Cycle (years 1-3 in secondary school), which has revealed a number of problematic areas to be addressed, namely: the inflexible, overcrowded, exam-focused nature of the curriculum; the poor transition between primary and second level education and a decline in literacy and numeracy standards (NCCA, 2010). In 2012 a major reform of the Junior Cycle was announced. Six key skill areas have been identified (see figure 1<sup>2</sup>) and schools are required, in addition to teaching a reduced amount of traditional curriculum content, to engage in an Assessment for Learning (AfL) process which will enable them to demonstrate the extent to which students are developing these skills as part of their learning. The proposed key skills resonate with those advocated for in the literature on 21C learning and are grounded in national and international research and practice (NCCA, 2011).



Figure 1: NCCA Junior Cycle Key Skills

Central to the reform process are the pivotal roles that ICT and 21st century skills, such as collaboration, will play in students' learning.

<sup>2</sup> Retrieved from

[http://www.juniorcycle.ie/NCCA\\_JuniorCycle/media/NCCA/Documents/key\\_skills\\_oct\\_2012\\_WEB\\_FINAL.pdf](http://www.juniorcycle.ie/NCCA_JuniorCycle/media/NCCA/Documents/key_skills_oct_2012_WEB_FINAL.pdf), Jan. 2013

### **2.3 ICT-enhanced Learning**

It has long been argued that ICT can be a powerful tool for teaching and learning and that it has the potential to act as a catalyst for change in education (Papert, 1993; Conole, 2004; McGarr, 2009; OECD, 2010), through its capability to shape a more open, collaborative, constructivist and constructionist approach to learning. It is, however, sobering to note that 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 (Resnick & Rusk, 1996; McGarr, 2009; Donnelly, McGarr et al., 2011).

Formal education has shown itself to be resistant to change, as evidence by the corralling of ICT within the boundaries of a separate learning space, such as 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). 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 (McGarr, 2009) and he goes on to argue that significant systemic changes must be made before there can be a more integrated use of ICT in schools. This view is shared by many others (Conole, Dyke, et al., 2004; Pauleen, Marshall et al., 2004; McGarr, 2009) who argue that the potential of technology in education can only be realised where there is an understanding of how it can be used effectively. The mere presence of technology in schools does not necessarily lead to changes in learning outcomes (Dynarski et al., 2007) and 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).

The revised Junior Cycle with its emphasis on key skills over content and with a very different approach to assessment offers a framework within which the latent potential of ICT to enhance learning can be exploited.

### **2.4 Teamwork and learning**

Learning models that seek to encourage high levels of student engagement and intrinsic motivation typically embrace collaboration and teamwork (Ryan and Deci, 2000). The theories of Piaget and Vygotsky highlight the importance of the interaction between social, affective and cognitive states in a student’s development and learning. Vygotsky’s “more able other” identified the peer as a key figure in learning. With teamwork the pool of “more able others” includes all team members and in a project based approach different team members may be able to play that role at different stages in the process as peers learn from each other (Vygotsky, 1978; Piaget, 1928).

There currently exists, however, a serious gap between theories of teamwork or group work and its practice in formal education (Johnson & Johnson, 1987; Blatchford, Kutnick et al., 2003;). An underlying problem is the fact that individualised learning and assessment is so embedded in formal educational systems that it prevents 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, 2006a; Blatchford et. al, 2006b). Stifling the development of these relationships through a teacher-led, didactic paradigm impoverishes learning.

The SPRinG (Social Pedagogical Research in Group work) project, undertaken by three English universities between 2000 and 2005, attempted to address the wide gap between the potential of group work to influence motivation and attitudes towards learning and relationships and its limited use in schools. 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 England, 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).

While the SPRinG research is overwhelming positive in its endorsement of teamwork in second level schools a major omission in the study was that it did not address the use or role of ICT in the process. As ICT 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) and the need to embrace teamwork and peer learning in the formal classroom becomes more important.

### 3. The Bridge21 Model for Teaching & Learning

For systemic change of the order envisaged in the Irish Junior Cycle reform to take place, a number of significant barriers need to be overcome. These include the provision of innovative forms of professional development for teachers and accounts of exemplars of 21C models for learning in classroom settings to which teachers can directly relate (Conneely, Girvan & Tangney, 2012). Bridge21 (Tangney, Oldham et al., 2010; Lawlor et al., 2010;) with its strong emphasis on the use of ICT and team work provides one such model for classroom practice.

#### 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 Figure 2 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.
- Engagement with content through student-led **projects**.
- **Technology** used as an integral tool in the process.
- 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 second level classroom. Hence, it is the most distinguishing element of the Bridge21 model. It uses 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 2: 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 designed with teamwork at its core and 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 this teamwork as a vehicle to transfer responsibility for learning to the learner.

## 4. Out of School Implementation - Bridge2College

### 4.1 Bridge2College Programme Overview

The main deployment of the Bridge21 model has been as part of an out-of-school educational outreach programme entitled Bridge2College. The programme was established in 2007 as a joint initiative of Suas Educational Development and Trinity College Dublin, specifically in collaboration with 15 schools from areas of social disadvantage in Dublin engaged in the Trinity Access Programmes (TAP)<sup>3</sup>. An additional series of computer programming workshops were provided to students from a further 55 schools nationwide. The core group of participants were Transition and 5th Year students, aged between 15 and 17 years.

For all workshops, students attended on block release from school, during term time and within school hours, for 3.5 days (22 hours total). A maximum of 25 students attended per session, with participants working in teams of 4 or 5, of mixed gender and from different schools. As per the learning model outlined above, there was a strong emphasis on collaborative, project-oriented constructivist learning activities. 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. Students were encouraged to regularly reflect on and discuss their learning, knowledge and skill development.

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.

### 4.2 Out-of-School Research Overview

Research on the Bridge2College programme 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.



Figure 3: The Bridge2College Learning Space

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. These themes are briefly elaborated upon below.

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<sup>3</sup> 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/](http://www.tcd.ie/Trinity_Access/)

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There is strong evidence of a dramatic contrast in the way the young people viewed their 21C learning during the 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 Bridge21 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 student reflections on the learning experience: *“It pushes responsibility on you.”*; *“You’re responsible for yourself and your own work.”*

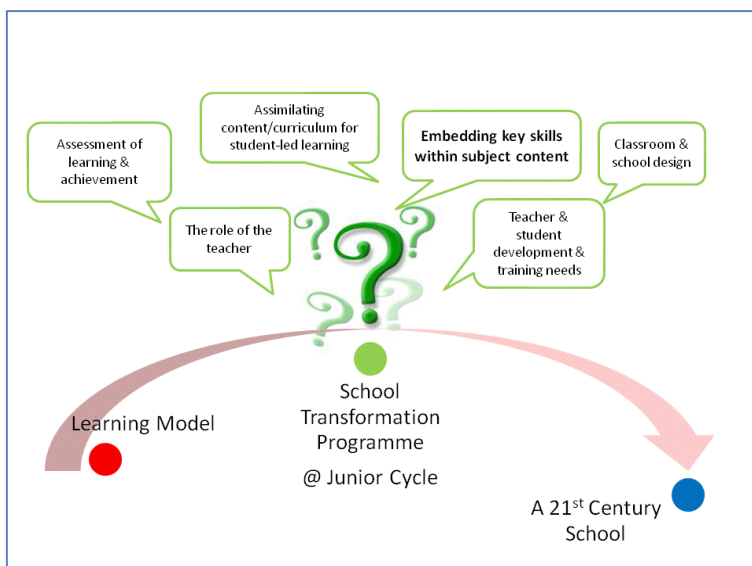
The positive impact of teamwork is also strongly referenced by the students. It should be noted that the majority of the students had little or no previous experience of any structured collaborative environment: *“I like working in a team rather than by myself.”*; *“I learned how to interact with other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

In terms of the residual impact of the Bridge2College learning experience, the research shows good evidence of assimilation of both 21C and technical skills. Furthermore, there is some evidence of the 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 adapting the model for use in formal schooling, particularly within the context of the Junior Cycle reform.

## 5. Bridge21: In-school Implementation

### 5.1 In-school Programme Overview

Building upon the experience recounted above, and in response to the calls for change in classroom practice required for the Junior Cycle reform process, the authors spent the 2011/12 academic year working with 8 schools to explore the adaptation of the Bridge21 model for use in the formal



classroom. The goal was 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, would act as role models and reference points for the *early majority* as they too embrace



change<sup>4</sup>. A myriad of issues arise, as depicted in Figure 4, and a fuller account of the experience of the pilot schools can be found in (Conneely, Girvan et al., 2012).

Figure 4: Issues in the School Transformation Process

The in-school programme is based on an active partnership with schools and the transformation process followed is not that of parachuting a model into the classroom, but rather the collaborative adaptation of elements of the model to suit the evolving needs, and capacity, of each school as it goes through the change process. We strive to continuously learn from the experiences of schools, teachers and students and as such are following an iterative action research cycle.

The schools in the 2011/12 programme came from a diverse geographical and socioeconomic background and thus were a representative sample of the wider cohort of secondary schools in the country. A characteristic they shared was strong school leadership and support for the process, and groups of teachers who were open to exploring changes in classroom practice. The 2011/12 programme focused upon the first year of secondary school and covered the full spectrum of subjects, as well as cross curricular work.

## 5.2 Implementation Approaches

The structure for engaging with Bridge21 is shown in **Error! Reference source not found..** At the start of the school year, each school participates in a planning and development process, comprising professional development workshops for teachers and training programmes for students. There is a strong emphasis on teachers planning, preparing and developing an understanding of the key elements of the model. Individual teachers and schools are then free to choose from one of the following three options as to how the Bridge21 model can be used in practice in the classroom. In 2011/12, all schools tried option 1 with some also trying options 2 and 3.

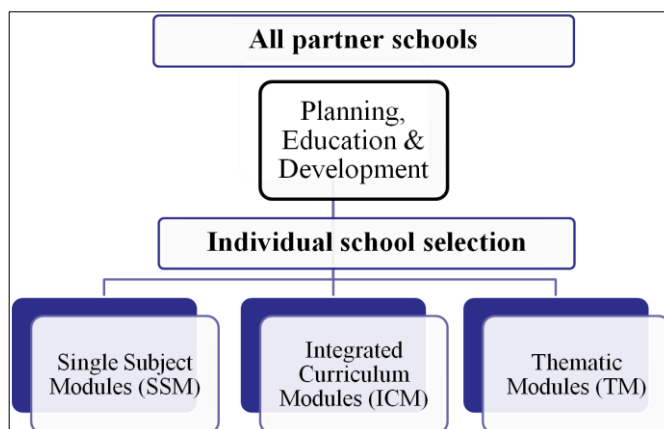


Figure 5: Options for Adapting the Model in the Classroom

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<sup>4</sup> The terms early adopter, early majority etc. come from Rogers, 1995.

1. **Single Subject Module:** Subject teachers adopt the Bridge21 model & use it within a **single subject**, within the confines of the regular timetable. The learning objectives are specific to a single subject area, but also focus on the **integration of key skills**.
2. **Integrated Curriculum Module:** The Bridge21 model is used to support cross-curricular project-based learning during one or more **integrated curriculum modules** as part of the weekly timetable. The learning objectives include **multiple subject areas**, and also the **integration of key skills**.
3. **Thematic Module:** Teachers develop and implement cross-curricular, team-based projects. During a **thematic learning and teaching** week, the regular timetable is altered to allow students engage in an **immersive project** utilizing learning from different subject areas. The learning objectives include **multiple subject areas**, and also the **integration of key skills**.

In terms of the day-to-day implementation of the Bridge21 learning model in the classroom, 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 team 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) (Galton & Hargreaves, 2009). The teacher’s role is different from the conventional one but is nonetheless pivotal in ensuring the effectiveness of the teamwork and orchestrating the students’ learning.

### ***5.3 Engagement With Teachers***

The adaptation of the Bridge21 learning model in the formal classroom raises a number of serious and profound questions and challenges including: the role of the teacher; the design of classrooms and other formal 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 21<sup>st</sup> century learning skills.

As already noted above, the Bridge21 team works closely with teachers in its partner schools in the areas of planning, teacher education and development. The programme requires active participation from teachers and principals at in-school workshops, 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, the programme also includes workshops and training for students to develop teamwork and leadership skills. The training programme takes place either in school or in the Bridge21 learning centre and comprises a series of immersive experiences in the learning model.

### **5.4 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 learning tasks and/or project. This is achieved in a number of ways:

- Extensive use is made of the internet, where students are encouraged to research and critically evaluate their own information.
- 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. 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 learning 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. This encourages a sense of autonomy amongst students and encourages them to self-direct their learning.
- Online collaborative tools also allow for teams to publicly and/or privately share work, which encourages co-operation and interaction between teams for larger-scale projects and presentations. Such tools are also useful for assessment purposes, particularly peer- and self-assessment, and collecting evidence of the development of 21C skills.
- Laptops provide flexibility to design the learning space and furniture layout according to the needs of individuals and teams.
- Rather than learning how to use one technology or application in depth and out of context in a discrete ICT class, students gain ICT skills in the process of undertaking a Bridge21-type project.

Overall, the Bridge21 model of learning provides a framework within which the potential of ICT to enhance learning and the development of 21C skills is supported.

### **5.5 Initial Findings**

The Bridge21 project is following an action research methodology with the research team acting as participant observers, 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 and shaping further cycles of implementation. The data is both qualitative and

quantitative and draws on multiple sources: questionnaires, semi-structured interviews, focus groups and systematic observation. A pre and post questionnaire was designed to explore students’ views and appreciation of a number of the Junior Cycle key skills (see Figure 1) and in 2011/12 this was administered to 134 students in two schools (Johnston, Murchan, et al., 2012).

The analysis of data from the 2011/12 programme echoes many of the findings from the out-of-school implementation in terms of student motivation and engagement but it also sheds light on some of the issues arising in the school transformation process. Details of this analysis can be found in (Conneely, Girvan et al., 2012; Johnston, Murchan, et al., 2012) but the key themes emerging from the perspectives of teachers and students can be summarised as follows.

Students reported that they enjoyed the experience of learning with the Bridge21 model and that they enjoyed working in teams and learning from their peers. Learning in this way was described as “fun”, the way computers were integrated into the process was compared unfavourably with traditional classes and the level of independence and autonomy granted to them was seen as a very positive attribute. Analysis of the data from the key skills questionnaire showed a statistically significant increase in awareness of 6 of the skills probed in the questionnaire while improvements in 4 others featured in the interview data. The need for students to improve their own communication and presentation skills featured prominently in the data as did learning how to work in a team.

Analysis of data from teachers corroborated the findings from the students. However, it also raised a number of issues which directly affect teachers. Mastery of content knowledge by students is a key concern for teachers but many observed that with a team-based approach students made faster progress in the assimilation of content than in a traditional, didactic approach. Teachers were cognisant of students improving 21C skills such as communication and research skills and felt pride in their own achievements and sense of professional development from having engaged in a challenging innovation in teaching and learning and seeing the benefits in practice.

The analysis highlighted some key factors for the success of an innovation such as this, of which the role of leadership in the school and the need for innovative models of teacher professional development were paramount.

## **6. Conclusion and Future Work**

All the indicators are that the Irish second level 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 dominated by a terminal high stakes (written) examination. How change will evolve in the coming years is 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, Bridge21 offers a pragmatic model of teaching and learning combined with an action research methodology which can help schools navigate through the uncharted waters of reform which lie ahead.

The authors are working with an increasingly wider network of schools (12 in the 2012/13 academic year) and are continuing to refine how the model can be adapted for use in school. Innovative models of teacher professional development will need to be devised to achieve the goals of the ambitious systemic reform process the Irish education system has embarked upon and all developments will need to be underpinned by reliable research data. We hope to play a role in this collaborative process.

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