AN EXPLORATION INTO THE ADAPTATION OF THE BRIDGE21 MODEL FOR 21st CENTURY LEARNING IN IRISH CLASSROOMS

Case Study Report for the NCCA

BRIDGE21

THE POWER OF LEARNING

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November 2012

Summary

This report describes the experiences of teachers and pupils in 8 schools as they engaged with the research team, and authors of this report, in attempting to adapt the Bridge21 model of 21st century (21C) learning for use in the mainstream classroom to deliver core curriculum content. The work, and the report, is firmly situated within the context of the Junior Cycle reform process and the participating schools can be viewed as innovators in the emerging change process. The schools come from a diverse geographical and socioeconomic background and thus are a representative sample of the wider cohort of secondary schools in the country. A characteristic they share is strong school leadership, which is supportive of the process, and groups of teachers who are open to exploring changes in classroom practice.

Figure 1: Student portrayal of Bridge21

The intervention described in this document consisted of a series of continuous professional development (CPD) activities with teachers and the training of students to work in teams. Teachers then incorporated elements of the Bridge21 model into their classroom practice in a variety of ways. Data was collected through a purpose-designed student questionnaire focusing on key skills, classroom observations of Bridge21 classes and focus group interviews with teachers.

The key findings of this study are that while schools and teachers are still very much at the start of a much longer process of change, students are keen to embrace collaborative, self-directed learning (if it is scaffolded and structured in an appropriate fashion). Specifically, the research sought to investigate a selection of the key skills proposed in the NCCA framework for a new Junior Cycle, and there is empirical evidence that they were modest levels of development over a relatively short period of time. Other key findings provide an insight into the culture and mindset of principals and teachers as they embark on the current journey of reform at Junior Cycle. The Bridge21 team are continuing to engage with schools in the reform process and the programme has expanded to include 12 schools in the 2012-13 programme.

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Note: The drawings which appear in this report are taken from the responses to post-questionnaires in which students were asked to express, in a visual form, some aspect of their learning experience through the Bridge21 programme.

Bridge21 was founded in 2007 a not-for-profit joint venture of Suas Educational Development and Trinity College Dublin.

Suas Educational Development is an ambitious, education-focused social change organisation that supports programmes in Ireland, India & Kenya. Founded in 2002, Suas has grown quickly to become a leading mid-size organisation in development within Ireland. Suas promote quality education for all by providing short-term volunteers, financial and technical support to Partner schools in India & Kenya. In Ireland Suas support young adults to engage with social change through a range of service-learning programmes.

Trinity College builds on its four-hundred-year-old tradition of scholarship to confirm its position as one of the great universities of the world, providing a liberal environment where independence of thought is highly valued and where staff and students are nurtured as individuals and are encouraged to achieve their full potential. The departments specifically associated with Bridge21 are the Trinity Access Programmes and the Centre for Research in IT in Education (which is a collaborative research group between the Schools of Education and Computer Science and Statistics).

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1   Introduction

1.1   About Bridge21

Bridge21 is a not-for-profit, joint venture of Trinity College Dublin[1] (TCD) and Suas Educational Development, an Irish NGO dedicated to supporting high quality education in targeted under-resourced communities. Over the past five years, an innovative model of 21st century learning has been developed in an out-of-school context, with over 4,000 participants. The students (mostly from Transition Year) have attended workshops (typically 3.5 days/22hrs in duration) in a purpose-designed learning space in Dunlop Oriel House, which is located on Fenian Street near the east end of the college campus. The workshops and learning model are designed to release the potential of ICT and student-led collaborative learning, and to equip students with the skills they need to live, work and learn in the challenging world of the 21st century.

1.2   The Learning Model

The core components of the Bridge21 learning model are as follows:

- **Technology** as an integral tool in the learning process.
- Delivery of content through student-led **cross-curricular, thematic projects.**
- A physical **learning space** designed and configured to support team-based learning.
- A structured **team-based** pedagogy influenced by the Patrol System learning method of the World Organisation of the Scout Movement (WOSM).
- A pedagogical approach which focuses on **key skill acquisition** & content knowledge.
- A focus on the **social context of learning** to increase student motivation and engagement
- Adult support that seeks to **guide** and **mentor**, with teachers orchestrating and scaffolding team activities.
- Incorporation of team and individual **reflection** as a regular part of the learning.

A video of the learning model in action, featuring commentary and descriptions from Bridge21 staff, students and teachers, is available on www.bridge21.ie/about-us/our-model/.

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[1] The Trinity expertise is drawn from the Trinity Access Programmes and Trinity's Centre for Research in IT in Education (a collaborative research group between the School of Education and the School of Computer Science & Statistics).

Figure 2: The Bridge21 Learning Model

The typical format of the Bridge21 learning experience is a day-long session (approx. 5 hours' duration, excluding breaks). Project tasks and challenges are constructivist in nature, requiring students to work together in teams of five, to problem-solve, research and explore various topics via project challenges and collaboratively create multimedia artefacts (videos, blogs, podcasts, games etc.). A strict deadline is imposed on teams to deliver their work on time, and make presentations and demonstrate their learning to their peers and adult mentors. Learning activities have a clear scaffold which gives the teams deadlines and milestones to work towards, but also allows them the freedom and flexibility to manage their own learning and shape their final work output. Creativity is promoted by not requiring one 'correct' answer, but encouraging teams to devise different solutions and means of presentation.

Figure 3: The Bridge21 Learning Space

One facilitator supports a group of 25-30 students, sometimes with the assistance of mentors, whose role it is to support and guide the teamwork, but not directly lead it. Time is allocated at the end of each day for students to reflect on their achievements in the project and how they have worked in their team, encouraging the development of students' ability to think and talk about their learning.

1.3   Making an Impact

Since 2007, over 4,000 young people from 50 schools nationwide have taken part in programmes and workshops at Bridge21. The programme was initially conceptualised as an outreach initiative of TCD, targeted primarily at Transition Year students from second level schools in Dublin who attended week-long workshops (known as the 'Bridge2College Programme'). Over the last 5 years, other programmes were developed to include participants from primary schools and postgraduate third level courses.

Figure 4: The Bridge21 Learning Space

Results from four years of research underpinning the development of the programme indicate that participation in Bridge2College learning activities has a positive impact on intrinsic motivation and students' attitudes towards their personal learning and ability (Lawlor et al., 2010). The results also highlight the potential of a technology-mediated team-based model of learning to support the development of 21st century skills (such as collaboration, communication, problem-solving and critical thinking). Furthermore the data indicate skills transference to other learning contexts beyond Bridge21, in school and elsewhere. This video on the Bridge21 website (www.bridge21.ie/about-us/about-bridge-21/) features students speaking directly about the impact that participation in the programme has had on them.

Further information about Bridge21 can be found on the project website (www.bridge21.ie) and in the following publications: (Conneely, 2013 - in press; Lawlor J., Conneely C., & Tangney B., 2010; Tangney B., Oldham E., Conneely C., Barrett S., & Lawlor J., 2010)

1.4   The Model and School Transformation

The experience and research on the Bridge2College outreach programme suggests that the learning model speaks directly to the new and more flexible approach to learning, as envisioned by the NCCA for the reformed Junior Cycle. The learning model follows an approach to curriculum, ICT use, classroom design and pedagogy that have the potential to change current classroom practice. The approach to learning presents a shift in focus from a narrow view of teaching individual subjects, to a wider goal of teaching key competencies and skills through engagement with curriculum material.
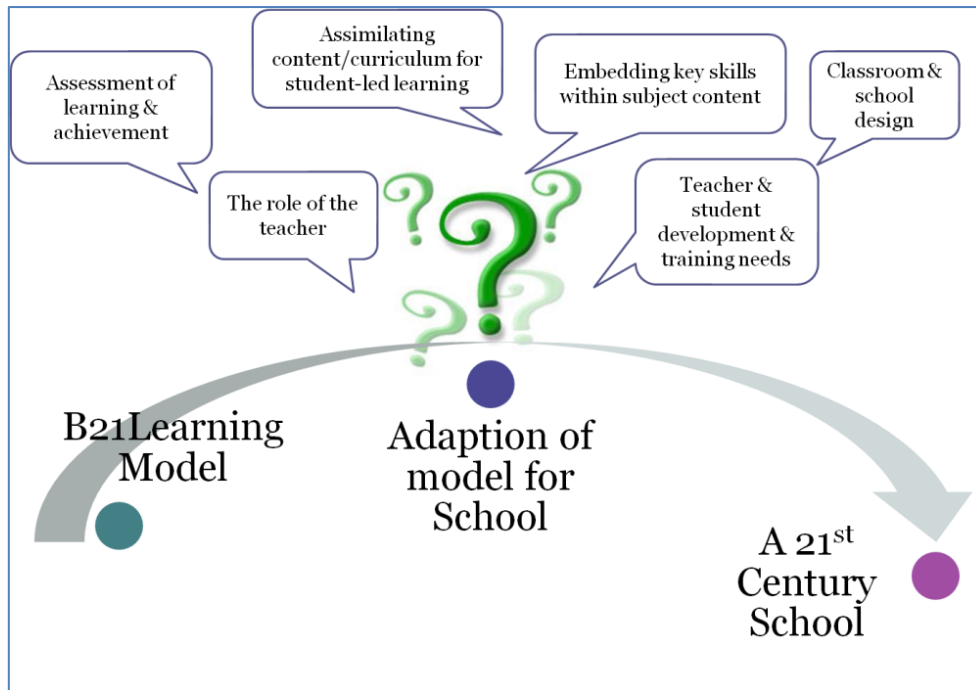
Figure 5: Adaptation of the Bridge21 model into schools

Against the backdrop of the current Government-led reform agenda for Junior Cycle, Bridge21 expanded its activity over the last two years to also include a programme for schools and teachers, working towards adapting the learning model for use in mainstream classrooms to deliver core curriculum content.

2   Bridge21 School Transformation Programme Outline 2011-12

2.1   Programme Aims

In May 2011, Bridge21 launched a programme for schools and teachers to explore new approaches to teaching and learning being advocated by the NCCA for the reformed Junior Cycle.

A partnership programme was developed with eight schools nationwide, with the following aims.

1.   To explore ways in which the Bridge21 learning model can be adapted by teachers to deliver curriculum content in new and engaging ways.
2.   To identify how the Bridge21 learning model can support the development and acquisition of the NCCA's proposed new key skills for Junior Cycle and foster a cohort of students who are confident, self-directed 21st century learners.
3.   To encourage the development of an active, collaborative learning community of teachers and identify their professional development needs.
4.   To identify factors that facilitate and impede the implementation of the Bridge21 model in the classroom.
5.   To gather evidence to illustrate students' and teachers' experiences and views regarding the Bridge21 approach to teaching & learning.
6.   To inform and advise the NCCA on the needs of students, teachers and principals in the Junior Cycle reform programme.

The overall goal of the 2011-12 programme was to create a pool of 'early adopters' (Rogers, 1995) – students, teachers, principals and learning communities – who, through their concrete experience, would act as role models and reference points for the 'early majority' (ibid.) as they fully embrace the reform agenda.

An overview video of the 2011-12 school transformation programme is available to watch on www.bridge21.ie/explore/teachers/.

2.2   School Profiles

Of the eight schools involved in the 2011-12 programme, six were Dublin-based and the remaining two were in Wicklow and Sligo. The schools represented a diverse range of socio-economic areas, were of varying sizes and gender-type, and included two fee-paying schools. Students from four of the schools had been participants on the Bridge2College (B2C) programme since 2007, hence there was already a well-established and positive working relationship between school management and staff and the Bridge21 staff. Table 1 provides a summary of the schools' profiles.

Members of the Bridge21 team spent significant portions of time in the partner schools delivering workshops, engaging with students and supporting teachers and principals (further details are given in the *Programme Schedule* below). The project team was also responsible for the collection of research data in order to demonstrate the effectiveness of the programme.

The 2011-12 programme focused on 1st Year classes and their teachers. The minimum requirement for participation in the programme was 1 class per school; however, in some schools as many as 4

classes were involved (this was at the discretion of the school principal). Across the 8 partner schools, there was a combined total of 300 1st Year student participants.

Table 1: Summary School Profiles

School identifier	Location	Language of Instruction	Gender	DEIS Indicator	Total Student Enrolment	Free Ed / Fee Paying	B2C Programme participant
A	Dublin 2	English	Mixed	Yes	125	Free education	Yes
B	Dublin 22	English	Girls	No	900	Free education	Yes
C	Dublin 4	English	Mixed	No	120	Fee paying	No
D	Sligo	English	Girls	No	400	Free education	No
E	Dublin 8	English	Girls	Yes	170	Free education	Yes
F	Dublin 14	English	Girls	No	630	Fee paying	No
G	Co. Wicklow	English	Mixed	No	430	Free education	No
H	Dublin 24	English	Mixed	No	800	Free education	Yes

Teachers' participation in the programme was voluntary. Following initial meetings and agreement from the school principal, the Bridge21 team were invited to facilitate a whole staff seminar at the beginning of the year. From this, teachers were asked to volunteer to participate in the programme. Again, the minimum requirement for participation in the programme was 1 teacher per school, with a maximum of 12, from a range of subject areas. In most schools an average of 5 teachers were involved and they worked collaboratively to provide peer-support to one another throughout the year. Across the 8 partner schools there was a combined total of 50 teacher participants.

In some schools, as the project progressed during the year and teachers became more confident and comfortable with the Bridge21 learning model, the use of the model extended to 2nd, Transition and 5th Year classes.

2.3 Programme Schedule

In order to meet the needs of individual schools, teachers and students, the overall time commitment for the 2011-12 programme was subject to discussion and agreement between school management and Bridge21 staff. A proposed schedule, totalling 50 hours of workshop delivery and support services, was presented to principals before the beginning of the academic year. The schedule was designed to offer a selection of services, which could be tailored to suit the individual needs of the school (for more details see Table 2). Programme activities were implemented onsite in schools or at the Bridge21 learning centre in Oriel House.

Table 2 Sample Programme Schedule

Date	Activity	Duration*	Participants		Location	Details
August / Sept.	Student Workshop	2 days	Students (25-50)	Teachers (1-5)	Bridge21, Oriel House *or* In-school	Induction Course for students – training in teamwork skills; Teachers as observers
Sept. / October	CPD Workshop	1 day		Teachers (All staff or small group)	Oriel House *or* In-school	Introductory course for teachers
January / February	Student Workshop	1 day	Students (25-50)	Teachers (1-5)	Oriel House *or* In-school	Development course for students – teamwork skills; leadership development; curriculum-based projects
April / May	CPD Workshop	0.5 day		Teachers (5-12)	Oriel House *or* In-school	Review with teachers
October - April	Active Teacher Support	2 days (total time during year)		Teachers (5-12)	In school	Classroom observation; 1:1 review with teachers; A Community of Practice
*1 day = 6 hours approx. | Total time during year = 50hrs approx.						

2.3.1   Schedule for students

In accordance with the relational approach advocated by Blatchford et al. (Blatchford et al., 2003) during the SPRinG research study in the UK[2], an Induction Course was provided for students, where they were given the opportunity to learn and develop their skills of *how* to work and learn as part of a team. This was an important component of the Bridge21 programme schedule, as it prepared the students with the necessary training in teamwork, technology and project-based learning to take back to school.

The specific learning outcomes from this Induction Course were.

1. A basic understanding of teamwork, collaboration and *how* to work with their peers.
2. Development of a range of ICT skills through participation in 'hands-on' multimedia learning activities.
3. A basic understanding of project-based learning.
4. Development of key skills: (creativity, communication, working with others, information management & thinking skills).

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[2] SPRinG (Social Pedagogic Research into Group-work) was jointly conducted by the Institute of Education at the University of London, the Faculty of Education at the University of Cambridge and the Education Research Centre at University of Brighton between 2000-05. The project involved collaborating with teachers to enhance the effective use of group-work across Key Stages 1 to 3 (ages 5-14). It involved 4,259 students from 162 classes in primary and secondary schools across the UK. See www.spring-project.org.uk for more details.

5. Experience of a flexible, collaborative learning space.
6. Increased confidence and positivity about learning.

Student workshops were implemented primarily in the Bridge21 learning centre at Oriel House (with a maximum capacity of 30 students per session). In some cases, to increase capacity, the Bridge21 staff implemented student workshops on-site at school, where as many as 50 students participated in day-long workshops.

Figure 6: Student portrayal of Bridge21

The Induction Course for students also included a simultaneous teacher development component. A small number of teachers were released from school to accompany students to and from the Bridge21 learning centre. During the workshop, teachers were introduced to the Bridge21 learning model and engaged in observational activity and reflection.
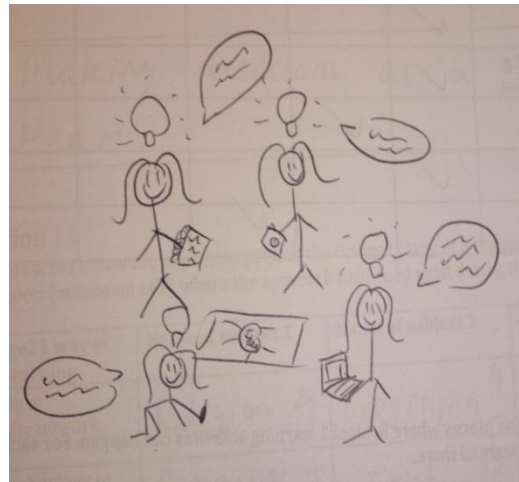
Following the student Induction Course, teachers participated in a continuous professional development (CPD) workshop (more details below). It was intended that those teachers who had observed the student workshops would act as mentors/champions to other participants in their school, with the support and guidance of Bridge21 staff.

2.3.2   Schedule for teachers

The implementation of the Bridge21 learning model in schools was based on the active participation of teachers and school leadership in the areas of planning, teacher education and development. One member of staff from each school was assigned the role of Liaison Teacher, to ensure ease of communication and maximum support levels from Bridge21 staff throughout the year.

Within the CPD workshops provided to teachers, there was an emphasis on experiential learning, providing them with the opportunity to develop and transform their practice through experiencing the Bridge21 learning model first-hand. Principals and teachers from across the 8 schools met with Bridge21 staff to discuss and identify aspects of the learning model where teachers felt they most needed professional development and support. The model of CPD then designed for participant teachers followed a 4-step cycle over the course of the year: Experience - Develop - Evaluate - Transform (see Figure 7).

Step 1 | Experience: A 1-day CPD workshop was held during the first term. This session focussed on introducing teachers to the Bridge21 model via a structured observation of their students participating in the Induction Course. It also aimed to up-skill teachers in the following components of the Bridge21 learning model, identified as the areas in which they most needed most support.

1. *Teamwork*: using teamwork in the classroom, understanding the role of the teacher in student-led, team-based learning activities (particularly project-oriented activities).

2. *Technology*: confidence using ICT, skills enhancement, using technology to mediate learning experiences.
3. *Skills-focussed:* developing & delivering a vision for 21st century learning which promotes the learning of key skills & capacities, as well as content knowledge.

At the end of the workshop, teachers discussed and identified particular components they would take away and try out with a 1st Year class.
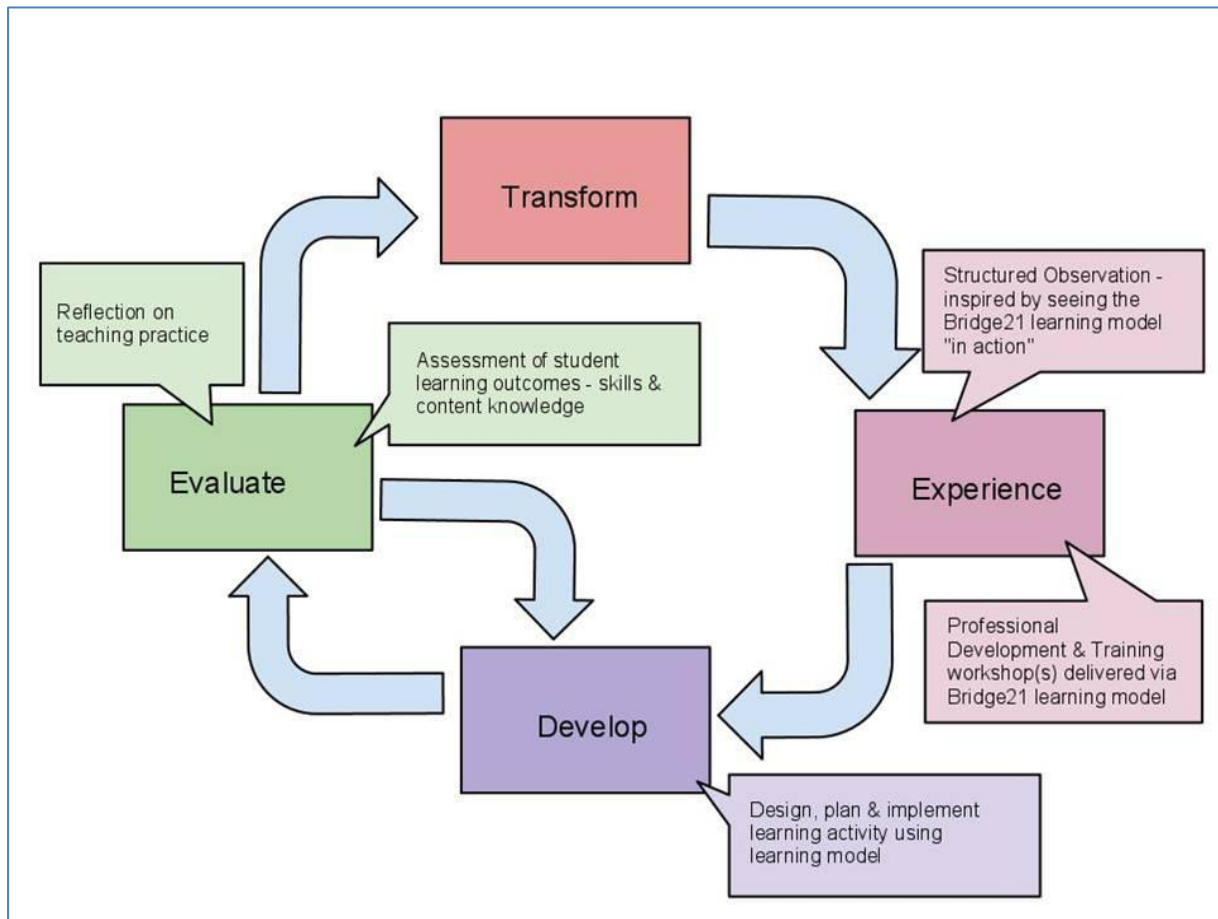
Figure 7: Model of CPD for teachers

Step 2 | Develop: Resources (project templates, hand-outs, reflection tools etc.) were made available to teachers to support them in designing, planning and implementing a learning activity with a 1st Year class. Bridge21 staff were also available to offer feedback on draft plans and additional support, if needed, during the implementation of a learning activity.

Step 3 | Evaluate: Teachers were asked to assess student learning outcomes, both in terms of the key skills developed and the content knowledge acquired. They were also encouraged to reflect on their practice and role in the classroom during the learning activity. Again, Bridge21 staff were available to conduct observation of learning activities and structured one-to-one or group feedback

sessions with teachers. Key learning and insights then informed another cycle of the Develop and Evaluate stages, as teachers planned and implemented further learning activities.

Step 4 | Transform: This was the goal for the end of the year, whereby teachers had been inspired and influenced by the Bridge21 CPD experience to transform their approach to teaching and day-to-day classroom practice.

2.3.3   Additional Support

In addition to the student and teacher workshops described above, partner schools were also provided with regular contact and support throughout the school year from the Bridge21 team. This took the form of meetings, facilitation of planning sessions and guidance in the adoption of new approaches to classroom layout, teaching methodology and use of ICT. Schools were also given the opportunity to avail of classroom observation, with one-to-one review meetings and group feedback sessions.

In addition, planning materials, best practice documents and other resources were made available to teachers to guide them in the development and implementation of Bridge21 learning activities in their classrooms. For examples of project planning documentation and activity ideas, see Appendixes 9.2, 9.3, 9.4 and 9.8. Teachers from across the network of 8 schools also had the opportunity to meet and discuss their ideas at events hosted by Bridge21 during the year.

3 School Approaches

3.1 Implementation options

The Bridge21 programme in 2011-12 was based on an active partnership with schools that were committed to ambitious plans for development and reform of teaching and learning in Junior Cycle. Throughout the year, all partner schools worked with the Bridge21 team, and other schools in the network, in the areas of planning, teacher professional development, student training, programme development and evaluation of the roll-out of innovations in the school. Principals were required to make an individual selection regarding the implementation approach that would best suit their school.
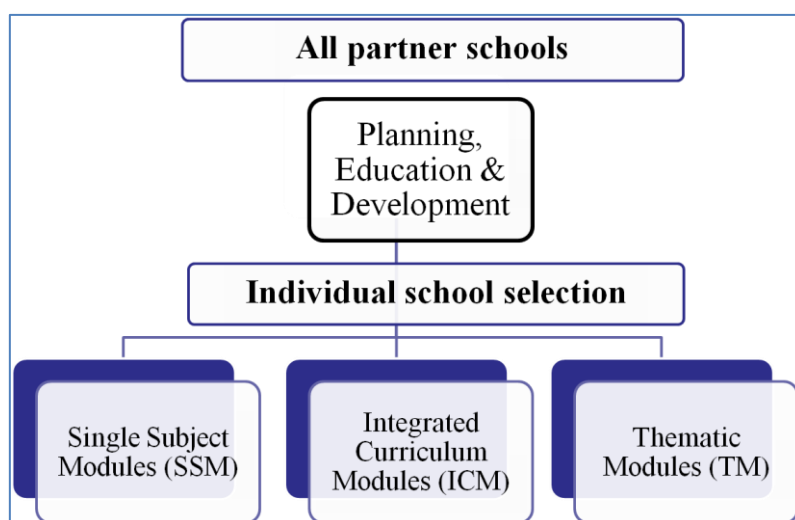
Figure 8: Programme Implementation model

Three implementation approaches were proposed to partner schools. The simplest approach was for subject teachers to adopt a version of the Bridge21 model and use it within a single subject and the normal timetable set-up (**Single Subject Module**). The second option was to create one or more integrated curriculum modules involving a number of subject areas as part of the weekly timetable, during which the Bridge21model would be used to support cross-curricular, project-based learning (**Integrated Curriculum Module**). The final option was to engage in thematic learning and teaching modules, for which a number of weeks would be set aside during the year (**Thematic Module**).

Each of the implementation approaches required varying degrees of change to teachers' timetables and the way classes were organised. Thus, in order to meet the needs of the participant teachers and students, each school was invited to make an individual selection regarding the implementation approach. The majority of schools opted for the simplest approach of the single subject module, as this presented the least number of logistical challenges and caused minimum disruption to the regular timetable. It also gave teachers the opportunity to explore and become familiar with the components of the Bridge21 model within the comfort-zone of their own subject area. A number of schools who began with the single subject module at the beginning of the year, progressed to integrated curriculum and/or thematic modules towards the latter stages of the year.

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**.

Examples of what each approach looked like in the classroom are presented in Section 4.2 below.

3.2 Bridge21 in the Classroom

Before embarking on adapting elements of the Bridge21 model in their classrooms, advice and tips were provided to teachers on how to set up a learning activity in their subjects. Some of the key points are highlighted below.

1. **Team pre-selection**
   Teachers should pre-select teams, it is not advisable to allow students to pick their own teams. Aim for mixed ability, where appropriate. Maintain team stability over a set period of time, to allow for maximum student development. See Appendix 9.5 for more guidelines on team selection.

2. **First time tasks**
   When the teams are put together, if is their first time working together, their first tasks should be the following:
   - **Choose a team name** - something that captures the spirit & reflects the unique personalities in their team.
   - **Write a team Charter** - a set of rules/promises (approximately 5) that the team agree together. A whole class briefing beforehand, during which good/bad examples of rules and promises are discussed, is recommended.
   - **Elect a team Leader** - again, a whole class briefing beforehand, during which good/bad examples of leadership are

Figure 9: Student portrayal of Bridge21

discussed and the teacher gives clear guidelines, is recommended. See Appendixes 9.6 and 9.7 for more tips on team roles and electing a team leader.

3. **Design & layout of the learning space**

Consider the design and layout of the learning space to support the collaborative nature of the learning activity. Re-arrange your classroom space so that students can easily and comfortably work together, share resources and interact easily with their peers. It is also important to consider your use of the classroom space when you take on the role of facilitator (rather than a direct instructor of the learning) and how you can encourage a more student-led approach. (See Figure 4 for examples of classrooms set-up for Bridge21 activities.) Alternative learning spaces within (and outside of) the school are also worth considering (e.g. the library, general purpose area (GPA), Art & Design Room etc.).

Figure 10: Sample Bridge21 Classrooms at Schools A & C

4. **Preparation & planning**

   Plan in advance the resources that will be needed during the learning activity/project. It is important to ensure that all ICT resources (if used) are working properly and that you have a back-up plan should technical issues arise.

5. **Structure of the learning activity**

   Follow the suggested Bridge21 format for learning activities (see Figure 5). This format can be applied to a 40-80 minute class period. The presentation/deadline ensures a focus is maintained, encourages the team to pull together and help one another achieve the task on time and to the best of their ability. The briefing and de-briefing components of the activity are essential for students' achievement of the learning outcomes of the activity (including subject content and skills, such as teamwork etc.).

   "*Free riders (those who let others do the work) were found in each group so some got off lightly. I only weeded them out when groups were made to stand in front of a class to present work and say what they did. Free riders had little to say. I should have done this earlier.*"

   Feedback from an English teacher in School D highlights the importance of presentations in a team-based learning activity
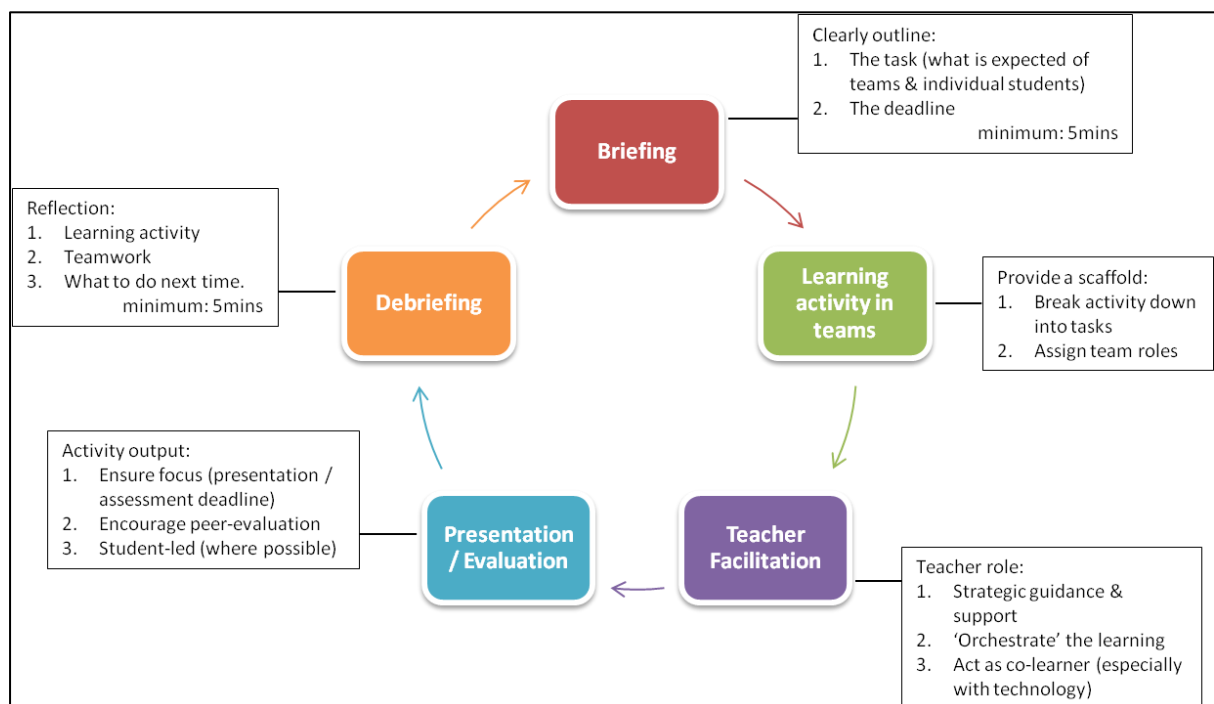

Figure 11: Suggested format of learning activity

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3.3 Classroom examples

3.3.1 Single Subject Module

This option provided individual teachers with the opportunity to adapt and develop the Bridge21 model for use in an individual subject within the regular timetable (generally 40 minute class period, max. 80 minute period). After the student Induction Course, which generally took place during the first few weeks of the year, teachers were asked to implement the Bridge21 approach in at least one of their regular classes with 1st Years every week. Teachers were encouraged to build on the foundation skills students had developed during the Induction Course and present them with more challenging subject-focused content to learn.

Examples of how teachers adopted the Bridge21 model (or components of it) in their subjects, within the regular timetable are outlined in Table 3. The examples incorporate a wide range of subject areas from all 8 schools in the network, reflecting the diverse group of subject teachers who participated in the 2011-12 programme.

It is worth noting that the Bridge21 model aligns well with the Project Maths approach to contextualized problem-based learning. A separate project in TCD, called MobiMaths, has developed a suite of apps for smartphones to be used in a contextualized approach to teaching mathematics. Table 3 includes sample Maths activities which used MobiMaths apps in tandem with the Bridge21 pedagogy[3].

Table 3: Examples of Bridge21 classroom activities

Task	Details	Subjects
Research, create & share a study document for your peers	Each team is given a different part of a chapter to research, both in their textbooks and on the internet. They are required to write up notes, find images & collaborate together to create a document online (using GoogleDocs). This is then shared and presented to the other teams.	Geography Science History Home Ec. R.E.
Write a character study/thematic blog post	Each team is allocated a different character or theme from a play/novel/short story. They have to write a blog post which capture the key points of that character/theme & share with the rest of the class. The task ends with final presentations to other teams.	English Irish
5-minute movie	Teams are challenged with the task of writing a script, acting, filming & producing a 5-minute version of a play/novel/short story. Can also be done as an animation. The task ends with a final screening of all the movies	English Foreign Languages
Measuring and estimation	Teams are challenged to carry out estimations & measurements such as working out the area and perimeter of irregular shapes laid out on the sports field and to estimate the number of tennis balls which could fit into the (fenced-in) sports pitch. Students use a mixture of traditional measuring devices (such as trundle wheels) as well as MobiMaths apps.	Maths.

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[3] The MobiMaths tools, (Tangney B. et al., 2010), are available on both the Apple App Store and the Android Marketplace.

Design a Festival Poster	Each team is asked to choose an annual holiday/festival. They then conduct research and compile a list of vocabulary & other information. They then choose how they want to represent it in visual format to communicate the meaning & spirit of the particular festival (i.e. a poster or other piece of art work). The task ends with final presentations to other teams & peer feedback.	Irish Foreign Languages
Promotional video for local business	Each team is asked to choose a business in their local area. They conduct background research using their textbooks & the internet. They compile questions & set up meetings/interviews in preparation for a field trip/site visit, during which they capture video footage, photographs & collect additional information. Use all data to create a 3min video to promote the business, which is presented to other teams.	Business Studies Geography

Within their subjects many teachers made use of Web 2.0 technologies to encourage resource and material sharing amongst students. They were also used to support ongoing collaboration between students after team-based learning activities during school time, particularly tasks that were project-oriented. Furthermore, teachers made use of the technologies to give students autonomy over their work and assignments and to encourage peer feedback. For example, the most popular technologies used by teachers in Schools B and F included Edmodo, Prezi and Penzu. A group of teachers in School A undertook additional training in Google Apps for Education and made particular use of Google Drive during their Bridge21 classes. See Appendix 9.11 for more details on the Bridge21 Technical Toolkit.

3.3.2   Integrated Curriculum Module

This option required a 2-3 hour block of consecutive classes on the school timetable. Generally, it comprised of an amalgamation of one period of the weekly allocation of 2-3 subject areas, along with the weekly allocation for CSPE. Teachers timetabled during this block had the opportunity to design (with the support of Bridge21 staff) and implement cross-curricular, team-based projects. The 2-3 hour slot facilitated sustained student work on projects, and was an attempt to address the challenges of achieving meaningful and engaging teamwork during a 40 minute period and the additional time needed in classroom set-up.

The learning objectives in these integrated curriculum modules includes multiple subject areas and the key skills for Junior Cycle. It was suggested to teachers that projects could vary in length from a single project during the weekly ICM block to a project completed over a number of weeks per term.

Only 1 of the 8 schools from the 2011-12 programme opted for this module. Having built up a term's worth of experience using elements of the Bridge21 learning model in their individual subjects, a group of teachers came together to design, create and implement an integrated cross-curricular project. This required a significant commitment from both the teachers themselves in preparation work and planning time, and also from the school principal to re-design a 4-hour block of the timetable on Wednesdays to allow the project be implemented. An overview of the project is detailed in Table 4.

Project Title	*The Changing Landscape of Our Local Area*
Description of task	Students were given a specific topic to explore under the headings of past, present & future (e.g. fashion, food, architecture, pastimes etc.) They were required to **research and create the following** to tell the story of how their topic had evolved from the past into the present & a prediction of how it might change in the future: • A visual display (e.g. a model, role-play or demonstration, a poster) • A 3-minute video • A PowerPoint presentation • An information factsheet
Subjects	Geography, Art, Home Economics & Physical Education
Time Allocated	**Project implementation**: 4 hrs @ week over 6 weeks **Teachers & Bridge21 staff**: **Planning**: 1 hr meeting @ week over 4 weeks <u>before</u> project **Review & evaluation**: 1 hr meeting @ week <u>during</u> project & 2 hour meeting <u>after</u> project
Format	Week 1: Introduction to project, team formation, initial brainstorming & planning activities Week 2: Field trip - visit to local area & Science Gallery, TCD Week 3: Research & review of information collected on field trip Week 4: First draft of factsheet, presentation & video content Week 5: Second drafts & presentation preparation Week 6: Presentations & showcase of work

Whist only one school opted for the fully integrated curriculum module as outlined by Bridge21 at the beginning of the year, it should be noted that more suitable variations occurred in some schools. Groups of teachers across the 8 schools managed to conduct cross-curricular projects with 1st Year classes without making changes to the regular timetable. For example in School F, the Music and Irish teachers worked together to design a team-based project that involved writing, composing and recording Irish language songs for Seachtain na Gaeilge. Teams were also given the added challenge of scripting a short movie to accompany their song. The technologies utilised in this case were Garage Band and MovieMaker. This project was implemented within the confines of normal 40 minute class scheduling.

Another variation on the integrated curriculum module which occurred in School C was the allocation of a 3-hour block of consecutive classes to an immersive Maths lesson. A challenging, problem-based activity was designed which covered the following topics from the 1st Year Maths syllabus: estimation, measurement, geometry and volume. The problem posed to the students was:

How long would it take to fill the pond in the park beside the school using only a bucket filled with water from a tap in the school yard?

Students worked in teams of 4-5 and were equipped with a bucket, a 2 litre bottle and Smartphones with MobiMaths apps (as explained above). The initial stage of the activity involved estimation tasks and both team and whole-class discussions on how to solve the problem. This was then followed by an active learning session, where students filled buckets and carried them to the pond. The tools provided were used to take measurements and students returned to the classroom for the final stage of the activity, where they used the data collected to calculate estimations.
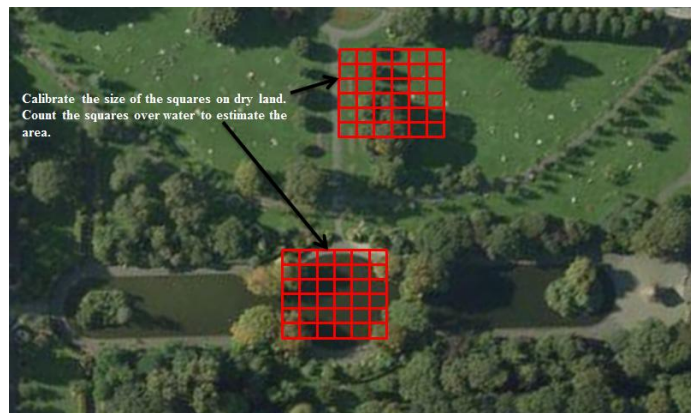
Figure 12: A screenshot from a MobiMaths app used as part of the "pond challenge"

Groups presented their findings to the rest of the class, followed by a whole-class discussion. A video of this learning activity can be viewed at http://vimeo.com/51593588.

A further variation on the integrated curriculum module which also occurred in School C involved a group of teachers who came together to develop a 7-week cross-curricular project, which was implemented within the confines of normal 40 minute class scheduling. Details of this project and the assessment criteria are presented in Tables 5 and 6.

Table 5: Sample cross-curricular project (implemented at School C)

Project Title	*Design the School Lunch Menu*
Description of task	The Principal has recently received complaints about the school menu. He is now asking you to re-design the school lunch for whole school. Each group is asked to propose a menu for one day of the school week. The best menu will be decided after presentations before the Principal, a member of the canteen staff and a food nutritionist expert. The best school lunch will be prepared on a Friday in November for the whole school. The lunch must meet the following requirements: • suit all students • nutritionally well balanced, appetizing & digestible • pleasing to the eye • value for money • easily prepared & served for a large number
Subjects	Home Economics, Science, Art, Business, English
Time Allocated	**Project implementation**: During 40 min classes of subjects involved over 7 weeks

Table 6: Assessment criteria for 'Design the School Lunch Menu' project

Week	Deliverable	What to include	Weighting
1-6	Weekly Templates	Completed worksheets by group and individuals	10 %
1	Survey Design Completed	Survey	10 %
2	Survey Delivered and Analysis	Analysis of survey	10 %
3	Proposed Lunch Menu	Menu of food and reasons for your choice	10 %
4	Kitchen Observations	Summary of kitchen observations	10 %
5	Debate between groups	Written speeches for the debate	10 %
6	Final Presentation	Menu presentation + Sample Tasters of your proposed menu	30 %
7	Reflection on group work Tests on Subject Specific Areas	Reflection worksheets	10 %

3.3.3 Thematic Module

This option included a thematic, project-based learning approach which would be implemented by several teachers across numerous subjects. During thematic weeks, it was suggested that classes would be timetabled as normal, but all subject teachers would agree to focus on an agreed theme during that week and students would engage in a project utilizing learning from the different subject areas. Teachers were asked to develop and implement cross-curricular, team-based projects. It was intended that the learning objectives would include multiple subject areas and the recommended key skills for Junior Cycle.

Only 1 of the 8 schools from the 2011-12 programme opted for this module. Staff identified 4 weeks in the year, where the timetable would be suspended and students would engage in thematic week-long projects, culminating in a presentation/public showcase. The following are a brief sample of the themes and project details.

> **Theme 1: Conflict**
>
> **Exploring Coltan- a 'Conflict Mineral'**
>
> You are invited to participate in a live debate this Friday on the topic:
>
> "*Apple is exploiting the 3rd world*"
>
> You will work in teams to research & prepare the topic using the knowledge gained in your Science, History and Geography classes this week. You will also have the opportunity to develop and practice debating skills throughout the week in your English class.

Theme 2: Survival – The How To Guide

You are travelling in a plane (back in 1960's) when lightning strikes, damaging the plane's engines. The plane crash lands, and your group are the only survivors. Prepare and present a survival guide on how you survived for 1 year by yourselves.

You can present your survival guide through a mixture of

- Book
- Video
- Role Play
- Practical Demonstrations

Before starting on the survival guide, you will need to decide where you landed. (You can also decide when, if you believe in time travel). In your survival guide you will need to describe

- Shelter – what sort of shelter do you live in
- Food – On what food did you survive, where did it come from and how did you prepare it
- Fire – How do you make fire ?
- Water – How did you source clean drinking water
- Tools – What sort of tools did you use, make and how
- Health – How did you deal with health issues

Your survival guide will be assessed on the following criteria:

Shelter – type of shelter, details of construction, materials	10%
Food – Food choices and how it was it prepared	10%
Fire – How to make fire, materials used, details of other energy sources used	10%
Water –Sourcing & storage of clean drinking water	10%
Tools – What was used, how were they made, what materials were used	10%
Health – Health issues & how they were dealt with	10%
Map/ Description of Habitat	10%
Use of Irish Lang.	10%
Use of DVD/ Props/ Song/Demos	10%
Values/ Rules for living & surviving together	10%
TOTAL	100%

It should be noted that, in other schools, without making changes to the regular timetable and class schedule suggested above, groups of teachers managed to implemented immersive, thematic projects. For example, in School A, a group of teachers designed a 2-week project centred on the theme of the 100th anniversary of the Titanic (inspired by the JCSP Literacy Competition 2012[4]). Week 1 was spent in school, where teachers integrated the theme into their subject areas, as per the regular timetable. The subjects included History, Geography, Art, Maths, Home Economics and English. Week 2 was spent at the Bridge21 learning centre, where students had an opportunity to choose a particular area of interest to them and engage in an immersive project, using the knowledge they had gained via their subjects the previous week. The student work output from this creative, active project included short films, physical models, creative writing (short stories, journal entries and "letters home" from various characters) and a statistical analysis of the passenger numbers on the boat.
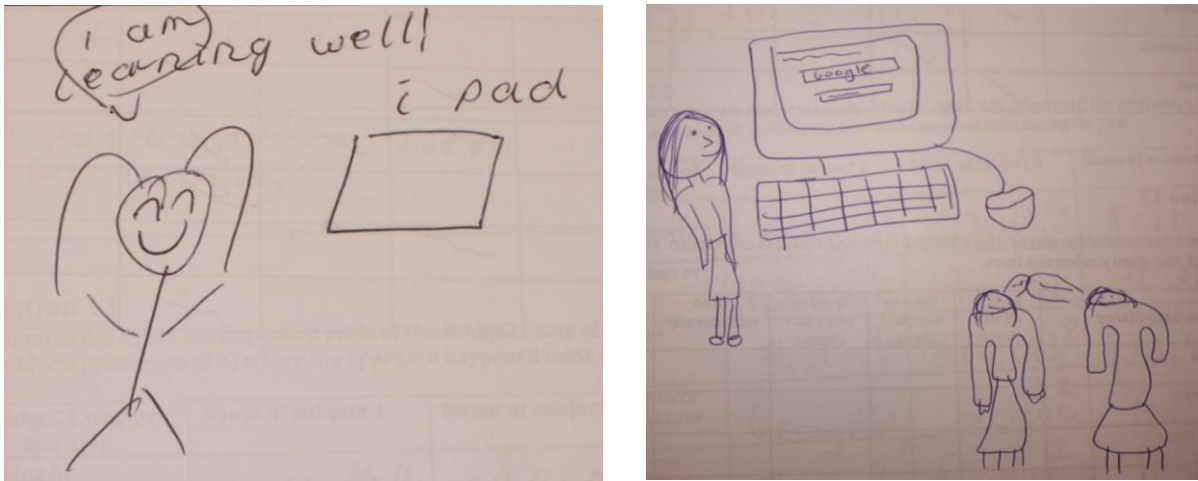

Figure 13: Students' portrayal of Bridge21

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4 Research Methodology

To evaluate the 2011-12 Bridge21 programme, a mixture of qualitative and quantitative data was collected from teachers and students, as summarised in Table 4. This data comes primarily from 2 schools and is corroborated by evidence from the other 6 in the study.

Table 7: Summary of data collection instruments

Data Collection Instrument	Participants	N
Questionnaire	Students (pre and post)	134
Team reflections	Students	41
Individual reflections	Students	53
Focus group interviews	Teachers	12
Teacher reflections	Teachers	5

Three NCCA key skills areas were identified for focused study: 'Being creative'; 'Working with others'; and 'Managing information and thinking. Within these, eleven skills were explicitly examined in pre and post questionnaires with students - see Figure 8.

Table 8: Skills explored in the student questionnaire

Each skill was examined through multiple questions to increase validity of results. In total 134 students completed both pre- questionnaires (in January) and post-questionnaires (in May). The complete pre and post questionnaires can be found in Appendixes 9.12 and 9.13.

Students' views of learning in the classroom with and without the Bridge21 approach were also elicited through the questionnaires. These included questions about the frequency of learning in teams and open questions which asked students to write three things that they did and did not like about Bridge21.

Structured reflections were collected from both teams (N=41) and individuals (N=53). These reflections focused on capturing students' learning at different stages of Bridge21 classroom activities. Quantitative questions were included in the team reflection template and focused on how

well the team was functioning and the types of behaviours the team members were developing. Open ended qualitative questions asked what skills the team had learned and which needed improving. The individual reflections followed a similar format. The reflection templates can be found in Appendixes 9.9 and 9.10.

Teachers involved in the programme were invited to participate in focus group interviews with one of the project team members. These interviews were open, allowing the interviewer to form emergent questions as each interview progressed. The interviews were audio recorded and then transcribed before data analysis. Teachers were also invited to write written reflections on their experience of using the Bridge21 model in the classroom and to capture personal perceptions of their professional development through the programme.

Qualitative data, including teacher interviews, were coded using the NCCA key skills as a guide and also open coded to identify unexpected outcomes of the project (Creswell J., 2009). Statistical analysis of the consolidated questions for each of the 11 skills being investigated was conducted to identify statistically significant changes between pre- and post-questionnaires with significant effect sizes.

5 Findings

The main findings of the evaluation of the 2011-12 Bridge21 programme are discussed under separate headings for students and teachers, although there is obviously some overlap between the two perspectives.

5.1 Students

From analysis of the student data the main themes emerging are motivation and the development of key skills.

> Student: *"It was a wonderful experience because we worked in teams and used the technology. It's taught us so much."*

5.1.1 Motivation/engagement/enjoyment

96% of students described the Bridge21 approach to learning as excellent or good[5]. They appreciated the value of teamwork, learning with and from other students. This significantly enhanced their learning.

When asked to describe in their own words what they liked about Bridge21, the students most often identified working as part of a team, using ICT and learning new things.

Below are samples of students' answers:

- *"we learned how to work in a group"*
- *"working in groups with more independence than a normal class"*
- *"not being by myself"*
- *"we helped each other"*
- *"using computers"*
- *"it was really fun"*
- *"there was such great enthusiasm"*
- *"at the end we got to see other peoples work"*
- *"I learned new things"*
- *"we learned loads"*
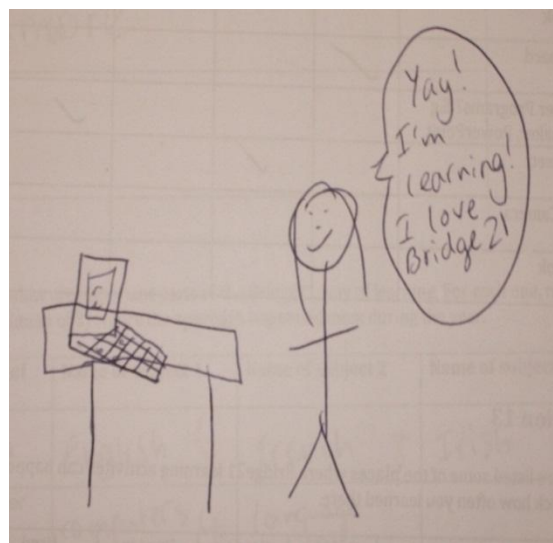
Figure 14: Student portrayal of Bridge21

Students reported that they tended to get on well with their teammates, even when working with students they didn't know. 90% of team leaders reported that everyone did their fair share of work. When asked to report on their own engagement with their team, 81% of students stated that they contributed to their team "always" or "nearly always". Their responses also indicate that they were willing to help their teammates as needed and listen to other student's ideas.

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[5] Percentages refer to the student questionnaire, N=134.

Students reported the integrated use of ICT in school increased from one or two times per month to one or two times per week. There was also a decline in the use of textbooks and copybooks. This is particularly interesting as both text and copy books as well as the lack of ICT were often mentioned by students in the pre-questionnaire when asked to write down what they disliked about school.

- *"I dislike the way we don't use computers in school just the teacher"*
- *"you have to take down lots of notes in class which is bad if you are a slow writer."*
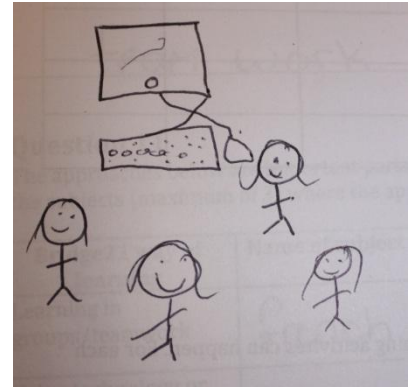
Figure 15: Student portrayal of Bridge21

It is also worth noting that while the use of ICT to achieve a task increased, there was no significant increase in the extent to which ICT was used to share and swap work with other students. This may have been due in part to their experience with the technology as well as the technical difficulties which students reported when asked what they didn't like about Bridge21:

- *"the computer crashed"*
- *"computers sometimes broke down."*

There was an increase in the use of worksheets, with almost two-thirds of students reporting that they used worksheets in all or most Bridge21 classes. This was an unexpected outcome and an area of interest requiring follow-up work on the nature of the worksheets and how they supported team work and key skills.

When asked to describe in their own words a class that they enjoyed, students highlighted that student interaction and the teaching method were key factors in why they enjoyed the class. Below are quotes from students:

- *"I enjoyed my science classes ... I like the way we get involved and aren't just sitting down reading the text book"*
- *"I enjoyed science class because we worked in groups and made plays to show off what we knew about cells ... I liked it because it was a fun way of finding out what I know"*
- *"I enjoyed home economics ... I liked that class because we had a bit of independence"*
- *"Science. It was interesting. We worked in groups. It was fun."*
- *"English poetry class ... I enjoyed hearing other people's opinions"*
- *"I enjoyed my English ... I enjoyed worked as a team the most"*
- *"A class I enjoyed during the month is maths. In this particular class we worked on chance. Normally I wouldn't particularly like learning about chance. But, in this class we worked in pairs, recording what coloured discs we pulled out of a bag. I really enjoyed this class because I got to work with my friends."*

These responses, collected at the end of the research, are interesting when compared to student's reasons for disliking school, collected at the beginning of this research.

- *"Sitting listening to teacher go on and on and on"*

- *"I don't like sitting at a desk for the whole class"*
- *"No interactive learning"*
- *"Learning from the book"*

There was greater frequency of students creating their own materials to aid their learning in Science, Geography, Religious Education and Irish. This reflected the particular way in which the Bridge21 model was adopted by teachers in single subjects (as described in examples in Table 3).

5.1.2   Key Skills

5.1.2.1   Questionnaire results

Quantitative analysis of the pre- and post-questionnaires demonstrate that in just a few months of the students' engagement in Bridge21, there was a modest but statistically significant increase in the following skills.

- Exploring optionspre- and alternatives.
- Implementing ideas and taking action.
- Co-operating.
- Using ICT to work with others.
- Using information to solve problems and create new ideas.
- Thinking creatively and critically.

See details of statistical analysis in Appendix 9.1.

Table 9: Skills which showed a statistically significant improvement

Being creative	Working with others	Managing information and thinking
Imagining	Relating effectively and resolving conflict	Being curious
★ Exploring options and alternatives	★ Co-operating	Gathering, recording, organising, and evaluating information
★ Implementing ideas and taking action	Respecting difference	★ Using information to solve problems and create new ideas
Changing and taking risks	Contributing	★ Thinking creatively and critically
Learning creatively	Learning with others	Reflecting on and evaluating my learning
Being creative through ICT	★ Using ICT to work with others	Using ICT to access, manage and share knowledge

These findings were supported from quotes by students when asked how Bridge21 had helped them learn:

- *"I use the brainstorm activity when I don't know what to do"*
- *"I completed a task in different ways"*
- *"more open to other ideas"*

- *"everyone's ideas are better than one"*
- *"it helped me have more ideas when constructing a task"*
- *"creative"*
- *"how to go about a task"*
- *"by team work"*
- *"working with others"*
- *"to cooperate with my team"*
- *"it helped me learn to cooperate with others"*
- *"using ICT responsibly in a school environment"*
- *"problem solving if a problem occurred."*

When asked what three skills they had learned, co-operating and working together were reported most frequently by students. They also mentioned reflecting on and evaluating their learning. Students reported reflecting most about their learning in maths, history, religious education and English.

As the year progressed there was an increased awareness that skills learned through solving a problem could be transferred to subsequent problems. This is particularly interesting given the emphasis on general cross-curricular and cross-task skills.

5.1.2.2   Unexpected results

42 students were asked to write a reflection on the Bridge21 experience. Beyond stating their enjoyment of this type of learning, students were keen to repeat the experience and, in their own words, identified many key skills that they had gained. Some of the key skills that were strongly referenced (with a frequency of 20 or more) included

- Imagining (22).
- Being creative through ICT (20).
- Co-operating (25).
- Reflecting on and evaluating my learning (33).

Table 10: Skills which featured in students' reflections

Being creative	Working with others	Managing information and thinking
⭐Imagining	Relating effectively and resolving conflict	Being curious
Exploring options and alternatives	⭐Co-operating	Gathering, recording, organising, and evaluating information
Implementing ideas and taking action	Respecting difference	Using information to solve problems and create new ideas
Changing and taking risks	Contributing	Thinking creatively and critically
Learning creatively	Learning with others	⭐Reflecting on and evaluating my learning
⭐Being creative through ICT	Using ICT to work with others	Using ICT to access, manage and share knowledge

5.1.2.3 Communication skills

In both individual and team reflections, when asked what skills they needed to improve in order to work with others, students identified communication and group work skills. Communication skills were of particular interest as these were not examined in the key skills questionnaire. While communication skills such as listening were often identified by students as having been learnt through the Bridge21 experience, students were also aware that there was room for improvement.

Listening skills were identified when students were asked how Bridge21 helped them to learn over the year:

- "*listening to others*"
- "*that maybe I should listen better*"
- "*always listen to peoples answers*"
- "*I've learned to listen more.*"

This is interesting when compared to what students disliked about Bridge21:

- "*when people didn't listen to ideas.*"

In total, 87% of students reported that they always or nearly always listened to other people in their team. However, they were also aware that this was a skill that required practice and further refinement.
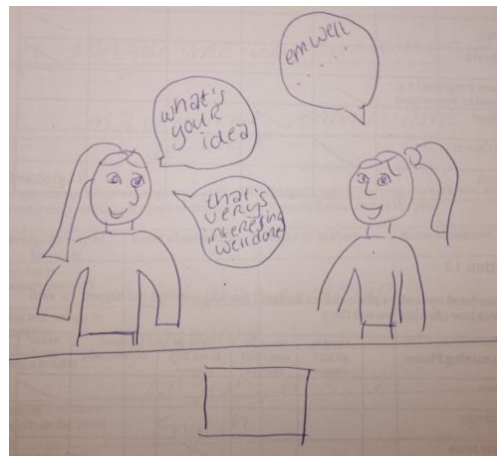
Figure 16: Students' portrayal of Bridge21
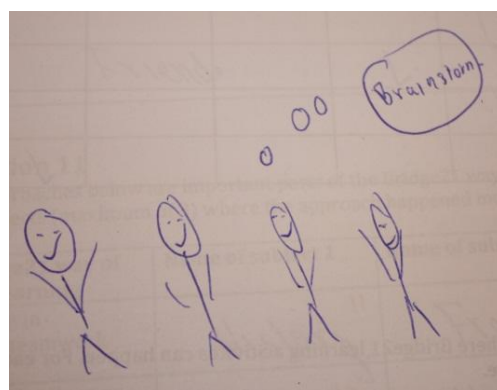
5.1.2.4   Learning *how* to work with others

In addition to the NCCA key skills identified directly and indirectly in the data, students identified that they had learned *how* to work in a team. Learners identified that through Bridge21 they learned how to work effectively as part of a team. They gained skills such as time management, planning, meeting deadlines, taking personal responsibility and communicating within a team, as the following quotes reveal:

- "*I learned how to work in a team*"
- "*we all learned how to work in a group, which I think is a valuable lesson*"
- "*I didn't have the best experience in Bridge21 because of my group but I did learn how to work in a team in these situations better*"
- "*we first as a team planned it all out*"
- "*The second day involved more team work which was great and we cooperated and communicated, shared thoughts to make a radio add, TV add and model. It involved a lot of team work and planning but it was so much fun and so much learning.*"
- "*I learned how to work in teams and put a time limit to my work*"
- "*be a better leader*"
- "*how to work with different people*"
- "*I personally learned more about compromise.*"
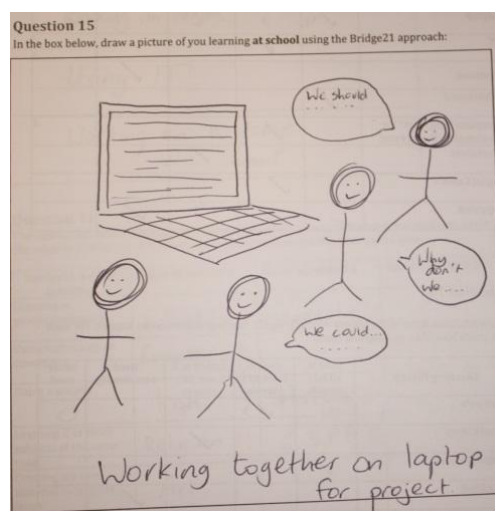
Figure 17: Student portrayal of Bridge21

Having been introduced to teamwork as an approach to learning, students were able to identify aspects of how to work in a team which they had learnt and those aspects which they still needed to improve on. Beyond the NCCA key skills, planning and organising a team were key skills identified by students as being learnt through participation in Bridge21. Before the introduction of Bridge21, action planning by individual students in advance of completing tasks was rare. By the end of the programme this had increased, with only 23% of students reporting that they rarely or never created an initial action plan.

In summary students responded very favourably to the Bridge21 model of learning. In a short intervention this could be attributed to a novelty factor, but given the sustained nature of the engagement and its spread across different subjects the findings suggest that this is not the case. Teamwork seems to resonate very strongly with the participants and there is evidence of improvement in some of the key skills under investigation.

5.2   Teachers

In this section of the findings we focus on the views of the teachers who participated in focus group interview and submitted written reflections on their experience and perceptions regarding professional development during the Bridge21 programme 2011-12.   While teachers take a

somewhat different perspective than students, there is evidence of enthusiasm for the model and an appreciation of changes it can bring about in the student-teacher relationship.

"*Interviewer:* *So with the first years that are going into second year, will you continue with them?*

Teacher: *I'll continue with them because I've seen such brilliant results and they love it, they really want to learn in this way. It also means when you do have a lesson where they've got to sit and listen they understand that you have thought about this and this is the way you feel like they're going to learn best, it's not ' I just feel like doing this today' or this is what we do in this class. If you want them to do questions from the book or if you want them to listen and do exercises that you've organized for them, they understand that you've put some thought into this and you feel that's the best way to do it so there's an increased level of trust there.*"

5.2.1   Benefits

Through interviews, teachers described a range of benefits to students engaged in the Bridge21 approach. Importantly students' depth of understanding and recall of topics was enhanced:

"*it was really fantastic, they really enjoyed it and they all knew the story that we'd studied and they could all understand it to a much deeper level than would normally happen in a first year class*"

"*I was asking the students did they understand the word 'landscape' ... and I thought now I have to explain this and then one of the students put up her hand and said 'oh yes Miss, the Bridge21 project we did' – she understood the word and was able to explain it to the rest of the class.*"

Teachers were encouraged to observe that students made faster progress with subject content when working as part of a team. This worked well for teachers who were somewhat concerned initially regarding the amount of time required to invest in training students how to work and learn effectively as a team. However, this investment was deemed to be very worthwhile when teachers saw evidence of increased student engagement and motivation, which in turn led to faster progress in subject content.

Teachers identified that students developed research, observation and presentation skills through their engagement with the Bridge21 model. Presentation skills were also improved however some teachers felt that the research undertaken by the students was better than the final presentation due to students' lack of practice in how to communicate their findings:

"*Yeah, like even in their PowerPoints or movies – now I know there was an issue with the technology again for the movie making but in the PowerPoints they didn't portray all that they learnt that day, it didn't come out and it didn't get across to the others.*"

Teachers also experienced a personal sense of achievement when, through the use of the Bridge21 model, student engagement improved and student enjoyment and pride in their work were evident:

> "*Teacher:*   *It was a group letter.*
>
> *Interviewer:*   *Okay, so they had to write it collaboratively?*
>
> *Teacher:*   *Pairs or in groups of three and again they had to go away and research that together and agree on it and there was lots of little arguments about what went in and what got left out and then as part of the final assessment they had a question very similar to the one they worked on and they all performed really, really well in it so that was really encouraging.*"

They also identified the sense of achievement in colleagues:

> "*So the History Department and the Science Department both dedicated twenty percent of their end of year exam to group based projects on some element of the history course for First and Second year, I think where they went away and they had to research themselves and produce whatever - a project, or poster - I think they could have done a PowerPoint if they wished or whatever, to show they were learning and they were so motivated and even the Science and History teachers have both finished the year on a real high because the students have enjoyed it so much and produced such good work.*"

5.2.2   Factors for Success

Teachers identified seven key factors for success in Bridge21 projects, namely:

1. Nature and scope of the project.
2. Students need experience of working in teams.
3. Students require clearly defined roles.
4. Group composition.
5. Student autonomy.
6. Peer assessment.
7. Use of technology.

These factors are discussed in detail below.

5.2.2.1   *Nature and scope of the project*

The nature of the project was seen as important. In interviews with teachers it was identified that the nature of the task often depended on how the teacher interpreted and structured the task. In particular specific projects or tasks were better than those that were left broad or vague. Teachers suggested that a narrow and concrete theme which students could relate to was more likely to succeed than a broader and more abstract project which was less aligned to students' personal day to day experiences. For example one group of teachers implemented cross-curricular projects between geography, home economics, art and physical education. These projects included a specific

task on local buildings which was successful and a less successful fashion project which they described as too broad.

"*Teacher 1:*   *They couldn't make the connection between fashion and (the locality). They couldn't bring it back they found it really difficult actually. We wanted them to be analytic about what people wear in (the locality) and maybe try to relate it to a wider community and maybe see the differences. I mean, it was too close to the bone for them to be able to do that – they were going down the road with the iPad and I'd say to them take a picture of this and they would be mortified, you know? They didn't want that.*

Teacher 2:   *Whereas it was easier for geography. That was good actually the taking of the buildings.*

Teacher 1:   *When we brought them down to the regeneration project and down to the old primary school and there's a lovely health centre inside it – they took pride in that and they were showing us around so that was kind of nice because we had never been down there but it wasn't the same for the fashion, I felt that was really difficult for them*"
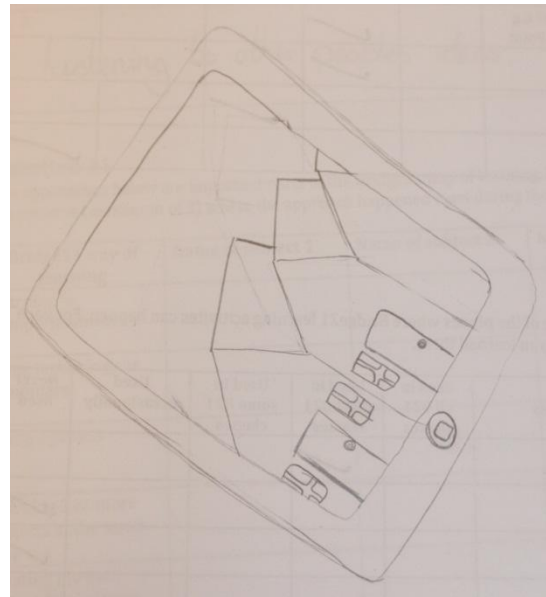
Figure 18: Student portrayal of a Bridge21 project at school

5.2.2.2   *Students need experience of working in teams*

Teachers also identified that students needed time to become familiar with this model of learning, particularly regarding what was expected of them:

"*Teacher:*   *They were far less likely to trust themselves. They were more likely to question what they were doing rather than have an idea and go with it – they didn't want to take a risk of being wrong so they were a lot more afraid of the work. 'What's the answer? What do you want us to do and what's the answer?' They couldn't just take that independent role which the students much younger than them had no problem doing.*

Interviewer: *Why do you think that was?*

Teacher: *Probably because they haven't been. I didn't take the time to teach them how to do group work and that would be one major fault on my part and the second thing is that we have been discouraging it for years.*"

This quote is worth noting, given the fact that the cohort of students under discussion participated in a Bridge21 Induction Course. It suggests that some students struggled to transfer and apply initial skills learned in a 'curriculum-free' scenario at Bridge21, to a curriculum-focussed task in school. Overall, however, it highlights the point that a significant amount of time and attention are required to train students how to work effectively as part of a team and develop the skills to learn collaboratively with their peers.

5.2.2.3 Students require clearly defined roles

The changing expectations of students as well as teachers resulted in uncertainty amongst some teachers regarding the appropriate level of structure and input to provide within each project. Through their experience of using Bridge21, teachers identified that students with clearly defined roles within a team and a narrow focus were effective team members. Teachers also found that the presence of a clear team leader was an important aspect in the success of a project. Students' prior experience of teamwork was identified by teachers as a predictor of success. This was highlighted by those teachers who identified that in the future they would take time to teach the necessary skills and introduce roles:

> "I would also spend some time working on teaching group work, teaching how to rely on each other. What's more, I didn't give them particular roles the last time and I'd certainly do that."

Once in their teams, 73% students identified that they had a clear role within the group. However, there are insufficient data to draw conclusions about those that did not feel they had a clear role and whether or not they made less of a contributions to the team.

5.2.2.4 Group composition

Group composition was considered to be a factor for success in Bridge21 learning activities in the classroom. Teachers adhered to the guidelines for team selection provided by Bridge21 (see Appendix 9.5) and followed a set of structured activities to ensure a positive initial formation of team dynamics. Some teachers identified mixed ability groups as a particular challenge and within mixed ability groups, some of the factors for success became more acute.

Figure 19: Student portrayal of working in groups during a Bridge21 activity

However, other teachers noted the benefits of mixed ability groups:

> "Because they know that if it's a mixed ability team it's actually better than a solo run because they're not as exposed."

Some teachers remarked that there were particular benefits to learning as part of a team for weaker students who might otherwise disengage:

> "Teacher 1:   The bus trip, that day that we were on the bus with the phones that brought some of the weaker students on board, didn't it?
>
> Teacher 2:   Yes it did.
>
> Teacher 1:   The second trip was quite successful about bringing people on board."

5.2.2.5   Student autonomy

Analysis of the data indicates that an element of student choice was often associated with positive engagement in the task. When students were positively engaged in tasks and motivated by the project challenge, teachers found that deep learning occurred. Elements of student autonomy that teachers explored included choice of topic within an overall project theme, choice of roles within the team and choice of technology to demonstrate and communicate their learning.

However, it should be noted that this element of choice needs to be balanced within a framework, with some degree of structure, so that student learning outcomes can be managed and evaluated.

5.2.2.6   Peer assessment

Peer assessment was an important motivational factor identified by teachers. They noted that between subsequent rounds of presentations to their peers, students' levels of engagement and standard of work improved:

> "Teacher: It worked out well. Some students put a lot less work into it than others. I didn't give out any penalties, I didn't give out to anybody for not doing the work but because they had to stand in front of their peers and deliver something that they hadn't done their best on, it was enough to make sure that they would improve the next time and there was a huge, huge different between those first ones and the second ones, the engagement and even the standard of work.…. I don't even think it was the grade at the end of the day. I think it was the experience of having to stand in front of their peers."

Teachers also reported that students enjoyed learning in this way, presenting their work and engaging in peer assessment:

> "Teacher: they could see they had a finished product at the end of it and they all felt like they'd given it their best and that they'd really enjoyed it."

There was also substantial evidence from students' own writings to suggest that this was a motivating factor for students:

> "Student: [it was] really rewarding when we presented what we had done to everyone else"

5.2.2.7   *Use of technology*

The use of technology was identified as a facilitating factor which had a positive effect on student engagement. As part of a Bridge21 project, technology was considered to provide a connection between students' personal and educational use of technology, providing an opportunity to foster a 'mature' use of technology in an educational context. Rather than learning how to use one technology or application in depth and out of context in a discrete ICT class, students gained ICT skills in the process of undertaking a Bridge21 project.

As already noted in Section 4.3, many teachers made use of Web 2.0 technologies to encourage resource and material sharing amongst students. They were also used to support on-going collaboration between students after team-based learning activities during school time, particularly tasks that were project-oriented. Furthermore, teachers made use of the technologies to give students autonomy over their work and assignments and to encourage peer feedback.

Figure 20: Students' portrayal of technology use during the Bridge21 programme

5.2.3   Challenges

Where technical problems occurred, teachers found that they contributed to student disengagement. Teachers also saw their own uncertainty and unfamiliarity with certain technology based skills as an impediment. For example, in one case digital photographs were lost, images that students had taken time to carefully select and compose for the purpose of their project. However, while Bridge21 projects are facilitated by technology, they are not dependent on it and in some cases teachers found 'pen and paper' solutions to their technical problems.

> "Teacher: *I felt I didn't have the skills to make a little movie. I happened to mention it*
> *at home and they were looking at me like 'what does she know about this'*
> *and it's true, I knew nothing about how to make a movie so I feel if I was to*
> *be involved again I would need to have the skills.*"

A few teachers felt that learning outcomes did not adequately reflect the time committed, identifying a number of desirable conditions for future Bridge21 classes: a tighter project focus and more structured implementation, the teaching of teamwork and project skills to students, teacher CPD in IT skills and the provision of reliable technology.

Teachers noted that the time available within the current structure of the school day could limit student engagement in this approach to learning. They required flexibility with breaks depending on the activity and concentration levels of the students.

Finally, over dependence on the teacher required reinforcement of students' roles over the course of the project. With more experience of Bridge21learning this dependence on the teacher decreased.

> "Teacher: *As I said it can be frustrating at times but to see the improved engagement particularly in the younger students is something that really works for me"*

6   Discussion

6.1   Key Outcomes of Pilot study 2011-12

The findings outlined above indicate the overall success of the Bridge21 programme in the eight partner schools during 2011-12. The aims of the programme (as listed in Section 3.1) were broadly met.

> ✓ A number of different ways were explored to adapt the Bridge21 learning model to deliver curriculum content in new and engaging ways
> ✓ Positive indications that the Bridge21 learning model can support the development and acquisition of the NCCA's proposed new key skills for Junior Cycle and has the potential to foster a cohort of students who are confident, self-directed 21st century learners
> ✓ An active, collaborative learning community of teachers was established in partner schools and some of their professional development needs were identified
> ✓ Factors that facilitate and impede the implementation of the Bridge21 model in the classroom were identified
> ✓ Evidence was gathered to illustrate students' and teachers' experiences and views regarding the Bridge21 approach to teaching & learning

It is encouraging to note that in the questionnaire 96% of students described the Bridge21 approach to learning as excellent or good. Their responses to teamwork and learning with and from their peers show an enthusiasm for and engagement in the Bridge21 learning activities. There is also modest evidence of gain in some of the key skills identified at the outset of the pilot programme for focused study and investigation.

However, the findings also reveal several challenges and areas for development and improvement in future programmes. For example, while the cohort of teachers involved in the programme were enthusiastic and willing to try new ideas, they also had some concerns in relation to reforming practice while existing within the current national curriculum and system of high-stakes assessment. The findings also point to the need to revisit the established model of CPD in Ireland and the huge investment of time, resources and commitment required to bring about real change in the classroom.

It is hoped that this Case Study report will be of use to inform and advise the NCCA on the needs of students, teachers and principals in the on-going Junior Cycle reform programme. The key outcomes have also informed the design and implementation of the 2012-13 programme at Bridge21.

6.2   The Reform Journey - what it takes

6.2.1   Student Training & Development

The positive response of students to the team-based approach of Bridge21, suggests that they are enthusiastic, engaged and motivated to learn, when working in a group with their peers. However, adequate time must be given to training students *how* to work as part of a team. This was an essential component of the design of the Bridge21 programme, with an average of 3 days assigned to the student Induction Course per school, at the end of which it was intended that students had developed a confidence and ability to work in a team with their peers. Individual and team

reflections at the end of workshops indicated the development of these skills, as evidenced by the student quotes in Section 6.

In some instances, students struggled to transfer the skills they had developed during the Induction Course back into the classroom and to apply their capabilities in teamwork to subject-specific learning tasks and activities. Teachers highlighted that students' lack of experience in teamwork limited early implementations of the Bridge21 approach in the classroom. For example, even though students learned how to assign and be responsible for a role within a team, problems arose if this was not routinely practiced by teachers on return to the classroom. As one teacher commented:

"*We gave out roles to everybody and everybody was assigned a role but I think that the roles were so difficult and unfamiliar to the weaker students …it didn't really work out.*"

Once students had experience of and understood how to work as part of a team these limitations were overcome. An important consideration for future programmes is to bridge the gap between the initial training programme for students and when teachers eventually take up the ideas in the classroom.
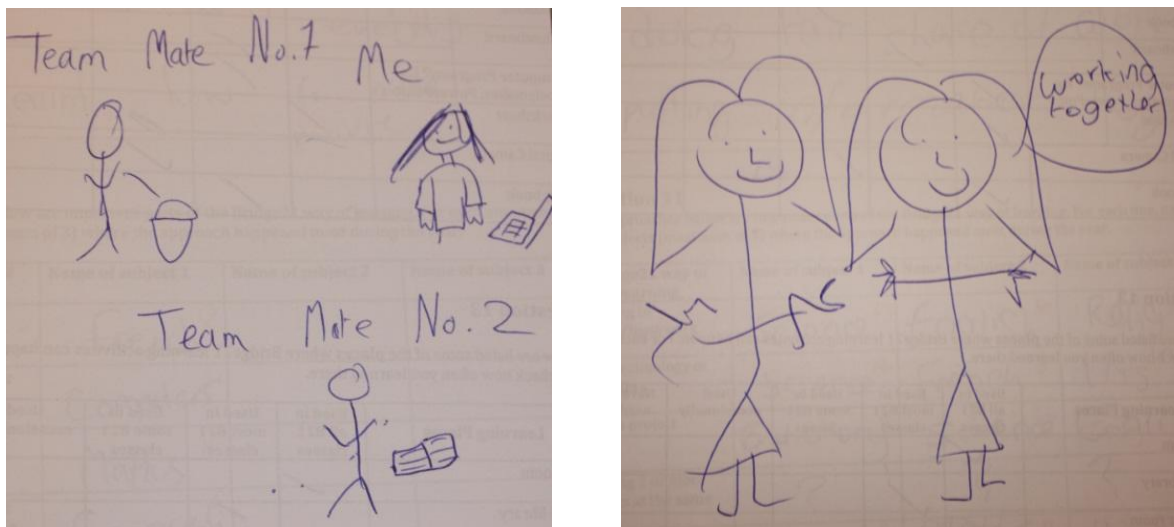
Figure 21: Students' portrayal of learning during the Bridge21 programme

Furthermore, it might be worth consideration by the NCCA to include the sub-skill of learning *how* to work with others under the primary skill of 'Working with Others'. The explicit mention of this as an important skill which contributes to a students' overall ability to work with others will encourage teachers to design group-based learning activities accordingly, with an appropriate amount of time dedicated to the initial team training.

With regard to ICT, the findings outlined above suggest an increased level of engagement from students as a result of technologies used during Bridge21 projects. The team-based approach of Bridge21 activities in the classroom encouraged resource sharing and peer teaching, so students did not need as much direct instruction in how to use the ICT tools as teachers initially expected. This was also due to the project-oriented nature of Bridge21 activities which encouraged a discovery-learning approach to the technology.

Concern expressed by some teachers that technology use in a learning activity must be relevant to and consistent with the learning outcomes. Otherwise, it was found that the technology was a potential distraction for students, which was particularly detrimental to the team-based nature of Bridge21 learning activities. When used in a meaningful way, the technology served to facilitate the team-based approach of Bridge21 activities in the classroom, as it encouraged resource sharing, peer teaching and the delegation of roles and responsibilities.

6.2.2 Teachers

Whilst student enthusiasm for the Bridge21 model of learning in the classroom was very apparent in the data, teachers were more aware of the challenges that came with the overall context of school reform. Many of the findings presented in Section 6 above highlight the need for investment of time, resources and sustained support in teacher professional development, particularly in relation to the headings below.

6.2.2.1 *The role of the teacher*

, A team-based approach to learning calls into question the role of the traditional, didactic teacher and requires a shift in teaching style to one of facilitation and mentoring. This approach, coupled with the project-oriented nature of Bridge21 activities, was often perceived as more unstructured and therefore, more difficult to manage. Furthermore, some teachers were unfamiliar with the strategic nature of facilitation required and were unsure as to the amount of guidance they should provide to the teams. One teacher commented

"*I have to admit I found it very taxing from our point of view [...] not wanting to be dominant in what we were doing because it wasn't our project but you still had to be there on top, I shouldn't be saying on 'top' but you had to be there to try and keep a structure on it and that was very, very difficult.*"

Such comments from teachers highlight the potential of the Bridge21 model to foster students' ownership of the learning. By adopting the Bridge21 model in their classrooms, teachers were required to move away from a direct instruction style to one of orchestration and facilitation. Meanwhile, the students were challenged to move from being a dependent learner to becoming an independent learner (see Figure 22). Amidst this change process, teachers often feel an initial loss of influence and a lack of purpose in students' learning. However, as students develop an increased sense of responsibility for their learning, this sense of loss passes and the teacher can find themselves in much more influential position than before and the teacher-student relationship shifts to being one of co-learners.
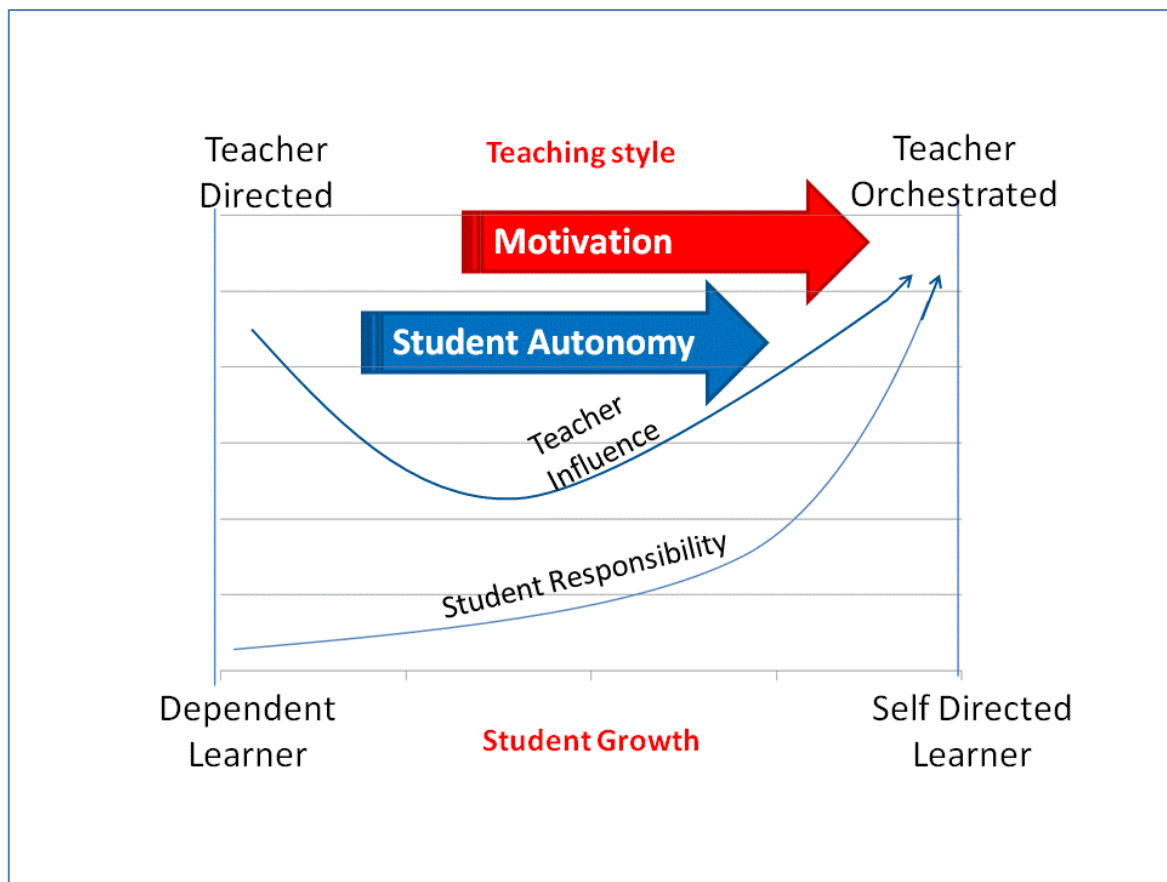
Figure 22: The Role of the Teacher and Self-Directed Learning

6.2.2.2 Project-based learning

A core component of the Bridge21 model is project-based learning (PBL), because it allows students to acquire curriculum content through exploratory, hands-on, challenging tasks. Another merit of this approach is that the learning outcomes not only include curriculum content but also the development of key 21st century skills (such as creativity, problem-solving, communication etc.). Furthermore, a project-based approach to learning allows teachers to create authentic real-world challenges that can enable students to see links between subjects and make connections to the world outside of school.

Figure 23: Student portrayal of Bridge21

Findings from the 2011-12 programme indicate that PBL offered teachers the opportunity to take an innovative and creative approach to how the curriculum was taught during Bridge21 classes. However, if teachers themselves had not had first-hand experience of learning in this way, they experienced some difficulty in the planning and design phase of a project, particularly structuring

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the task and in articulating the learning outcomes. Challenges also arose when a project topic or theme was cross-curricular, as it called into question the emphasis and weighting of certain subject areas. As highlighted in the Factors for Success in Section 6 above, the nature of the project had an effect on the eventual success of the project. This was dependent on the teachers' interpretation and structuring of the tasks and challenges in the project, suggesting a strong need for further professional development in this area.

Teachers were very conscious of setting challenges and project tasks that would align with students' prior knowledge and learning in their particular subjects. The findings indicate that this is an important consideration in the project planning phase in order to capture students' interest from the start and ensure their engagement in the inquiry-oriented process of PBL. However, students' prior skills and capabilities were sometimes overlooked or assumed by the teachers, which led to challenges during project implementation. For example, some teachers expressed disappointment in the quality of team presentations at the end of a project and felt that it did not reflect the quality of students' learning or the amount of time and effort that had been put into a project.

Similar to the training discussed above in relation to students' teamwork skills, these findings point to the need that students must be given the chance to gain experience in *how* to make presentations and effectively communicate their learning. Other skills associated with PBL, such as managing information and thinking, problem-solving and creativity must be practiced, improved and developed over time, so that students can effectively apply them to any project or challenge which they are set.

In piloting new approaches to teaching the curriculum through the Bridge21 programme, the PBL component encouraged teachers to think about alternative means to assess and evaluate student learning outcomes, both in terms of subject content and 21st century skills. However, it was found to lead to frustration amongst teachers at times, due to the fact that perceived themselves as still operating within the 'old regime' of formal examinations and thus, under pressure to conform to its standards and norms of assessment. In order to resolve this tension, adequate support and resources must be given to teachers who

Figure 24 Student portrayal of Bridge21

are willing to pilot new approaches to assessment within the current system. This requires further exploration going forward.

6.2.2.3 Model of CPD

The Bridge21 programme of Continuous Professional Development (CPD) for teachers was designed with an immersive, experiential learning approach in mind. The aim of this approach was to provide teachers with the opportunity to develop and transform their practice through experiencing the Bridge21 learning model first-hand. Insofar as was possible, CPD sessions were conducted in the Bridge21 learning space, in order to give teachers first-hand experience of their students' learning environment and to encourage them to consider the alternative design of learning spaces.

Another rationale for the particular CPD approach of the 2011-12 programme is that teachers teach as they were taught themselves, and so it was important that teachers had first-hand experience of learning in new way and developing their own understanding and capability regarding 21C skills. Findings indicate that even with the skills-focused approach to CPD, defining measures of evaluating key skill development remained a challenge to some teachers, due to their personal lack of experience, confidence and understanding. This points to the need to give teachers adequate time to explore the meaning of 21st century skills and develop a concrete understanding of their application in particular subject areas.

Furthermore, with the integration of ICT across the six NCCA key skills for Junior Cycle, it is essential that CPD is structured in a similarly integrated manner. Teachers require ICT-mediated CPD programmes, which model the integration of technology into the overall learning experience. By learning directly this way themselves, they will develop an understanding of how to design and implement technology-enhanced learning experiences for their students.

Key challenges arose during the implementation phase of the CPD programme related to time and lack of resources. As Bridge21 was working with volunteers, in reality, principals had many barriers to overcome in order to release groups of Bridge21 teachers for a full day, not least the cost of substitution and supervision. As a result, the CPD programme in some schools had to be re-designed into shorter 2 hour modules, implemented over a series of weeks, usually after school. This had a diluting effect on the overall immersive, experiential learning approach of the CPD programme and a knock-on effect on the adoption of the Bridge21 model in classrooms. In a comparison of the schools who participated in the 2011-12 programme, findings suggest that the CPD approach was one of the factors in explaining the varying level of adoption of the Bridge21 model across the schools.

6.2.3   Whole School

6.2.3.1   Resources

In addition to the technology issues discussed above regarding the Bridge21 approach to CPD, teachers require reliable resources and technical support in order to integrate technology into their teaching. As one teacher commented:

> Teacher: *In terms of the technology, I don't know whether I will go down that road if I can't….*

> Interviewer: *If the resources aren't available?*

> Teacher: *Yeah. If I can't get more reliable resources I don't know if I will be go down that road but I will be certainly pushing in the background to get those resources made available to me but I won't necessarily do that within the classroom. In terms of younger students, I hope to continue to push it.*

Where there is a shortage of resources, school management need to explore creative solutions to make technology easily available to those teachers who are willing to pilot new ideas in their classrooms. Furthermore, to allow teachers to develop a level of confidence in their technical skills, school management should consider the integration of IT into general administrative procedures, so

that it becomes part of the day-to-day routine for teachers. For example in one school, when Google Apps were being introduced, a number of months were set aside for staff to use the technology for general administrative and planning purposes, so as to give them an opportunity to develop a confidence and familiarity with it before utilising it in their teaching.

6.2.3.2 Timetable considerations

As already outlined in Section 4.1, three implementation approaches were proposed to partner schools. Each of the implementation approaches required varying degrees of change to teachers' timetables and the way classes were organised. Thus, in order to meet the needs of the participant teachers and students, each school was invited to make an individual selection regarding the implementation approach.

The majority of schools opted for the simplest approach of the single subject module, as this presented the least number of logistical challenges and caused minimum disruption to the regular timetable. The merits of this approach were that it also gave teachers the opportunity to explore and develop confidence using the components of the Bridge21 model within the comfort-zone of their own subject area and within a familiar time-frame.

Findings indicate that a number of schools who began with the single subject module at the beginning of the year, progressed to integrated curriculum and/or thematic modules towards the latter stages of the year. This suggests that the adoption of the Bridge21 model in the classroom encouraged teachers and principals to examine and reflect on the type of learning experiences they wanted their students to experience and the learning outcomes (both subject content and key skills) they wanted their students to achieve.

This raises the question of how learning can be organised to facilitate a school's vision and ethos in relation to student learning and development. The most basic question to be considered is the length of class time. Findings indicate that it was extremely challenging to engage students in meaningful collaborative, project-based learning activities in a 35 or 40-minute class period. Schools also need to give serious consideration to the overall structure of the timetable, for example, the frequency and total amount of time spent on individual subjects, the ordering of subjects from 1st - 3rd year, learning via an immersive experience, options to group subjects together according to umbrella themes or disciplines etc.

It is encouraging to note the level of autonomy which will be given to schools within the NCCA's framework for the new Junior Cycle. However, these issues regarding the structure and design of the timetable will have to be considered at length by school principals and teachers, as they make decisions regarding subjects, short courses and how learning will be organised to suit the needs of their students.

6.2.3.3 Role of Leadership

A common characteristic across the schools was strong leadership. This trait generally manifested itself in the principal who had a clear vision for Bridge21 in the school and regularly provided strong support to staff who were participating in the programme. Principals were open to new and

alternative ideas about teaching and learning. They were also willing to be flexible and provide creative solutions to problems regarding the timetable or making students and teachers available to participate in workshops during the year.

While the role of the principal was key in the overall leadership of the programme in schools, it was also evident that individual teachers had a key role to play in leading and implementing changes 'on the ground'. These teachers acted as champions for Bridge21 in the school. They were open to trying new ideas in their classrooms, willing to think about teaching and learning in a different way and involving their students in the critical evaluation of changes to classroom practice. This finding echoes with the NCCA report, *Innovation Happens: Classrooms as Site of Change* (NCCA, 2011), which describes school classrooms as sites of innovation where new century approaches to learning and key 21st century skills were explored, trialled and developed.

However, in some schools where only a small group of teachers were involved, there was a risk of staff feeling isolated and frustrated by challenges or problems. At the early adoption stage, these teachers were in need of continuous support and encouragement, both from within and outside of the school. Sustained engagement was an important factor for success, so that the adoption of the Bridge21 model would not be viewed as a one-off learning activity or project.

The success of the Bridge21 programme 2011-12 was largely due to the habits, attitude and mind-set of the participant school principals and teachers. Yet, there is still a long way to go towards establishing a new culture in schools and changing the hearts and minds of those who are resistant to innovation and reform.

6.3 Future Work & Areas for further research

This report describes the experiences of teachers and pupils in 8 schools who participated in the Bridge21 programme 2011-12, which involved the adaptation of the a model of 21st century learning for use in the mainstream classroom to deliver core curriculum content. The work of the 2011-12 programme, and this Case Study report, are firmly situated within the context of the Junior Cycle reform process and the participating schools can be viewed as innovators in the emerging change process. The schools were a representative sample of the wider cohort of secondary schools in the country, and thus it is the intention of the authors that this report will provide the NCCA with an insight into the needs of students, teachers and principals in the ongoing Junior Cycle reform programme.

The key outcomes of the report have informed the design and implementation of the 2012-13 programme at Bridge21, which has expanded to include 12 schools from across Ireland. Some of these schools are also members of the NCCA Junior Cycle reform network.

Development areas for the 2012-13 Bridge21 programme are primarily focussed on the design and approach to CPD for teachers and the investigation of new and alternative measures of student achievement and evaluation. The pre and post questionnaire, which was piloted with 134 students from the 2011-12 cohort, will be administered to an increased number of 1st year students from across the 12 participant schools (approx. n = 500). This increased sample size will allow for more in-depth analysis of the potential of the Bridge21 model in developing key skills.

7   Acknowledgements

The authors and the wider Bridge21 team would like to thank the principals, teachers, students and parents of the eight participant schools in the 2011-12 programme:

- CBS Westland Row, Dublin 2
- Coláiste Bríde, Clondalkin, Dublin 22
- John Scottus Senior School, Dublin 4
- Mercy College, Sligo
- Mercy Secondary School, Goldenbridge, Dublin 8
- Mt. Anville, Dublin 14
- Scoil Chonglais, Baltinglass, Co. Wicklow
- St. Mark's CS, Tallaght, Dublin 24

8 Appendixes

8.1 Statistical Analysis of Key Skills from student pre and post questionnaire:

Key Skill	Sub-Skill	Mean Difference	SD	t	Alpha	Effect Size
Being Creative	Exploring options & alternatives	.27	.87	3.4	.001	.32
	Implementing ideas & taking action	.14	.56	2.9	.005	.26
	Learning creatively	-.06	.48	-1.43	.154	.13
Working with Others	Co-operating	.22	1.10	2.16	.03	.23
	Contributing	.04	.58	.67	.51	.06
	Learning with others	.12	.93	1.4	.17	.15
	Using ICT to work with others	.34	1.32	2.6	.01	.31
Managing information and thinking	Gathering, recording, organising and evaluating information	.12	.82	1.68	.10	.17
	Using information to solve problems and create new ideas	.11	.61	2.02	.05	.21
	Thinking creatively and critically	.12	.51	2.63	.01	.24
	Reflecting on and evaluating my learning	.00	.57	.67	.94	.02

8.2   Project Planning - Overview Template

Project title: _____

Subject(s): _____

Year/Class: _____

1.   Explain the project (*summary of what students will be challenged to do*):

2.   The learning intention (*what the project is intended to achieve*):

3.   Previous learning needed to complete the project:

a. Subject content knowledge:	b. Key skills:

4. What the students will learn during the project:	
a. Subject content knowledge:	b. Key skills:

5. Resources that students will need to access/use:

6. How the learning will be organised during the project (*weekly/daily time allocation, total duration, physical space*)

7. Generating evidence of learning (*how will students' knowledge, understanding & skills be demonstrated*):

8.3   Project Design Checklist

Does the Project . . .?	👍	👎	?
FOCUS ON SIGNIFICANT CONTENT AND AUTHENTIC ISSUES Students learn important subject matter content and address problems & issues from the world outside the classroom			
ESTABLISH A NEED TO KNOW AND DO Students are brought into the project by an entry event that captures interest and begins the inquiry process			
ENGAGE & MOTIVATE STUDENTS TO LEARN Students are engaged and motivated by the project & can see the connection between subject areas			
REQUIRES CONSTRUCTIVE USE OF TECHNOLOGY Technology is being used purposefully and to support students' learning			
DEVELOP SKILLS & KNOWLEDGE Students acquire key skills & competencies as well as subject knowledge			
INCORPORATE FEEDBACK AND REVISION Students use feedback and reflection to evaluate & improve their work			
CONCLUDE WITH A PUBLIC PRESENTATION Students exhibit products or present solutions and explain their work to others and respond to content- and process-focused questions			

- Project design checklist is adopted from the Buck Institute for Education: http://www.bie.org/

8.4   Learning Activity Planning Template

Activity Title:

Overall Project Title:

Subject(s):

Class:

Duration:

Summary of the learning activity (*what will students do / create*) :
The learning intention (*what the activity is intended to achieve*):
Previous learning (*content knowledge and skills*) needed to complete the activity:
Subject content knowledge that students will learn:
Key skills* that student will learn:
Resources that students will need to access/use:
Evidence of learning (*how students will demonstrate their understanding & skills*):

8.5 Team selection: Guidelines for Teachers

Teamwork is a core principle of the Bridge21 approach to learning. A very structured approach to teamwork is applied, with team stability maintained over a set period of time. This allows students to grow and form together as a team, to support each other's development, commit themselves to a shared project and be able to interact with other groups. It also enables young people to develop their individual and collective capacities through sharing and building on their individual skills, talents and experience.

During Bridge21 classes, we would encourage you to design learning activities which will allow your students to work on challenging projects in teams of 4-5 students. Below are some guidelines on how to divide a group of students into teams. It is recommended that you do this in the class before learning activity so that they come to the Bridge21 class prepared and aware of the set-up.

Some of the guidelines may not be relevant your particular group of students (for example, mixed gender), but we would encourage you to adhere to as many of the following suggestions as possible:

✓ Mixed gender

✓ Mixed ability

✓ Mix students from different classes

✓ Mix students from different year groups

✓ Pair students with Special Educational Needs with a trusted & responsible peer

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The focus of Bridge21 is to enable students to develop the ability and skill to work with others of a different ability, personality type & skill set to themselves, therefore the following are not recommended:

X No "best friends" together

X Students cannot pick their own teams

Recommended team size: 4 students (min. 3 students, max.5 students @ team)
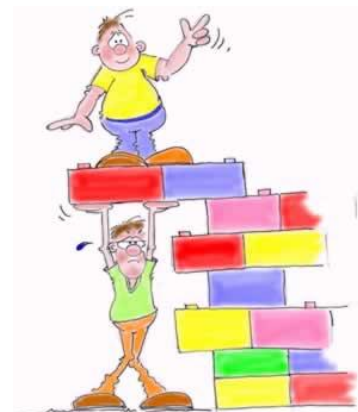
8.6 Team Roles

Electing a team leader

The purpose of the **Team Leader** is to keep the team on task and facilitates decision-making processes within the team. This student is a key link between the team and the teacher, as they report to the teacher on a regular basis for feedback, clarification and can request additional help if needed. They also try to ascertain the strengths of each team member and assign appropriate tasks to them (again, with the support of the teacher).

It is a good idea for teachers to lead a discussion/brainstorm on what makes an effective Team Leader, particularly if leadership is a skill that has not yet been developed or students have not yet been exposed to in the context of the formal classroom. It is important that they understand the core Bridge21 principles of leadership, so during the brainstorm/discussion, let them come up with ideas but make sure the following points are noted/highlighted. The leader:

- Is the link between the team and the facilitator(s)/teacher
- Not the "boss" or the "queen"
- Brings out the best in everyone, encourages talent-sharing
- Encourages everyone, keeps a positive attitude in the team
- Keeps the team on task and facilitates communication between members
- Supports the role of others
- Makes sure everyone is making a worthwhile contribution
- May not be the one "noticed" but is doing behind the scenes (but all the same - teachers can see when a leader is effective)

Other team roles:

Scribe: Documents the teams' work processes & progress throughout the task via photos, memos, notes etc. Records obstacles/challenges and achievements during the task for later reflection & discussion with the team & class

Time-keeper: Supports the team leader in keeping the team on task & ensures that timeframes are adhered to.

Researcher(s): Researches & finds specific material and/or resources to suit the learning activity

Reporter / Presenter (s): Summarises the team's work/discussion/results and presents them to another peer group, the teacher or the whole class

Further roles: (suitable for multimedia-based learning activities)

TV director and/or editor, Radio director and/or editor, Script-writer(s), Actor(s), Designer(s), Artist(s) etc.

8.7 Team Role Sheet - Sample

Role	What this person will be in charge of…	Name
Team Leader	- Keeping everyone working together to give their best effort on the project - Helping team members with their roles	
Artistic Designer	- Designing and making the visual display for the project - Collecting materials for the visual display	
Film Director	- Directing the 3-minute movie - Planning, collecting photos & videos, editing & publishing the movie	
Presentation Director	- Directing the PowerPoint presentation - Planning, collecting information, & editing the presentation	
Researcher	- Finding information about the topic to share with team members - Producing the factsheet	

Everybody has to:
- Share & agree on ideas
- Help one another to make sure all of the tasks are done

8.8 Sample Brainstorm Activities

Resources:

- Post-its
- Markers/pens (1 for every team member)
- A4 whiteboard/sheet of paper (1 per team)

Encourage everyone to practice **key behaviours of brainstorming**:
- Write down as many ideas as possible
- Write down whatever idea comes into your mind (no matter how ridiculous!)
- Don't judge somebody else's idea
- Think outside the box!
- Encourage others who might be shy/nervous

Brainstorm Activities

1. Always start with a 5 minute 'warm-up' topic – something completely unrelated to what the students will eventually work on in their project
   Examples:
   Things to do with an orange!
   How many uses can you think of for a paper-clip?

   Rapid-fire feedback round, where each team appoints a reporter to quickly share some ideas with the whole group

2. Main brainstorm activity:
   a. Come up with as many ideas as possible, specific to the topic under discussion/investigation/exploration in a project (5 minutes)
   b. Affinity mapping exercise: Group similar ideas together
   c. Choose/vote on top three ideas
   d. Write 3 pros & 3 cons for each idea
   e. Appoint a reporter to present the three ideas to the whole group
   f. Decide on best idea for the project

8.9 Team Reflection

1. Overall, how would the team rate their performance today?

Excellent   Good   Average   Fair   Poor

☐   ☐   ☐   ☐   ☐

Why does the team feel this way?

_____

_____

2. What was the team's best achievement today?

3. How often did the following happen in your team today?

	Never	Only now & again	Sometimes	Nearly always	Always
We took turns when talking to each other					
We were sensitive to the needs of one another					
We discussed things and did not argue					
We were well organised					
We were interrupting & cutting each other off when speaking					
We got on well together					
We all did our fair share of the work					

4. List **3 skills** the team have learned today

_____

_____

_____

5. List **3 skills** the team would like to develop/improve on

_____

_____

_____

8.10 Individual Reflection

1. How well did you work with your team in this project?

	Never	Only now & again	Sometimes	Nearly always	Always
I enjoyed working with my team					
I did not contribute to my team's ideas and work					
I trusted my teammates					
I had a clear role to play in my team					
I didn't help my teammates when they needed it					
I got on well with my teammates					
I was bossy with some teammates					
I made a good contribution to my team					
I listened to my teammates' ideas					
I liked working with my team					

2. List **three** things you would like to improve about how you work with other students:

1.

2.

3.

8.11 Technical Toolkit

Free to use

Free to use resources often require the creation of an account and agreement to terms and conditions. Some are only available for specific operating systems.

Windows and Mac Operating Systems

Google Apps for Education: Free Web-based email, calendar, documents & many other resources for collaborative learning anytime, anywhere.
http://www.google.com/enterprise/apps/education/

(Includes Google Drive: A free online resource for creating, sharing, collaborating and storing documents, spreadsheets, presentations and much more. **https://drive.google.com/**)

Audacity: A free to download and easy to use audio recording and editing tool.
http://audacity.sourceforge.net/

Prezi: A free presentation tool with no slides. Organise, present and share ideas in a different format. **http://prezi.com/**

Penzu: Free online journaling tool with additional teacher resources. **http://penzu.com/**

Edmodo: Social networking site for students and teachers to connect to their class. Supports collaboration, sharing content and assessment. **http://www.edmodo.com/**

Windows only

Windows Movie Maker: Create, edit and publish a movie from both still images such as photographs as well as video clips. Add audio and scene transitions.
http://windows.microsoft.com/is-IS/windows-live/movie-maker-get-started

Mac only

GarageBand: Record, mix and publish music. **http://www.apple.com/ilife/garageband/**

Smartphones

MobiMaths: A suite of apps to support the contextualized learning of Mathematics. Available on both the Apple App Store and the Android Market.

The purpose of this questionnaire is to collect information about your general experience of school, how you like to work and how you learn. It is to help with the evaluation and development of the Bridge21 programme, which your school is taking part in.

We really value **your honest opinion** and want you to **take your time** to think about each question carefully and **answer as best you can**.

All of the information collected on this questionnaire will be annonymised (all names will be removed) and stored safely in accordance with the Data Protection Act in Trinity College, University of Dublin. If you have any questions you can ask your teacher and they will contact the Bridge21 staff.

Definitions

Some of the words below will appear many times in the questionnaire. We have provided a definition of each word to help you understand and answer the question as best you can. If you have any questions please ask your teacher.

Task	Any piece of work to do with learning. Can be a small task that takes a few minutes to complete (for example, answer a question, write a paragraph) or a large task that takes hours/days to complete (write an essay, complete a project)
Team	A group of students who share talents, support each other and work together to achieve or create something
ICT	Information & Communications Technology : any type of technology that you use, for example, computer, laptop, iPad, mobile phone, iPod or MP3 player, game console
Learning	The way you gain knowledge and/or skills in a particular subject area, through the tasks you complete in and outside of class
In class	During timetabled subject periods at school
Outside of class	Outside of timetabled subject periods. Can be during school time (e.g. at lunch break) or after school (either on the school premises, at home or elsewhere)
Resources	Anything that provides information or facts to help you to learn about something or complete a task. For example, a book, a CD, the internet or a website, a video, a photograph or picture, a diagram etc.

Question 1

1. Name: _____

2. Date of birth: _____
   (DD/MM/YYYY)

3. Gender: Male ☐ Female ☐

4. Name of your School: _____

5. In what year are you?

   1st Year ☐   2nd Year ☐   3rd Year ☐

6. Name of the Primary School you attended:

   _____

7. Were you born in Ireland? Yes ☐   No ☐

8. What is your first language? _____

Question 2

This question is about **how you learned over the last month**. Put a tick (✓) in the box that describes **how often** you did the following:

	More than twice a day	1-2 times a day	1-2 times a week	1-2 times a month	Rarely / Never	Don't know
1. I brainstormed ideas						
2. I tried to complete a task in lots of different ways						
3. While solving one problem, I learned skills that I could apply to other problems						
4. I was encouraged to think about whether my way of looking at something was the only way						
5. I was given a chance to choose what I wanted to learn						
6. I drew up or helped to draw up an action plan for completing a task						
7. I knew the resources I needed to help me complete a task						
8. I worked with two or more other students as part of a team						
9. I worked with one other student on a task						
10. Other students helped me learn						
11. I learned from working as part of a team						
12. I learned alone						

	More than twice a day	1-2 times a day	1-2 times a week	1-2 times a month	Rarely / Never	Don't know
13. I used the Internet for research						
14. I used the school library for research						
15. I used more than one resource to find out information I needed to help me learn						
16. I used information I found to develop my own ideas about something						
17. Information I found helped me solve problems and learn new things						

Question 3

Describe a class **during the last month** that you enjoyed: *Why did you enjoy it? What did you enjoy most about it?*

Question 4

This question is about how you approach tasks and problems in your learning. Read the statements below carefully and put a tick (✓) in the box that best describes **your own opinion and your previous experiences of learning**:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. I am able to look at things from different perspectives					
2. Understanding a problem is the first step towards solving it					
3. I am good at solving problems					
4. During a task, I always have a good idea how I am getting on & can make changes if necessary					
5. I am able to judge the quality of my work					
6. I always understand what I need to achieve in a task					
7. I am good at figuring out what resources I need to complete a task					
8. I am able to make a plan in order to complete a task					
9. I can complete my work on time					
10. I am confident in making decisions					
11. I prefer tasks that have only one correct answer or solution					
12. I like to continue working on a task until I am satisfied with it.					
13. Learning in class is usually fun					
14. I don't like working in a team					

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
15. I try to understand tasks even if they seem difficult at first					
16. I like when the teacher gives me a task that I can do quickly					
17. I would like the chance to complete some tasks a second time					
18. I like it when tasks are challenging					
19. I would like to learn in different ways from how I currently learn					
20. Learning is usually fun					

Question 5

Have you worked with other students on a school-related task **in the past month**?

Yes ☐   No ☐

If yes, describe an example: *What was the task? How many others did you work with? What did you do? What did you learn? How long did it take? Did you enjoy it? Why?*

If no, **skip** to Question 6 ()

Read carefully the following statements about **working and learning with other students**. Put a tick in the box (✓) that describes **how often in the last month** you did the following:

	More than twice a day	1-2 times a day	1-2 times a week	1-2 times a month	Rarely / Never	Don't know
1. I helped another student to learn during class time						
2. I was helped to learn by another student during class time						
3. I helped another student to learn outside of class time						
4. I was helped to learn by another student outside of class time						
5. I used ICT to help me work with others on a task						
6. I used ICT to share and swap work with other students						

The next statements are about **working with other students** (in a group or a team). Think about them carefully and put a tick (✓) in the box that best describes **your own opinion and you previous experiences of learning**:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. My teammates have to ask me to do more work in a task					
2. My teacher has to ask me to do more work with my team					
3. I feel that other people reject my ideas					
4. When working with a group, I feel that I do more work than everyone else					

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
5. I am often encouraged to learn with others by my teacher					
6. I work on the computer on my own more often than I do with others					
7. I contribute as many ideas and suggestions as I can to a task					
8. I always do my fair share of the work					
9. I always listen to other students' ideas					
10. Computers help me learn with other students					
11. I do not like sharing my ideas with others					
12. I can learn more working with others than by myself					
13. Computers are best suited to working on your own					
14. I prefer listening to other students than saying my own ideas					
15. I am a good team member					
16. We achieve good things working as a team					
17. I can lead a team					
18. It can be fun to work on tasks with others					

Question 6

Describe a class **during the last month** that you **did not** enjoy: *Why did you not enjoy it? What did you not enjoy about it?*

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Question 7

This question is to find out how you manage, organise and think about your learning. Read the statements and put a tick (✓) in the box that best describes **your own opinion and previous experiences of learning**:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. I know when information I find is useful or not					
2. I am able to use the information I find in my own work					
3. I am able to write the important points from the information I find in my own words					
4. I am able to figure out what I need from all the information I find					
5. I put effort into organising how I store information					
6. I have my own way of noting the key points of information I find for future use					
7. I know how to identify whether or not information I find is useful					
8. The computer helps me to organise and store information					

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
9. Finding my own information helps increase my level of understanding					
10. I like when my answer is good but different to that of other students in the class					
11. It's OK to spend a lot of time working on a task and not find an answer					
12. I like to hear how other students plan their tasks					
13. The best tasks can be approached in a number of different ways					
14. I sometimes leave a task when I'm stuck and return to it later					
15. I look lots of different ways of completing tasks before deciding what to do					
16. I can laugh when my solution does not work out or things go wrong					
17. I often see connections between what I learn in different subjects					
18. I know what I am good at					
19. I know what I need to do better to help me learn					
20. I know how to judge how well I'm learning and how I'm doing at school					
21. My teachers' assessment of my learning is almost always the same as mine					
22. Reflecting and thinking about my learning helps me to improve					
23. Using the computer encourages me to think about how I'm learning					
24. Learning is all about getting the highest grade possible in a test					
25. I always try to do my best					

Question 8
Write down 3 things you **like** about school

1.
2.
3.

Question 9
Write down 3 things you **dislike** about school

1.
3.
4.

Question 10
If you have extra comments about any of the questions, please write them here. If you have no other comments, you can leave this box blank.

Thank you for completing this questionnaire! ☺

8.13 Student Post-Questionnaire

The purpose of this questionnaire is to collect information about your general experience of school, how you like to work and how you learn. It is to help improve the Bridge21 programme, which your school is taking part in.

We really value **your honest opinion** and want you to **take your time** to think about each question carefully and **answer as best you can**.

All of the information collected on this questionnaire will be stored safely in accordance with the Data Protection Act in Trinity College, University of Dublin. All names will be removed so your name won't be identified with your answers.

If you have any questions you can ask your teacher and they will contact the Bridge21 staff.

Definitions

Some of the words below will appear many times in the questionnaire. We have provided a definition of each word to help you understand and answer the question as best you can. If you have any questions please ask your teacher.

Task	Any piece of work to do with learning. Can be a small task that takes a few minutes to complete (for example, answer a question, write a paragraph) or a large task that takes hours/days to complete (write an essay, complete a project)
Team	A group of students who share talents, support each other and work together to achieve or create something
ICT	Information & Communications Technology : any type of technology that you use, for example, computer, laptop, iPad, mobile phone, iPod or MP3 player, game console
Learning	The way you gain knowledge and/or skills in a particular subject area, through the tasks you complete in and outside of class
In class	During timetabled subject periods at school
Outside of class	Outside of timetabled subject periods. Can be during school time (e.g. at lunch break) or after school (either on the school premises, at home or elsewhere)
Resources	Anything that provides information or facts to help you to learn about something or complete a task. For example, a book, a CD, the internet or a website, a video, a photograph or picture, a diagram etc.

Question 1: Personal Details

1. Name: _____

2. Date of birth: _____
    (DD/MM/YYYY)

3. Name of your School:_____

4. In what year are you?

    1st Year [   ]   2nd Year [   ]   3rd Year [   ]

Question 2

This question is about **how you learned in school in the last 3 months (since February mid-term)**. Put a tick (✓) in the box that describes **how often** you did the following:

	More than twice a day	1-2 times a day	1-2 times a week	1-2 times a month	Rarely / Never	Don't know
1. I brainstormed ideas						
2. I tried to complete a task in lots of different ways						
3. While solving one problem, I learned skills that I could apply to other problems						
4. I was encouraged to think about whether my way of looking at something was the only way						
5. I was given a chance to choose what I wanted to learn						
6. I drew up or helped to draw up an action plan for completing a task						
7. I worked with two or more other students as part of a team						
8. I worked with one other student on a task						
9. Other students helped me learn						
10. I learned from working as part of a team						
11. I learned alone						
12. I used the Internet for research						
13. I used the school library for research						
14. I used information I found to develop my own ideas about something						

Question 3

This question is about how you approach tasks and problems in your learning. Read the statements below carefully and put a tick (✓) in the box that best describes **your own opinion and your recent experiences of learning**:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. Understanding a problem is the first step towards solving it					
2. I am good at solving problems					
3. During a task, I always have a good idea how I am getting on & can make changes if necessary					
4. I am able to judge the quality of my work					
5. I always understand what I need to achieve in a task					
6. I am able to make a plan in order to complete a task					
7. I can complete my work on time					
8. I am confident in making decisions					
9. I prefer tasks that have only one correct answer or solution					
10. I like to continue working on a task until I am satisfied with it.					
11. Learning in class is usually fun					
12. I don't like working in a team					
13. I try to understand tasks even if they seem difficult at first					
14. I like when the teacher gives me a task that I can do quickly					
15. I would like the chance to complete some tasks a second time					
16. I like it when tasks are challenging					

Question 4

Describe a class **during the last 3 months** that you enjoyed: *What class was it? What did you do? Why did you enjoy it? What did you enjoy most about it?*

Question 5

Read carefully the following statements about **working and learning with other students**. Put a tick in the box (✓) that describes **how often in the last 3 months** you did the following:

	More than twice a day	1-2 times a day	1-2 times a week	1-2 times a month	Rarely / Never	Don't know
1. I helped another student to learn during class time						
2. I was helped to learn by another student during class time						
3. I helped another student to learn outside of class time						
4. I was helped to learn by another student outside of class time						
5. I used ICT to help me work with others on a task						
6. I used ICT to share and swap work with other students						

Question 6

The next statements are about **working with other students** (in a group or a team). Think about them carefully and put a tick (✓) in the box that best describes **your own opinion and your recent experiences of learning**:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. My teammates have to ask me to do more work in a task					
2. My teacher has to ask me to do more work with my team					
3. I feel that other people reject my ideas					
4. When working with a group, I feel that I do more work than everyone else					
5. I am often encouraged to learn with others by my teacher					
6. I work on the computer on my own more often than I do with others					
7. I contribute as many ideas and suggestions as I can to a task					
8. I always do my fair share of the work					
9. I always listen to other students' ideas					
10. Computers help me learn with other students					
11. I can learn more working with others than by myself					
12. Computers are best suited to working on your own					
13. I prefer listening to other students than saying my own ideas					
14. We achieve good things working as a team					
15. I can lead a team					

Question 7

This question is to find out how you manage, organise and think about your learning. Read the statements and put a tick (✓) in the box that best describes **your own opinion and recent experiences of learning**:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. I know when information I find is useful or not					
2. I am able to write the important points from the information I find in my own words					
3. I am able to figure out what I need from all the information I find					
4. I put effort into organising how I store information					
5. The computer helps me to organise and store information					
6. Finding my own information helps increase my level of understanding					
7. I like when my answer is good but different to that of other students in the class					
8. It's OK to spend a lot of time working on a task and not find an answer					
9. I like to hear how other students plan their tasks					
10. I sometimes leave a task when I'm stuck and return to it later					
11. I look at lots of different ways of completing tasks before deciding what to do					
12. I often see connections between what I learn in different subjects					
13. I know what I am good at					
14. I know what I need to do better to help me learn					
15. I know how to judge how well I'm learning and how I'm doing at school					

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
16. My teachers' assessment of my learning is almost always the same as mine					
17. Reflecting and thinking about my learning helps me to improve					
18. Using the computer encourages me to think about how I'm learning					
19. Learning is all about getting the highest grade possible in a test					
20. I always try to do my best					

The last set of questions seeks your opinions and experiences of the Bridge21 programme. In answering the following questions, think about your experiences of Bridge21 throughout this school year.

Question 8
Write down 3 things you **liked** about Bridge21 this year:

1.
4.
5.

Question 9
Write down 3 things you **did not like** about Bridge21 this year:

1.
2.
3.

Question 10

Write down 3 ways in which Bridge21 has helped you learn this year:

1.
2.
3.

Question 11

The approaches below are important parts of the Bridge21 way of learning. For each one, name the subjects (maximum of 3) where the approach happened most during the year.

Bridge21 way of learning	Name of subject 1	Name of subject 2	Name of subject 3
Learning in groups/teamwork			
Using technology or computers			
Doing a project			
Learning 2 or more subjects at the same time			
Creating my own material to help me learn			
Taking time to think about what I've learned			
Telling others about what I've learned			

Question 12

Below are listed some of the **resources** that can be used by **students** in Bridge21 classes. For each one, check how often it was used by you and your classmates in **Bridge21 classes.**

Learning Resources	Used in all B21 classes	Used in most B21 classes	Used in some B21 classes	Used occasionally	Never used
Laptop					
PC					
Textbook					
Whiteboard					
Computer Programs? E.g Moviemaker, PowerPoint					
Worksheet					
Digital Camera					
Copybook					

Question 13

Below are listed some of the **places** where Bridge21 learning acitivites can happen. For each one, check how often you learned there.

Learning Places	Used in all B21 classes	Used in most B21 classes	Used in some B21 classes	Used occasionally	Never used
Classroom					
School library					
Computer room					
School Hall					
Other room in school					
Outside (in school grounds)					
Outside of school (e.g. visit to museum or field study away from school)					

Question 14

Overall, how would you rate the Bridge21 programme?

Excellent   Good   Average   Fair   Poor

☐   ☐   ☐   ☐   ☐

Question 15

In the box below, draw a picture of you learning **at school** using the Bridge21 approach:

Thank you for completing this questionnaire! ☺

9   Bibliography

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