1. Introduction

Bridge21 is a model for team-based, technology-mediated learning that embodies many of the principles advocated for a 21st Century approach to pedagogy (Lawlor J., Conneely C. and Tangney B. 2010; Lawlor J., Marshall K. and Tangney B. 2014). This chapter expands on the previous one in this volume, by reporting on an exploratory case study that was carried out in the 2011/12 academic year in which 8 schools adapted the model for use in the classroom. The study was carried out within the context of a major reform of the Junior Cycle (years 1-3) of the Irish secondary school system, centred on moving towards a more skills focused 21st Century model of teaching and learning (Ncca 2010, 2011).

The schools represented a diverse range of socio-economic areas, were of varying sizes and gender-type, and included two fee-paying schools. Members of the Bridge21 team spent approximately 50 hours over the course of the year working with each school, delivering workshops for students and staff, engaging in planning and review sessions with teachers, facilitating community of practice workshops across schools and collecting research data. Six of the schools were located in Dublin and the other two were in urban areas in different parts of the country. Four were mixed gender schools and four were single sex (female) schools.

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. The average number of teachers involved per school was 5, and they worked collaboratively, providing peer support throughout the year. 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 approach was extended to 2nd Year, Transition (4th) Year, and 5th Year classes. Across the 8 partner schools, there was a combined total of 300 1st year student and 50 teacher participants. The model of continuous professional development (CPD) designed for participant teachers followed a 4-step cycle over the course of the year: Experience - Develop - Evaluate - Transform (see Figure 1).
1.1 Classroom examples

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 for a single subject and within the normal timetable set-up (Single Subject Module). The second option was to timetable an explicit Integrated Curriculum Module spanning a number of subject areas in which the Bridge21 model would be used to support cross-curricular, project-based learning. The final option was to engage in thematic modules, for which a number of weeks would be set aside during the year for immersive project-based learning (Thematic Module).
In “Shaping our Future: How the lessons of the past can shape educational transformation”, Butler D., Marshall, K., Leahy M., (Eds), Liffey Press, Dublin, 2015, pp 348-381.

In each case the broad outline of a learning activity followed a cycle of: briefing; working in teams on a task; presentation by each team to the whole class followed by a period for debriefing/reflection. The role of the teacher moved from one that emphasised content instruction to one of facilitation and orchestration (see Error! Reference source not found.). It is necessary for the physical layout of the classroom to be set up to support the Bridge21 model. Figure 3 shows examples of how teachers in two schools re-arranged their classroom furniture to support team-based learning. In keeping with Galton’s argument that students need initial training in teamwork, participating students took part in workshops at the beginning of the academic year (Galton M. and Hargreaves L. 2009; Galton M., Steward S., Hargreaves L., Page C. and Pell A. 2009). This facilitated up-skilling in the area of teamwork and helped them become comfortable with the Bridge21 model of learning, prior to engaging with curriculum content.

![Figure 3: Sample Bridge21 classrooms in schools A & C](image)

### 1.1.1 Single Subject Module

Examples of how teachers adapted the Bridge21 model for use in their subjects, within the regular timetable, are outlined in Table 1. They cover a wide range of subject areas reflecting the diverse group of subject teachers who participated in the study.

<table>
<thead>
<tr>
<th>Task</th>
<th>Details</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research, create &amp; share a study document for your peers</td>
<td>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 &amp; collaborate together to create a document online. This is then shared and presented to the other teams.</td>
<td>Geography, Science, History, Home Ec¹, R.E²</td>
</tr>
<tr>
<td>Write a character study/thematic blog post</td>
<td>Each team is allocated a different character or theme from a play/novel/short story. They have to write a blog post that captures the key points of that character/theme &amp; share with the rest of the class. The task ends with final presentations to other teams.</td>
<td>English, Irish</td>
</tr>
<tr>
<td>5-minute movie</td>
<td>Teams are challenged with the task of writing a script, acting, filming &amp; 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.</td>
<td>English, Foreign Languages</td>
</tr>
<tr>
<td>Measuring and estimation</td>
<td>Teams are challenged to carry out estimations &amp; 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 apps developed for smartphones (XXX ref).</td>
<td>Math, Home Economics</td>
</tr>
</tbody>
</table>

¹ Home Economics.
² Religious Education.
In “Shaping our Future: How the lessons of the past can shape educational transformation”, Butler D., Marshall, K., Leahy M., (Eds), Liffey Press, Dublin, 2015, pp 348-381.

| Design a poster | Each team is asked to choose an annual holiday/festival. They then conduct research and compile a list of vocabulary & other information. Next, they 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. Using all the data, they create a 3min video to promote the business, which is presented to other teams. | Business Studies Geography |

Table 1 : Examples of Bridge21 classroom activities within single subjects

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 on-going collaboration between students after class time. Furthermore, teachers made use of technology to give students autonomy over their work and to encourage peer feedback. The most popular technologies used by teachers in Schools B and F included Edmodo, Prezi and Penzu, while in school A, a group of teachers undertook additional training in “Google Apps for Education” and made particular use of Google Drive during their Bridge21 classes.

1.1.2 Integrated Curriculum Module

The learning objectives for the integrated curriculum modules (ICM) included multiple subject areas and the generic Key Skills required for the new Junior Cycle (Ncca 2011). 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 during the term.

Groups of teachers across the 8 schools conducted 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 were Garage Band and MovieMaker. This project was implemented within the confines of the usual 40 minute class scheduling.

School C implemented a once-off learning experience by allocating a 3-hour block of consecutive classes to an immersive Maths lesson. A challenging, problem-based activity was designed which covered topics from the 1st Year Maths syllabus including: estimation; measurement; geometry and volume. The problem posed to the students was to investigate how long it would take to fill the pond in a nearby park using only a bucket filled with water from a tap in the school yard. The pond was irregular in shape and the activity involved Google Maps (to get an aerial view of the pond), the MobiMaths smartphone apps for measurement, and a bucket to be filled and carried to the pond for timing purposes.

A group of teachers in school E came together to design, create and implement a substantial cross-curricular project as detailed in Table 2. This required significant commitment from both the teachers themselves in terms of preparation work and planning time, and also from the school principal to schedule a 4-hour block in the timetable on Wednesdays to allow the project to be implemented.

3 Irish Language Week.
In “Shaping our Future: How the lessons of the past can shape educational transformation”, Butler D., Marshall, K., Leahy M., (Eds), Liffey Press, Dublin, 2015, pp 348-381.

**Table 2: Integrated Curriculum example - school E**

The approach followed 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 are presented in Table 3.

**Table 3: Sample cross-curricular project (school C)**

The project was assessed by providing a worksheet to be completed each week by every student and every team, and by having specific deliverables at the end of each week (as shown in Table 4). The project was followed up with regular testing in subject specific areas.

<table>
<thead>
<tr>
<th>Week</th>
<th>Deliverable</th>
<th>What to include</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-6</td>
<td>Weekly worksheets</td>
<td>Completed worksheets by groups and individuals</td>
<td>10 %</td>
</tr>
<tr>
<td>1</td>
<td>Survey Design Completed</td>
<td>Survey</td>
<td>10 %</td>
</tr>
<tr>
<td>2</td>
<td>Survey Delivered and Analysis</td>
<td>Analysis of survey</td>
<td>10 %</td>
</tr>
<tr>
<td>3</td>
<td>Proposed Lunch Menu</td>
<td>Menu of food and reasons for your choice</td>
<td>10 %</td>
</tr>
<tr>
<td>4</td>
<td>Kitchen Observations</td>
<td>Summary of kitchen observations</td>
<td>10 %</td>
</tr>
<tr>
<td>5</td>
<td>Written speeches for the debate</td>
<td>Menu presentation + Sample tasters of your proposed menu</td>
<td>30 %</td>
</tr>
<tr>
<td>6</td>
<td>Reflection on group work</td>
<td>Reflection worksheets</td>
<td>10 %</td>
</tr>
</tbody>
</table>

**Table 4: Assessment criteria for 'Design the School Lunch Menu' project (school C)**
In “Shaping our Future: How the lessons of the past can shape educational transformation”, Butler D., Marshall, K., Leahy M., (Eds), Liffey Press, Dublin, 2015, pp 348-381.

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

School C allocated 4 weeks in the school year to the thematic module. However, the staff went beyond the guidelines outlined above for subject timetabling, opting instead to suspend the regular 40-minute class structure so that students could engage in thematic projects in 2-3 hour blocks every day for a full week. The project culminated in a presentation/public showcase open to teachers, parents and students from other year groups. The following are a brief sample of the themes and project details.

Theme 1: 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:

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelter – type of shelter, details of construction, materials</td>
<td>10%</td>
</tr>
<tr>
<td>Food – Food choices and how it was it prepared</td>
<td>10%</td>
</tr>
<tr>
<td>Fire – How to make fire, materials used, details of other energy sources used</td>
<td>10%</td>
</tr>
<tr>
<td>Water – Sourcing &amp; storage of clean drinking water</td>
<td>10%</td>
</tr>
<tr>
<td>Tools – What was used, how were they made, what materials were used</td>
<td>10%</td>
</tr>
<tr>
<td>Health – Health issues &amp; how they were dealt with</td>
<td>10%</td>
</tr>
<tr>
<td>Map/ Description of Habitat</td>
<td>10%</td>
</tr>
<tr>
<td>Use of Irish Language.</td>
<td>10%</td>
</tr>
<tr>
<td>Use of DVD/ Props/ Song/Demos</td>
<td>10%</td>
</tr>
<tr>
<td>Values/ Rules for living &amp; surviving together</td>
<td>10%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
</tr>
</tbody>
</table>
In “Shaping our Future: How the lessons of the past can shape educational transformation”, Butler D., Marshall, K., Leahy M., (Eds), Liffey Press, Dublin, 2015, pp 348-381.

In other schools, without making changes to the regular timetable and class schedule, groups of teachers 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. 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.

2 Research Methodology
A mixture of qualitative and quantitative data was collected from teachers and students, as summarised in Table 5. The quantitative data comes from 2 schools while the qualitative data comes from all 8.

<table>
<thead>
<tr>
<th>Data Collection Instrument</th>
<th>Participants</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key skills questionnaire</td>
<td>Students (pre and post)</td>
<td>134</td>
</tr>
<tr>
<td>Team reflections</td>
<td>Students</td>
<td>41</td>
</tr>
<tr>
<td>Individual reflections</td>
<td>Students</td>
<td>53</td>
</tr>
<tr>
<td>Focus group interviews</td>
<td>Teachers</td>
<td>12</td>
</tr>
<tr>
<td>Teacher reflections</td>
<td>Teachers</td>
<td>5</td>
</tr>
</tbody>
</table>

*Table 5: Summary of data collection instruments (Johnston, Conneely et al., 2014)*

The Key Skills questionnaire was designed to measure the impact of the Bridge21 learning model on students and focussed on three skills: being creative, working with others and managing information and thinking. Within these three, eleven sub-skills were explicitly examined in pre and post questionnaires (see Table 6). 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).
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Table 6: “Key Skills” from the NCCA set of skills which were explored in the student questionnaire (Johnston K., Conneely C., Murchan D. and Tangney B. 2014)

Students’ views of learning in the classroom, with and without the Bridge21 approach, were also elicited through the questionnaires, which 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 individual students (N=53). These reflections focused on capturing students' learning at different stages of Bridge21 classroom activities. Quantitative questions, focusing on how well the team was functioning and the types of behaviours the team members were developing, were included in the team reflection template. Open-ended qualitative questions asked the students to capture what skills the team had developed and to identify which skills needed improving. The individual reflections followed a similar format.

Teachers involved in the programme were invited to participate in focus group interviews with the researchers. These interviews were semi-structured, 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 provide 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 Key Skills (Table 6) 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 sub-skills being investigated was conducted to identify statistically significant changes between pre- and post-questionnaires with significant effect sizes.

3 Findings

From the student perspective, the main findings reflect the positive disposition of participants towards the model of learning and highlight the fact that its use gave rise to an increase in both motivation and awareness of the development of key skills. These findings are discussed in detail in (Conneely C., Murchan D., Tangney B. and Johnston K. 2013; Johnston K., Conneely C. et al. 2014). While the perspective of teachers differs somewhat to that of the students, there is evidence of enthusiasm for the model and an appreciation of positive changes it can bring about in the student-teacher relationship. The views of teachers are discussed below and are
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primarily derived from focus group interviews, written reflections and classroom observations by Bridge21 staff during school visits.

3.1 Benefits

During the interviews, teachers described a range of benefits to students engaged in the Bridge21 approach. Perhaps most importantly, there was evidence that students’ depth of understanding and recall of topics was enhanced.

Teacher: 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.

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.

Despite some initial concern regarding the amount of time required to train students how to work and learn effectively as a team, teachers observed that students made faster progress with subject content when working in this way. The investment of time was deemed to be very worthwhile once teachers saw evidence of increased student engagement and motivation, which in turn led to faster progress through subject content.

Teachers identified that students developed research, observation and presentation skills through their engagement with the Bridge21 model. However, while presentation skills were also improved, some teachers felt that due to students’ lack of practice, the research undertaken by the students was not reflected in the final presentations:

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 was evident.

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.
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3.2 Factors for success

Teachers identified seven key factors for success in adapting the Bridge21 model for the formal classroom:

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

These factors are discussed in detail below.

3.2.1 Nature and scope of the project

In interviews with teachers it was identified that the nature of the project was viewed as important. Specific, well-defined projects or tasks were better than those that were left broad or vague. Teachers suggested that a narrow and concrete theme, to which students could relate, was more likely to succeed than a broader and more abstract project that 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”

3.2.2 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?
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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 in teamwork skills. 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 necessary to learn collaboratively with their peers.

3.2.3 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 the Bridge21 model, 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.

3.2.4 Group composition

Teachers adhered to the guidelines for team selection provided by Bridge21 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. 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.”

3.2.5 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.
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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.

### 3.2.6 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:

> 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 difference 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:

> 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:

> [It was] really rewarding when we presented what we had done to everyone else.

### 3.2.7 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 learning activity, 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 a wide range of ICT skills in the process of undertaking a Bridge21 project.

As previously noted, 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.

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.
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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 ICT 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 the Bridge21 learning model, this dependence on the teacher decreased.

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.

4 Discussion
The findings outlined above indicate the overall success of the Bridge21 programme in the eight schools during the period in question. Highlights of the intervention can be summarised as follows:

- 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. In particular, it has the potential to foster confidence, autonomy, and 21st century learning skills in participating students.
- An active, collaborative learning community of teachers was established in participating schools, resulting in the identification of some of their professional development needs.
- 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 student respondents described the Bridge21 approach to learning as either excellent or good. Their responses to teamwork and to learning with and from their peers indicate 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 iterations of the project. 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 associated with the overall context of school reform. Many of the findings
In “Shaping our Future: How the lessons of the past can shape educational transformation”, Butler D., Marshall, K., Leahy M., (Eds), Liffey Press, Dublin, 2015, pp 348-381.

presented above highlight the need for investment of time, resources and sustained support in teacher professional development, particularly in relation to the headings below.

### 4.1 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 a 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.

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 how to bridge the gap between the initial training programmes for students and when teachers take up the ideas in the classroom.

Furthermore, it might be worth consideration 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 training in team skills.

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 was expressed by some teachers that technology use in a learning activity must be relevant to the learning outcomes; otherwise, the technology could be a potential distraction for students. 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.
4.2 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 uncertain 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.*

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 (Figure 4). Throughout this change process, teachers often felt an initial loss of influence and a lack of purpose in students' learning. However, as students developed an increased sense of responsibility for their learning, this sense of loss passed and the teacher found themselves in a much more influential position than before, with the teacher-student relationship evolving into one of co-learners.

![Diagram showing the role of the teacher and student self-directed learning](Figure 4: The role of the teacher and student self-directed learning (Conneely C., Girvan C. and B. 2012))

4.3 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.

Findings from the study 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 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 section 3.2, the nature of the project had an effect on its overall success. 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 effectively communicate their learning and how to create effective presentations. 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 they 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 are willing to pilot new approaches to assessment within the current system. This requires further exploration going forward.

### 4.4 Model of CPD

The Bridge21 programme of 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.
In “Shaping our Future: How the lessons of the past can shape educational transformation”, Butler D., Marshall, K., Leahy M., (Eds), Liffey Press, Dublin, 2015, pp 348-381.

Another rationale for the particular CPD approach adopted in this study is that teachers tend to teach as they were taught themselves (Bandura A. 1977; Britzman D. 1991) and so it was important for teachers to have first-hand experience of learning in a different way and developing their own understanding and capability regarding 21st century 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 indicates a 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 proposed six 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 that arose during the implementation phase of the CPD programme related to time and lack of resources. As Bridge21 was working with volunteer teachers, principals had many barriers to overcome in order to release groups of teachers for a full day, including 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.

4.5 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 ICT 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.
In “Shaping our Future: How the lessons of the past can shape educational transformation”, Butler D., Marshall, K., Leahy M., (Eds), Liffey Press, Dublin, 2015, pp 348-381.

4.6 Timetable considerations

As outlined in section 1.1, 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 that 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, and options to group subjects together according to umbrella themes or disciplines.

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, the 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.

4.7 Role of Leadership

A common characteristic across the schools that participated in the study 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 the staff 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 fundamental 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 resonates with (Ncca 2011) which describes school
In “Shaping our Future: How the lessons of the past can shape educational transformation”, Butler D., Marshall, K., Leahy M., (Eds), Liffey Press, Dublin, 2015, pp 348-381.

classrooms as sites of innovation where new approaches to learning and key 21st century skills were explored, trialled and developed.

However, in some schools where only small groups 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 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.

Success of the Bridge21 programme 2011-12 was largely due to the habits, attitude and mindset of the participant school principals and teachers. There is however, 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.

5 Conclusion
This chapter described the experiences of teachers and pupils in eight schools that participated in the Bridge21 programme in the 2011-12 academic year. Participating teachers adapted the Bridge21 model of 21st century learning for use in the mainstream classroom to deliver core curriculum content. The study 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 were a representative sample of the wider cohort of secondary schools in the country. The findings of the study indicate that the Bridge21 model is a suitable vehicle to help deliver many of the objectives of the new Junior Cycle. Students responded very positively to the intervention and the study casts light on the main issues faced by teachers and the need for a new model of teacher CPD.

Acknowledgements
The authors wish to acknowledge the crucial partnership with Suas Educational Development in the earlier years of this work and the support of Social Entrepreneurs Ireland and the many corporate and private donor sources that generously support our work. Particular thanks to Dr. Keith Johnston and Dr. Damian Murchan, in the School of Education in TCD, with whom we collaborated on the development of the key skills questionnaire.

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

- CBS Westland Row, Dublin 2.
- Coláiste Bride, Clondalkin, Dublin 22.
- John Scottus Senior School, Dublin 4.
- Mercy College, Sligo.
- Mt. Anville, Dublin 14.
- Scoil Chonglais, Baltinglass, Co. Wicklow.
- St. Mark's CS, Tallaght, Dublin 24.
In “Shaping our Future: How the lessons of the past can shape educational transformation”, Butler D., Marshall, K., Leahy M., (Eds), Liffey Press, Dublin, 2015, pp 348-381.

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