21 Century Learning –Teachers' and Students' Experiences and Views of the Bridge21[1] Approach within Mainstream Education

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Abstract: Bridge21 is an innovative approach to learning for secondary education that is team and project based and that takes place in a technology mediated environment. Bridge21 was conceptualised and structured initially as an outreach intervention whereby participants attended workshops at a dedicated learning space within a third-level institution leading to refinement of a particular model of technology-mediated group-based learning. This paper reports on the current expansion of the Bridge21 project to mainstream schools at a time of proposed Government led reforms for lower secondary education in Ireland. Data were drawn from case studies with two participant schools over the course of academic year 11/12. Student experiences and views were captured by means of questionnaires which amongst other items asked students to create a visual depiction of their Bridge 21 experiences. Teacher experiences and views were gleaned by means of focus group interviews. Overall students reported positive experiences of the programme. Teachers were also positive but reflected the challenges of implementing a new approach to learning in the context of existing norms with respect to pedagogy and assessment. The application of visual research methodologies provided an innovative and useful complementary insight into students' experiences of the intervention.

Introduction

Bridge21 is an innovative approach to learning for secondary education that is team and project based and that takes place in a technology mediated environment. Bridge21 was conceptualised and structured initially as an outreach intervention whereby participants attended workshops at a dedicated learning space within a third-level institution leading to refinement of a particular model of technology-mediated group-based learning (Lawlor et al.,

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2010). This paper reports on the current expansion of the Bridge21 project to mainstream schools against a backdrop of proposed Government led reforms for lower secondary education in Ireland that prioritises the development of key skills based on a synthesis of the literature in the area (National Council for Curriculum and Assessment, 2011).

These proposed reforms are based on the enactment of key skills and are designed to make education, and in particular student learning, more relevant to 21 century living by providing opportunities for thinking critically, communicating effectively and working in collaboration with others, amongst other intended key skills. As such, the reforms reflect initiatives internationally to embed relevant content and processes in curriculum, teaching and learning (Dede, 2010; Partnership for 21st Century skills, 2006), exemplified also by the OECD's Definition and Selection of Competencies (DeSeCo) project (Rychen & Salganik, 2005). Facilitating a more student centered approach also implies a shift in the dominant pedagogical approaches so as to align formal education practices with the needs of the 21 century learner. Related to this the teacher who in traditional conceptions of schooling commands a dominant position and is regarded as the 'knower' is now encouraged to become a 'paragon of learning' or a co-learner engaging with students in facilitating and guiding learning activities towards the realisation of 21 century skills.

In tandem with the innovative approach to learning via Bridge21 data relating to the student experience were collected using the relatively non-standard approach of participant drawings. The outcomes of the analysis of these drawings served as a mechanism for probing of the wider data set consisting of student questionnaire responses and teacher focus group transcripts. The analysis of the drawings focused on the extent to which student's representations of their experiences of Bridge21reflected key elements of the model. It also addressed the relationship between the sub-set of participants who most closely reflected the key elements within their representations and their outcomes in respect of their awareness of and identification of a selection of key skills.

The Bridge21 Model
The Bridge21 learning model is designed to release the potential of technology-mediated learning, through a structured move away from individualised, teacher-led learning. Central to its rationale is the potential of ICT to support a structured collaborative, project-oriented learning environment. The essential elements of the model are: technology as a tool in the learning process, delivery of content through student-led cross-curricular thematic projects, a structured team-based pedagogy, recognition of the social context of learning and adult support that seeks to guide and mentor, with teachers orchestrating and scaffolding team activities (Lawlor et al., 2010).

From the beginning of the 11/12 academic year a partnership programme has been developed with six schools that were willing to take the lead in adopting the model. Participant schools had the option to adapt the model in a number of different ways:
1. Single Subject Module: used within a single subject, within the confines of the regular timetable.
2. Integrated Curriculum Module: used to support cross-curricular project-based learning.
3. Thematic Module: used to support cross-curricular, team-based projects and during a thematic learning and teaching week.

The implementation of the Bridge21 learning model in schools is based on the active participation of teachers and principals in the areas of planning, teacher education and development. Within the CPD workshops provided to teachers there was an emphasis on experiential learning, providing an opportunity to develop and reform practice through experiencing the learning model first-hand. A training programme was also provided for students in accordance with the relational approach advocated by Blatchford et al. (2003).

Methodology & Data Collection
The data presented in this paper are drawn from case studies with two participant schools over the course of academic year 11/12. School A is a mixed gender school and is deemed to be socially disadvantaged whilst School B is a private, fee paying, all female school. In both cases the school principal was highly supportive of the schools engagement with the Bridge21 project.

Student experiences and views were captured by means of questionnaires whilst teacher experiences and views were gleaned by means of focus groups interviews. Within the questionnaire students were asked to draw a picture of themselves learning at school using the Bridge21 approach. Guillemin (2004) argues that drawings offer a means of gaining further insights into how research participants interpret and understand their world necessitating

reflection and meaning making on the part of the participant. As is the case in this study she argues that this method is best used in conjunction with other research methods as analysis is hence not based on the image alone but in conjunction with other data, allowing participants who are more visual in nature the opportunity to express their understanding in a way which best suits them. This is reinforced by Prosser & Loxley (2009) who advocate the use of the visual within a mixed-methods design. Drawings were completed by 112 participants. As part of the data analysis each drawing was categorised on a thematic basis according to its representation of four key elements of the Bridge21 model: 1) whether it depicted the student learning alone or learning collaboratively with other students, 2) whether or not technology was being used, 3) whether learning was taking place within the classroom or in an alternative location, and 4) whether or not the teacher was depicted as present during the learning.

Research Questions
      This paper aims to address the following research questions in the context of implementing the Bridge21 model in the two case study schools.
1. To what extent did the participant students' representations of their Bridge21 experiences reflect the key characteristics of the model?
2. How did teachers' views reflect the key characteristics of the model as represented by participant students?
3. What are the characteristics of those students whose visual representations most clearly align with the key elements of the Bridge21 model and to what extent are their outcomes different to other students?

Findings 1: Student's representations
      As outlined above the findings aim to address in the first instance the extent to which students drawing of their Bridge21 experiences reflected the four key elements of the model.

Learning Collaboratively
      Generally the questionnaire data showed considerable student satisfaction with Bridge21, with 96% of students recording ratings of 'Good' or 'Excellent' for the programme. Students' responses also indicated their overall enjoyment of the collaborative approach to learning, that they had positive interactions with their peers, were willing to help their teammates when they needed it and that they listened to one another's ideas in the context of their project work. However not all students reflected the collaborative dimension to their learning experiences in their visual representations with only 38% depicting a learning experience categorised as 'learning collaboratively,' as summarised in Table 1 and illustrated in Figure 1. In contrast to this 47% depicted a learning scenario in which they were 'learning alone'. The remaining 15% could not be categorised as clearly 'learning alone' or 'learning collaboratively' and 16% of the sample did not provide any drawing. The unexpected high percentage of participants illustrating 'learning alone' may be attributed in part to the wording of the question which asked respondents to "draw a picture of *you* learning at school using the Bridge21 approach." Some qualitative responses offered by students at the end of the academic year did reflect a collaborative dimension not in evidence at the beginning of the school year. One student who pre-intervention observed that "I don't like sitting at a desk for a whole class" later outlined that "we interacted with everyone". Another student who at the beginning of the year stated that she did not like "sitting listening to [the] teacher go on and on and on" later noted "working in groups with more independence than in a normal class". Generally the analyses conducted show increased student reports of engaging in the more active methods promoted as part of Bridge21. Students reported engaging in teamwork more frequently and a higher appreciation of the value of this teamwork as indicated by ratings of how other students helped them to learn. In relation to their own engagement with their team 81% of students reported in the questionnaire that they contributed 'always' or 'nearly always' within groups with further responses indicating a willingness to help teammates and listen to others' ideas.

Elements reflected in participant images	Yes	No	Unclear
Pair or group collaboration	38	47	15
Use of technology	64	30	6
Teacher visible	16	67	17
Learning occurs away from classroom	3	14	84

Percentages may not total 100 due to rounding

The figures are based only on those 112 students who provided a drawing.

Table 1. Elements of the Bridge21 model reflected in participant drawings. Percents of students.
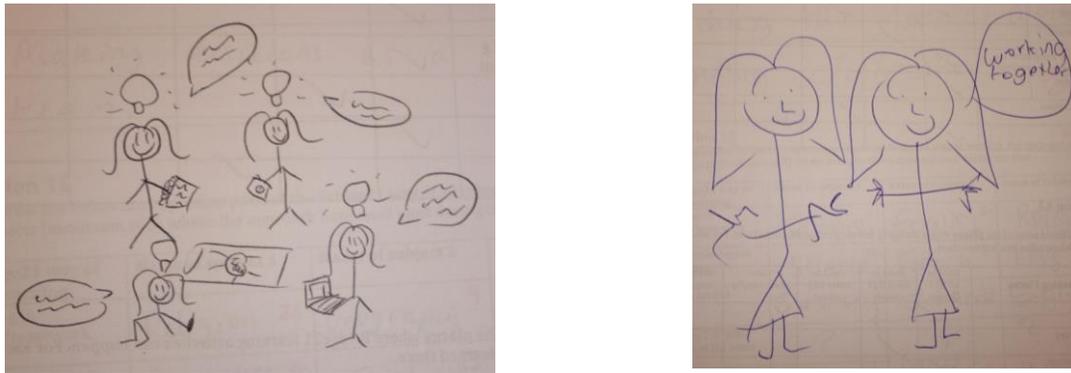

Figure 1. Sample drawings depicting learning collaboratively.

Use of Technology

Use of technology as a tool to facilitate the process of learning is another key element of the Bridge21 model and students did report greater use of technology with questionnaire data indicating that pre-implementation ICT was used on average 1-2 times per month rising to an average of 1-2 times per week by the year's end. As shown in Table 1, technology was present in the visual depictions of 64% of the participants in the sample who provided a drawing, it was clearly not present in 30% of cases and the remaining 6% of cases represented a mixture of alternative representations. Figure 2 presents a selection of student pictures that exhibited prominent roles for technology. Of the group who indicated through their drawing that they used technology as part of Bridge21, 28% depicted using the technology in collaboration with others and 54% depicted using it alone, as presented in Table 2. Eighteen percent of the relevant drawings did not yield data in relation to the collaboration criterion. Similarly of those same images where technology was evident, 72% depicted using technology without the teacher present and 13% depicted its use in the presence of a teacher (with 15% of responses not assignable on the "teacher" criterion).

Element of Bridge21 model	Yes	No	Unclear
Collaborate with others	28	54	18
Teacher Visible	13	72	15

Percentages may not total 100 due to rounding

Table 2. Interaction between Use of Technology, Collaboration and Role of teacher in drawings.
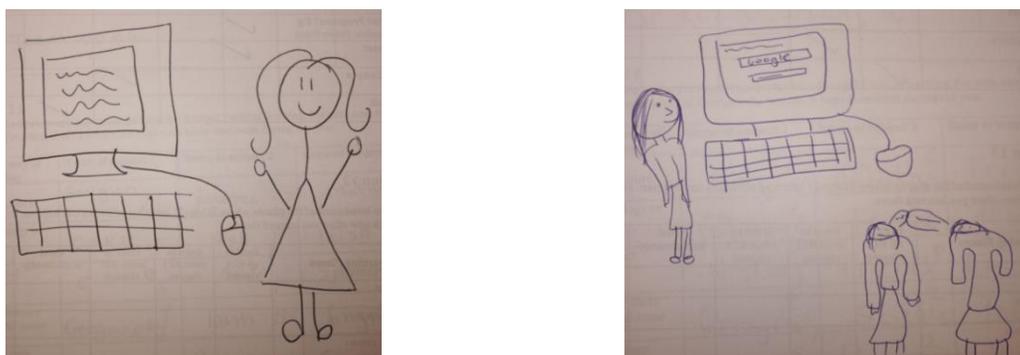

Figure 2. Sample drawings depicting use of technology.

The positive influence of ICT in the context of Bridge21 was also raised by participants in open-ended questionnaire responses highlighting their motivational factor and contribution to enjoyment of learning ("it made learning fun working with computers", "helped me see that computers are a great way of learning") as well as the

opportunity to acquire computer and technology related skills ("improving skills on computers", "it helped me use cameras", "learned how to make a movie", "upload some camera files"). Whilst the use of technology increased there was no significant increase in its use to share and swap work with others students. This may be attributed in part to student's familiarity with technology and to technical issues experienced over the course of implementation.

Location of Learning

In relation to the location of learning 84% of responses could not be considered to be depicting either one of the scenarios of interest i.e. either in the classroom or outside of the classroom. A further 14% depicted learning within the classroom and the remaining 3% showed learning to be taking place outside of the formal classroom. Of those which could be categorised the higher percentage depicting learning within the classroom can be attributed to the fact that in the main implementation took place via the single subject version of the model hence reflecting adoption within existing subject, timetabling and organisational structures.

Role of the Teacher

The role of the teacher in planning and facilitating the learning experience and in acting as a mentor for students may be seen as a change for both the teacher him/herself and for the student experiencing a possible change in the student-teacher relationship as a consequence. Student's representations seem to indicate that they did recognise the less central role of the teacher during Bridge21 experiences with 67% producing illustrations in which no teacher was visible, compared with 16% in which a teacher was visible. The remaining 17% of illustrations could not be categorised definitively. Related to this other questionnaire data showed greater awareness amongst participants of their own learning and of their ability to plan and implement learning strategies. Initially 43% of respondents reported that they 'rarely or never' drew up an action plan for a task but this was halved to 23% post-intervention. Whilst at the outset only 8% reported planning for learning one or more times per day this increased to 27% by the end of the school year.

Findings 2: Teacher's views related to students representations

Drawing on what may be described as a quantitative breakdown of their representations students identified the changed role of the teacher (67%) and the use of technology (64%) as the dominant characteristics of the Bridge21 model. Learning collaboratively was depicted to be a less significant characteristic (38%) whilst the visual data did not contribute usefully to an analysis of the location of learning due to the large percentage (84%) of non-categorisable illustrations.

Teachers' contributions within focus groups were broadly reflective of the prioritisation outlined above with teachers drawing particular attention to their changed and differing role within Bridge21 implementation. In adopting the facilitator/mentor role many teachers expressed uncertainty regarding what might be considered an appropriate level of structure and input to provide for students when implementing this approach. Generally teachers found the unstructured approach more difficult to manage and identified mixed ability groups, prior student experience, the nature of the project/task and the timeframe involved as factors effecting student engagement with this approach to learning. In recognising that the model requires a change for both teacher and student, teachers identified student's lack of familiarity and experience with independent modes of learning as a factor pointing to the need for students to be facilitated in learning how to work in groups as part of their preparation, and reinforced in relation to their particular role within a group over the course of implementation. Teachers' views in relation to student preparation suggest that the initial training provided at the start of the school year so that students could develop collaborative skills did not transfer adequately into the school base scenario highlighting the time and attention required to support students in adopting their aspect of the change, and also reflective of a changed emphasis in role for the teacher. Teachers recognised that students need clearly defined roles and to be given a specific manageable sub-task for them to participate effectively within groups and identified the allocation of such roles and tasks as a dimension of their changed role. In similar vein teachers were generally of the view that the allocated task should take place within a time frame compatible with student's attention spans, and that a degree of structure with the activity broken down into short term manageable targets by the teacher was necessary for successful implementation. It is evident that whilst the majority of student drawings did not depict the teacher as present, consistent with the less traditionally *instructional* nature of their work with Bridge21, teachers saw themselves as having a significant role to play in facilitating meaningful implementation. Teachers also recognised the challenges in transition to this new role, both for themselves and for their students.

Teachers also recognised the significance of the technology dimension although there was evidence that teachers saw the Bridge21 model more in terms of a project based approach, facilitated by technology rather than dependant on it. This was borne out in implementation with teachers reverting to 'pen and paper' techniques when technical problems arose preventing the use of technology. Overall teachers experienced technology as both an enabler and as a challenging aspect of Bridge21 implementation. As an enabler teachers recognised and supported students' interest in technology based learning and saw it as facilitating the team based approach, and the sharing of resources amongst students engaged in tasks. When acting as a motivating factor it was seen to have a positive effect on student engagement and the approach in general was seen as enabling connections between students' personal and educational uses of technology in contexts where use of devices such as smart phones are often banned within schools. This was seen as leading to a more mature appreciation and application of technology for the promotion of learning. Challenges occurred when technical issues arose leading, in one example, to the lost of digital images which had been collected for a project, and when the technology provided an avenue of distraction for students to pursue interests not related to the task at hand. Technical support and an adequate technological infrastructure were seen by teachers as necessary to enable implementation along with teacher professional development which would provide for up-skilling in terms of the technology and applications being used, as many participant teachers had concerns regarding their own competencies. Overall the evidence suggests that students placed a greater emphasis and value on the technology dimension than teachers did, as evidenced by the fact that 2 out of every 3 students focused significantly on technology in their drawings. In addition to considering their own role, teachers focused more on the elements of the project based approach such as the nature of the project or task and the makeup of the groups most likely to achieve successful implementation, rather than on the technology dimension.

Student collaboration was viewed by teachers as a contributing factor to the achievement of the positive outcomes they saw as accruing from participation in the programme, specifically enhanced research, observational and presentation skills although some teachers reflected that students ability to communicate their findings was mixed and that the research which fed into it was sometimes 'better' than the finished product. Whilst some teachers were concerned regarding the learning outcomes which ensued and questioned if students learned anything of relevance to the formal curriculum others expressed the view that some deep learning did occur when there was positive engagement with a task based on an element of student choice and collaboration within groups. Peer assessment was experienced as a motivational factor for students to produce their best work in the context of presentations with the levels of engagement and the standard of work found to improve from an initial to a subsequent round of presentations. Teachers reported student enjoyment of learning through presenting their work and in engaging in peer assessment. Notwithstanding the positive outcomes attributed to worthwhile student collaboration and linked to the changing role for both students and teachers, teachers identified the need to develop student's abilities to work in teams as an essential aspect of effective Bridge21 implementation. Teachers reported that student collaboration had the potential to achieve worthwhile outcomes but that effective collaboration needed to be nurtured.

Findings 3: Exploring characteristics and views of *Optimum Visual Profile* students

The analyses also focused on those participants representing what might be considered the 'optimum' Bridge21 learning characteristics or scenarios. As such, drawings representing the 'optimum' combination of criteria namely: learning collaboratively, using technology and without the presence of the teacher were identified. This resulted in the identification of 11students, or approximately 10% of those who provided a drawing. This group represented an interesting set of students denoted by the term *Optimum Visual Profile* (OVP) students.

Eight of the OVP students were enrolled in School B, with the remaining three in the more socially disadvantaged School A. All but two reported English as their first language. A key feature of the 11 students was the emphasis in their open responses on the role of teamwork and working in groups as part of Bridge 21. When invited to highlight things they liked about Bridge 21, 10 of the 11 noted issues such as "working in teams," "working with girls I didn't know", and getting to "know more about other people." The importance and value of technology featured prominently in the responses by ten of them also, in contexts such as "making a movie," "cameras," "using technology," and "using computers." Whereas the almost universal positive commentary from the OVP subgroup in relation to group work suggests a changed role for the teacher, a number of them also specifically noted the "independence" facilitated through the Bridge21 approach and the facilitating role of the instructors. This emphasis on the three elements of the model (collaboration, technology and role of teacher) was reflected also in participants open ended responses within the questionnaire on the ways in which Bridge21 helped them to learn. Again, seven of the eleven OVP students stressed the value of collaborative learning ("working in teams," "working

in a group," "making decisions as a team," "how to work in a team") and of technology ("I learned how to make movies," how to "use some apps on computers," "using a camera" etc). This sub-group was, on the whole, very positive about the programme, with six participants not registering anything they did not like about Bridge21 and the comments from the other five focused largely on occasions where dynamics within groups was not optimum, where "some people didn't work well with their team mates" and on some malfunctioning of technology.

The study explored also how the OVP group's questionnaire responses reflected their awareness, acquisition and enactment of three selected key skills, namely: *Being creative; Working with others;* and *Managing information and thinking* (NCCA, 2011). Eleven sub-skills within the key skills were measured using a large number of scaled likert items in the student survey. Data were then combined across individual items to generate composite indices for each of the 11 sub-skills and summary statistics were generated in relation to these aggregate skill variables. Measures of central tendency in the form of medians were calculated for the sub-skills for two groups separately, namely the OVP group and the rest of the participants. Data are presented in Table 3.

Key Skill	Sub-skill	Median OVP [a]	Median non-OVP [b]	Difference
Being Creative	Exploring options and alternatives	2.6	2.0	0.6
	Implementing ideas & taking action	2.9	3.0	-0.1
	Learning creatively	2.6	2.3	0.3
Working with Others	Co-operating	3.0	2.0	1.0
	Contributing	3.2	3.0	0.2
	Learning with others	1.8	1.8	0
	Using ICT to work with others	2.0	2.0	0
Managing Information and Thinking	Gathering, recording, organising and evaluating information	3.2	3.0	0.2
	Using information to solve problems and create new ideas	3.2	3.0	0.2
	Thinking creatively and critically	2.8	2.7	0.1
	Reflecting on and evaluating my learning	3.0	2.9	0.1

[a] Optimum Visual Profile. Students whose drawings optimally reflected the Bridge21 model
[b] Students whose drawings reflected a range of criteria, not optimally reflected in B21 model
Table 3. Medians of OVP students and wider group on Key Skills.

These results highlight some small differences in medians between the two groups, generally favouring the OVP group. For example, the median on the composite variable *exploring options and alternatives* was found to be 2.6 and 2.0 for the OVP and non-OVP groups respectively, a difference of 0.6, on a 5 point scale. Similarly, the corresponding difference in relation to the variable *cooperating* was 1.0, in favour of the OVP group. However, given the relatively small number within the OVP group, these differences have not been tested statistically.

Discussion and Conclusion

This study highlighted a number of insights into the implementation of Bridge21 in the case study schools. Students were generally positive towards the approach, valued learning with and from their peers and viewed technology as a significant aspect of their experience as highlighted by its prominent representation within their visual depictions. Drawing on an emergent visual methodology, the study found some corroborating evidence supporting the main elements underpinning the model. These data provide insight into how students interpreted and enacted the model in practice. Approximately two out of every three students prioritised the use of technology and the more facilitative role of the teacher through their drawings. Though less frequently represented in the drawings,

the use of group collaboration as a learning approach was also evident in student images. Taken together, team based collaboration, use of technology, and modifying the role of the teacher pose significant opportunities yet a fundamental challenge to traditional mainstream education in the context of transitioning to 21st century learning. The challenge in transitioning to a new approach but in the context of an existing system is indicated by the fact that of the three variations of the model available for adoption (single subject, integrated curriculum, thematic), the variation most similar to existing structures and norms of operation was adopted to the greatest extent by teachers in this study. The available variations represent a continuum with regard to the degree of change and disruption required to existing practices and it is entirely practical and understandable that teachers would begin with this approach and then progress to other more challenging possibilities as demonstrated by a number of the participant teachers. The study also clearly illustrates the challenge of transition and of being an 'early adopter' (Rogers, 1995), with the key skills based approach and innovative characteristics of the model being seen to be somewhat at odds with the dominant concerns of the existing system vis-à-vis curriculum coverage and terminal examinations.

Students and teachers did reflect some diversity in their views regarding the viability of the model reflective of their varying perspectives, priorities and reference points, with teachers more mindful of existing system demands which can often characterise how they are viewed as professionals. Drawing on the visual depictions it seems that students viewed technology as a key dimension of Bridge21, whereas teachers saw it more in the context of the overall project based approach, and the factors likely to contribute to success, with technology as an enabling factor. Students indicated a high degree of positivity with regard to their experiences and effectiveness within groups suggesting that such groups have a clear role and generally enhance learning. Teachers, however, were generally of the view that students needed more preparation to work effectively within groups and were uneasy with the perceived unstructured nature of the Bridge21 approach. This may be linked to teachers' expectations regarding the achievement of national learning targets which were not a significant reference point for students who, therefore, reflected a more positive experience of working in collaborative teams.

Both teachers and students did reflect their changing roles with Bridge21 implementation. Teachers adopting the Bridge21 model were required to move from a direct instructional role to one of planner, facilitator and orchestrator of classroom activities. Related to this, students are challenged to move from being dependent to independent learners as reflected in the majority of their visual depictions. In such a change process teachers may initially experience a sense of unease as they make sense of their new role, experiencing a perceived lack of influence and responsibility in respect of their students' learning. As students develop their capacity to be independent learners in a collaborative context teachers' apprehension should pass as they find themselves in a potentially more influential and authentic teacher-student relationship as co-learner.

In the context of quickening pace towards curricula based on key skills organisational frameworks, this study is both timely and relevant. Such alternative curricula are likely to require less conventional instructional and learning methodologies which relate more strongly to the digital environment within which young people live. The *optimum visual profile* students in this study portrayed themselves visually as quintessential Bridge21 learners. It would be interesting to focus research efforts more intensely on students such as this as understanding such clusters of practice may offer useful lessons for all interested in promoting modern curricula and pedagogical methods.

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