

The impact of web 2.0 technologies in the classroom

KnowledgeBank: Next Generation
research report

Kodu excerpt

December 2009

*Every
child,
every
opportunity*



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1. Background and research approach

The Knowledge Bank Next Generation (KB:NG) project was a jointly funded 2 year initiative. The funding partners were the Department of Education and Early Childhood Development, MultiMedia Victoria and the Department of Broadband, Communications and the Digital Economy. A series of three month trials and pilots were conducted in selected schools across the state to explore and identify how various Web 2.0 technologies could most effectively facilitate improved teaching and learning outcomes.

This report is an excerpt of the research report developed for this project, *The Impact of Web 2.0 Technologies in the Classroom* (2009).

Over four rounds of trials, the Web 2.0 technologies used included blogs, wikis, podcasting, streaming media, games and game making and web conferencing. Teachers developed their projects in line with their teaching area, goals and needs, resulting in a wide range of activities across the 75 trial schools.

The pilots included groups of schools working with a specific Web 2.0 application in a common year level or learning area. They focused on Intel SKOOOL, SuperClubs Plus Australia and Web 2 technologies to support Languages Other Than English (LOTE) learning. Kodu was included as one of the pilots, involving 25 classrooms from 20 schools. The survey response rate for participants in this pilot are shown in the table below.

Table 1: Survey Response Rates – Kodu Pilot

Respondent Category	Principals	Teachers	Students (% of schools represented)
KODU Response Rate	25% (5 responses)	55% (11 responses)	12% (51 responses)

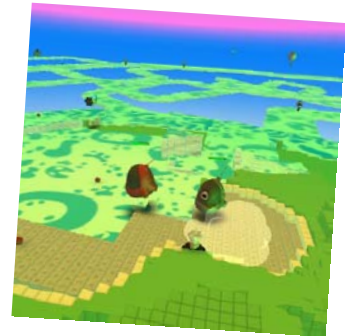
The KB:NG project also delivered a centralised portal FUSE www.education.vic.gov.au/FUSE. FUSE is a portal of teaching and learning content for Victorian schools that also showcases new and emerging technologies, supported by appropriate policy and process.

The research conducted across all trial and pilot schools was designed to answer the following: '***Are student learning outcomes improved through the integration of Web 2.0 technologies in teaching practice? If so, to what extent, in what ways and under what circumstances?***'

2. KODU pilot

Microsoft's Kodu is a new visual programming language for creating games and virtual worlds. The icon-based, language allows students to design, program and test their own games. Kodu is described as a creative construction tool that supports contemporary teaching and higher-order Web 2.0 learning, emphasising links to creative programming and critical thinking.

The Kodu pilot was conducted in 25 classes across 20 schools. The year levels ranged from Prep to Year 10 and also included special school classes.



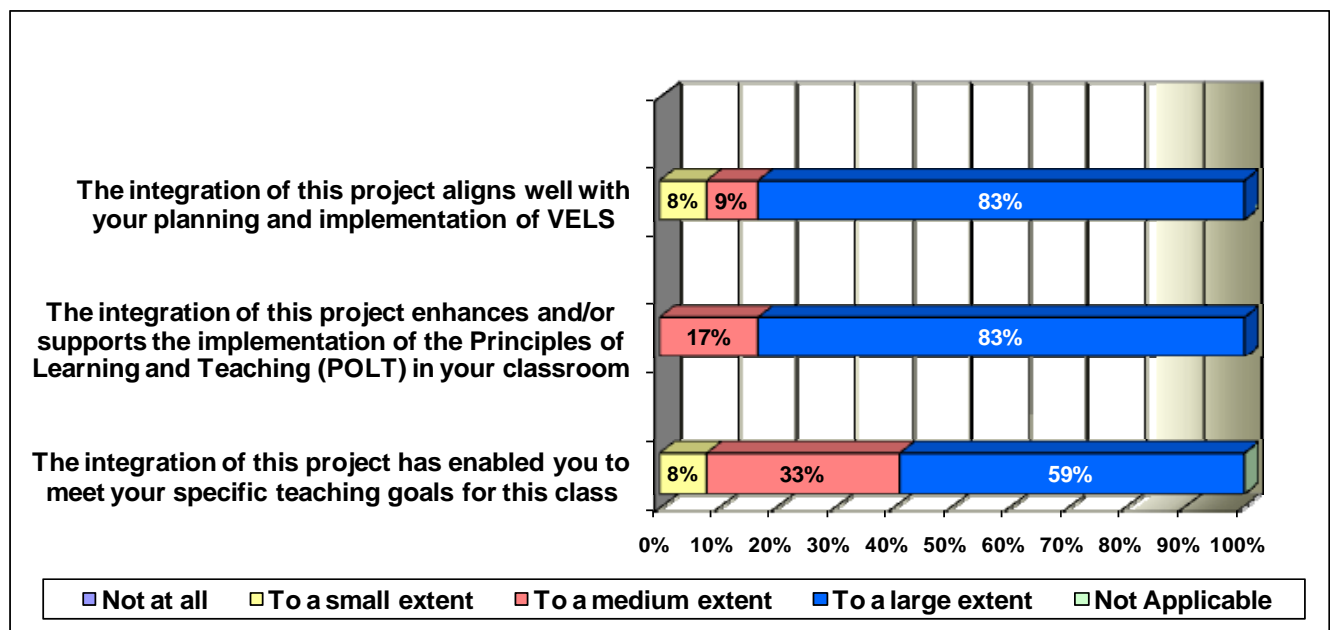
Relevance of the KODU pilot in the classroom

Participating teachers designed their use of Kodu according to their particular teaching and learning needs. Some saw it as a way for students to demonstrate their learning and understanding in regard to a project or unit of work. Others felt it would assist students in revising concepts taught in various learning areas. It was, for example, used to produce a game related to protecting the natural environment. It was also seen as an alternative way for students to create stories. One teacher, in particular, saw it as a way to assist her students who struggled to 'include complexity in their story writing', by encouraging them to use 'multiple characters, story lines and plot events whilst maintaining sequence, cohesion and interest'.

Many also introduced Kodu with a view to increasing their students' problem solving skills and critical thinking, while others targeted improved collaboration and cooperation as well as student engagement. In addition, developing students' ICT skills and confidence, particularly in programming, was also a priority.

All teachers responding to the survey believed that their use of Kodu in the classroom was relevant to and supportive of curriculum and teaching and learning requirements. As detailed in the graph below, 83% believed their pilot project had, to a great extent, supported the implementation of the Principles of Learning and Teaching (POLT) and aligned well with their implementation of the Victorian Essential Learning Standards (VELS). Although all agreed to some extent, responses were not as strong in terms of Kodu meeting the specific teaching goals for their class.

Figure 1: Extent to which the Kodu Pilot was relevant and supportive of curriculum and teaching and learning requirements



One teacher used Kodu to expand students' understanding of what learning is, the different situations and ways in which effective learning can occur and how learning can be transferred to other situations.

Another hoped to establish 'where, or if, video games fit into VELs', knowing that using a video game 'was bound to question and challenge the thoughts and beliefs of students, teachers, including myself, and the wider school community'. Ways the project had enabled POLT to be addressed were also detailed in a teacher's report submitted at the end of the pilot. In summary:

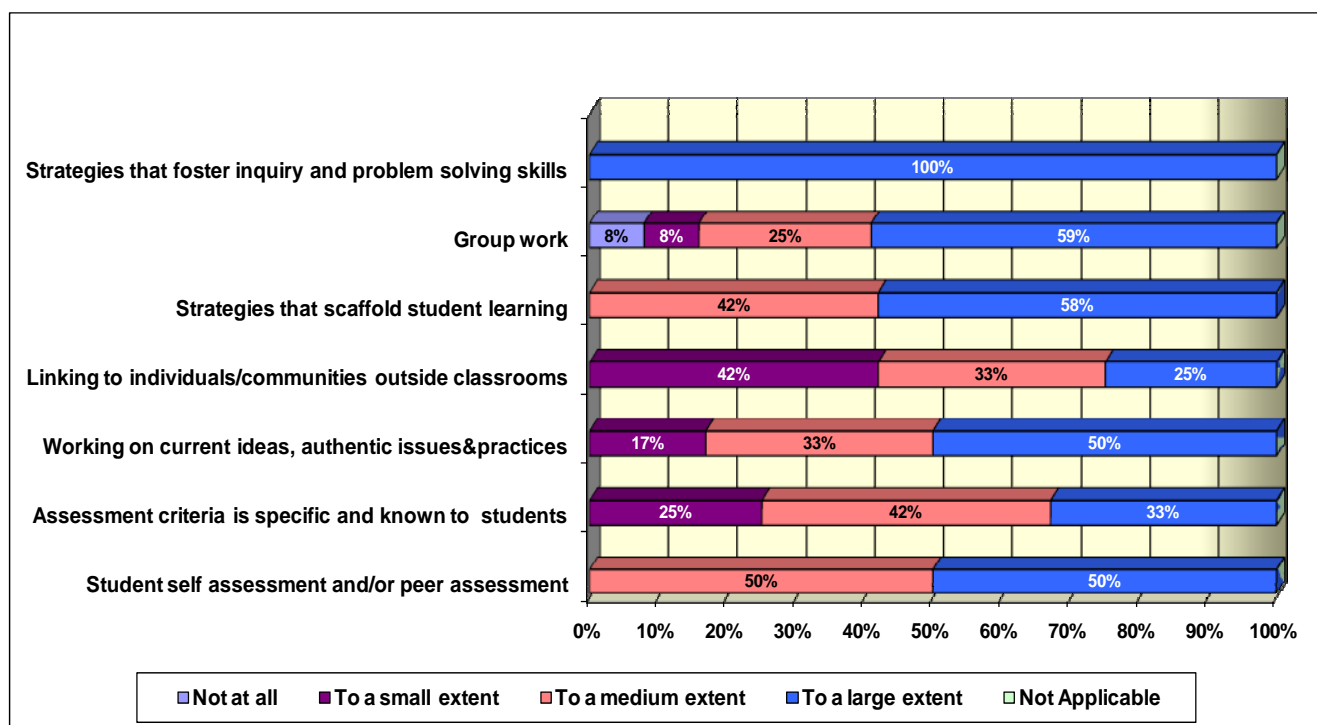
- It provided a supportive and productive learning environment by catering for students with diverse needs and supporting collaborative learning.
- It promoted independence, interdependence and self-motivation through the use of cooperative learning groups to develop the games and rubrics to guide them in their learning.
- Students' diverse needs, backgrounds, perspectives and interests were reflected in the learning program as they used their knowledge, understanding and experience of computer games from home.
- Deep thinking and application were supported and developed through the game making process and the creation, design and deconstruction of multimedia texts, and students engaged in problem solving and creative thinking.
- The learning connected strongly with the community and practice beyond the classroom, through the use of technologies that are also used beyond the classroom setting and through involvement in the Planet Kodu wiki, which allowed students to communicate and collaborate with a global audience.
- Assessment practices, including peer assessment, were an integral part of the teaching and learning.

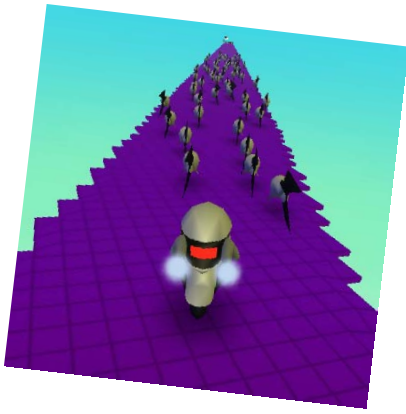
Teaching practices

Kodu enabled teachers to foster inquiry and problem solving skills. As shown in Figure 19, all teachers included this, to a large extent, in their teaching practice during the pilot, with some indicating that this was a significant increase when compared to their prior teaching practice.

Many specifically set out to build students' capacity to think critically and creatively, providing structures and tools through which this occurred, such as graphic organisers, proformas, rubrics and thinking tools. The 'Habits of Mind' were considered particularly relevant as a framework through which they encouraged student thinking. In some classes, problem solving methodology, which included planning, development, testing, problem solving, implementation and evaluation, was first discussed with students and then applied to their game making activities.

Figure 2: Specific teaching practices included in the Kodu Pilot





Most students were also being given more time to *'explore and play'* so that they could work through what might be possible in creating their own game. They had more scope to try new things, *'without limitations'*.

As Kodu was new for most teachers, there was also a greater sense of *'exploring together'* in the classroom, which, according to several teachers, encouraged students to work things out for themselves and share their knowledge and understanding with others. The technical challenges arising, particularly major issues such as the frequent *'crashing'* of games, were frustrating but were also encouraging students to search for solutions themselves.

In some classes, students were nominated as *'experts'* who were teaching others or were developing tutorials for use across the class. In one class, for example, a group of these *'experts'* worked closely with the teacher, as they learned the skills and also developed relevant tutorials for other students to use. Students were called on in the class to teach new skills, help find solutions to technical issues and support students who were struggling. In a small country school, the teacher had not used technology extensively in the classroom so the game making technology was particularly new to her. Many of her students were *'way ahead'* and were therefore exploring the options and teaching and supporting one another in the development of their games.

Structured reflection was also encouraged in some of the classes, assisting students to understand and articulate their thinking and their learning. It also helped teachers to gauge the approach students took in their problem solving and the gains they made through the activities. In one class, reflective writing was a strong component in demonstrating student learning outcomes and further developing their learning. These reflections were added to their electronic portfolios and they also provided the teacher with an opportunity to respond to each student with further queries and with suggestions on areas they might like to explore further. After seeing the impact of reflection on his students learning, another teacher believes he will now *'place more emphasis on and allocate more time for reflection'* in other learning activities.

Some teachers reported that they had also become *'more reflective'* about their own teaching practice. One detailed his *'move towards being a facilitator'* and another felt the pilot was reinforcing his belief that *'student centered learning situations are, in general, very powerful learning experiences'*.

The game making activities were mostly completed in pairs or groups, requiring collaboration and cooperation amongst students. Group work was a feature, to a large or medium extent, in **84%** of the classes, although some students worked individually on their game. In one of the special schools, the teacher recognised the limitations of some of his students so targeted only those students who were able to manage the game making activities, while including the others by assisting them to play the games that were created.

Teachers reported extensive communication and collaboration across their classes as students worked together to develop a game they were jointly creating, gained support and information from the student *'experts'* or were watching and discussing what other students were achieving. Increased self and peer assessment also grew relatively easily out of these collaborative activities. Where teachers made the assessment criteria explicit, through the use of rubrics for example, students understood and were guided in this assessment.

Whole class teaching activities, using an interactive whiteboard, were also included in some pilots, usually in the introductory stage of the Kodu activities. In one class, for example, all students were involved in the construction of a class *'world'*, the characters and the game. Students were then able to try their own, using tutorials that had been developed. This step by step process was, according to the teacher, important in developing students' confidence and ability to build their own games.

As demonstrated in many of the strategies above, teachers were recognising the importance of structuring and supporting student learning as they introduced Kodu in their classroom. Their survey responses indicated that **58%** were doing this to a large extent and the remainder to medium extent.

Teacher comments also indicated that many were now questioning and reviewing the way they provided new information to their students and one teacher commented that the teachers involved at her school had, as a result of their involvement in the pilot, *'increased their pedagogical understanding of the integration of 21st century skills in a classroom environment'*.

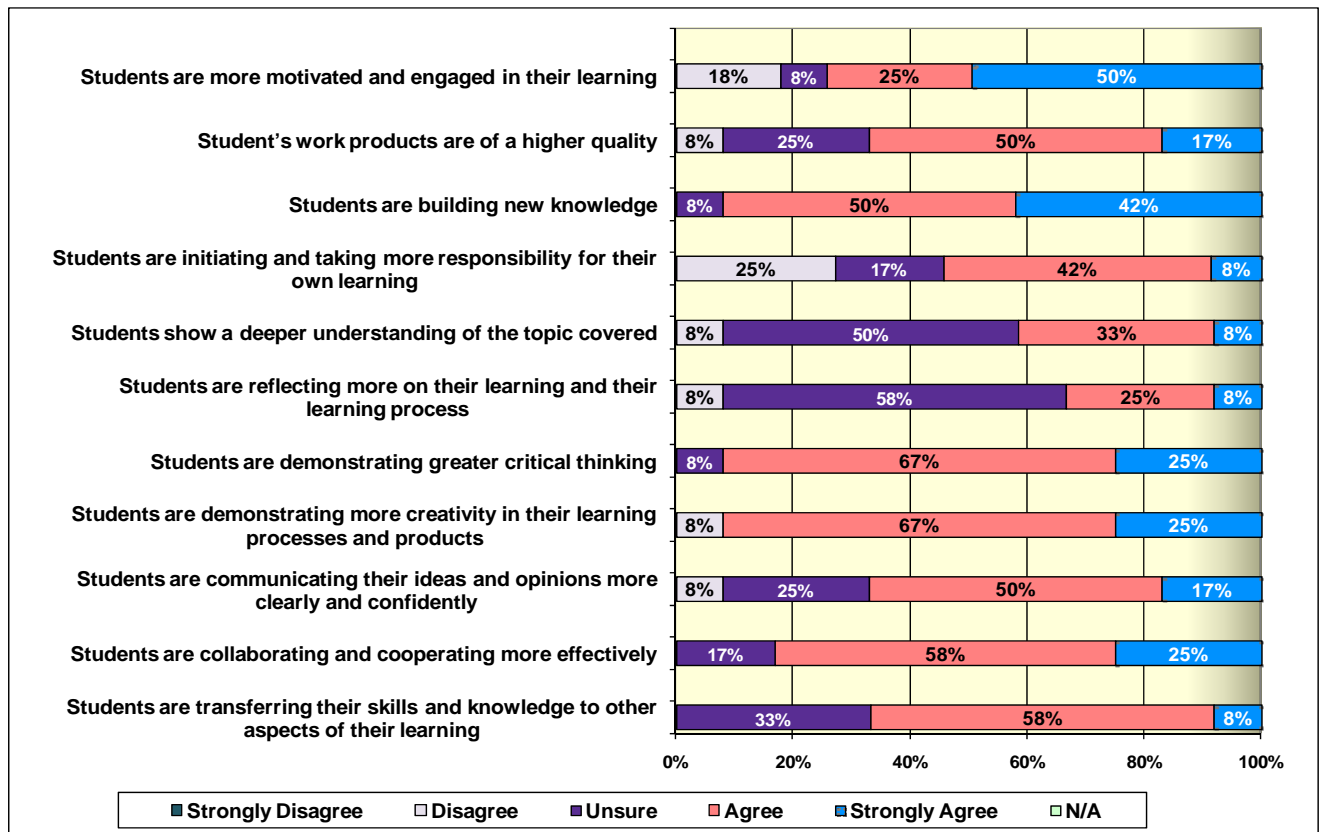
Impact on student learning

The impact of the pilot activities on student learning varied considerably across the classes. Most agreed that students were more motivated and engaged in their learning when using Kodu although, as indicated in Figure 20 below, **18%** disagreed and **8%** were unsure. Several teachers noted their surprise in seeing that it was often the disengaged, low achieving students rather than *'the high flyers'*, who *'shone'* when using Kodu. One noted that these students have *'not only found a valuable talent but they and their peers now see them in a different light.'* Another observed a vast improvement in their personal and interpersonal skills.

In a relatively small country based school, for example, a Year 3 student, who was totally disengaged and *'could not stay on task for more than 5 minutes'* became a key member of the *'expert team'* selected from across Years 3 to 6. The role of this team was to support teachers and students in the classroom as they worked on Kodu. The team spent additional time learning how to use Kodu and dealing with any associated technical issues where needed. During these times this student was sharing ideas and problem solving and, when faced with difficult problems, he showed remarkably high levels of persistence until he found the solution. He was also developing video tutorials, by directly recording his explanation for solving a problem, and worked effectively in the classrooms when needed, teaching and assisting both students and teachers across all year levels. In another school, a student who found it very difficult to pay attention in class and was regarded as *'a behavior problem'* was give the controller for Kodu, without any instructions, and within 10 minutes had created a game. The teacher was amazed at this most incredible turnaround, highlighting the need to relook at the learning experiences she needed to use with him in the future.

Many students were willing to share their time and expertise with others who needed help using Kodu, but some teachers found that students who were generally quiet in class had *'blossomed'* using the Kodu program. Their *'confidence has grown in experimenting with something new'* and *'they have even been willing to share gained knowledge with the whole class'*. In one class, students identified one such student as a *'knowledge resource.'* The teacher noted that this was the first time this typically withdrawn student had taken on a prominent classroom role.

Figure 3: The degree to which teachers agree or disagree about the impact of the KODU Pilot on students:



For some classes, the technical issues prevented full implementation of the initial plans and therefore impacted on the outcomes for students. The short timeframe was also seen as problematic by some. However, **92%** of teachers agreed that students were building new knowledge (**42%** strongly), demonstrating greater critical thinking skills (**25%** strongly), and demonstrating greater creativity in their learning processes and products (**25%** strongly).

New ICT skills and knowledge were developed as students learnt to program games. Students '*showed a growing confidence in their ability to experiment*' and were able to work '*more independently*' to produce high quality work. Teachers noted their excitement when they '*found a new, more efficient way to program*'.

Where teachers were integrating Kodu into a specific learning area, they were finding that students were able to demonstrate learning in that area. Some classes used Kodu in relation to the development of literacy skills. In one class, for example, it was used alongside a range of writing experiences, including a national novel writing competition. The pilot was designed to investigate whether developing a game can facilitate improved results in student narrative writing. Each student built the land and the characters and developed their game around the actions in the story they created. Kodu was seen as a way to increase their capacity to visualise their thinking and sequence the actions as they developed the location for their story and planned the events.

In a special school, although most students in the class were not capable of using Kodu, one student was able to apply basic aspects independently, such as developing a world and the character. According to the teacher, '*his conversation skills, ability to communicate his ideas and concentrate were all assisted using Kodu*'.

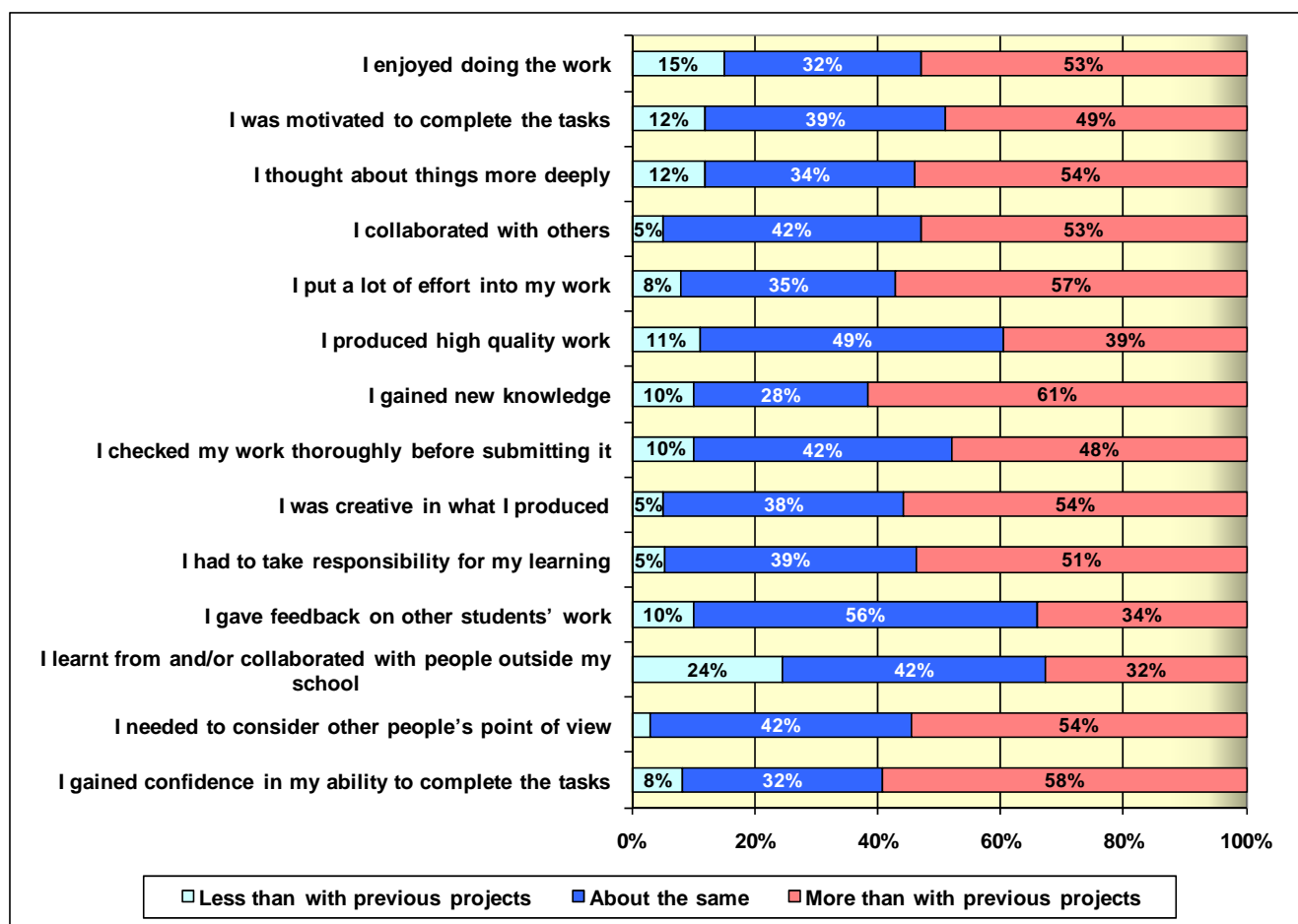
Teachers were also observing students thinking deeply, critically and creatively as they tackled and solved specific problems to develop their games. They were increasing their ability to construct ideas, think strategically and work through a sequence of their game '*to ensure it flows logically*'. Increased understanding of cause and effect and an ability to visualise their thinking was also noted as they developed their games. Some teachers also encouraged and were impressed by the ability of their students, including those in Prep, to articulate their strategies and their learning. 'Habits of Mind' was considered a valuable tool to support this.

The development of student resilience was also considered an important learning outcome, evidenced as they coped with computers that crashed or were slow to respond. Teachers also observed students' increased persistence in working at a task until they achieved what they wanted.

The student perspective

Compared to previous projects, **61%** of students responding to the surveys felt they had gained more new knowledge when working on the Kodu Pilot activities and **58%** had gained more confidence in their ability to complete the tasks. **54%** had thought about the tasks more deeply, been more creative in what they produced and needed to consider the point of view of others. In addition, over half enjoyed the work more than in other projects they worked on, collaborated more with others, took more responsibility for their own learning and collaborated more with others. Very few considered these outcomes occurred less than in previous projects.

Figure 4: Student perceptions of their learning with the KODU Pilot compared to their previous projects or work:



The students' open ended comments provided more detail. Many appreciated being able to create something new. One student *'really enjoyed exploring and figuring out how to create things'* and another *'had fun thinking differently'*. A third enjoyed *'how we were be able to create something like our own little world and how we could make it however we wanted and how we could show how awesome the world could be.'* Many were also proud of their new technology skills. They spoke of gaining confidence in their ICT skills and their new ability to *'add sound effects and make your character speak'*. Another was *'more confident in programming characters'*

Students also recognised the learning in other areas. For example, *'Making lists helps me with my writing skills'*, and *'Kodu helps me with mathematics by programming the characters'*. They recognised the importance of planning and appreciated working in teams and pairs.

In their reflections, students in one class talked about a range of gains in their literacy skills including being able to sequence and visualise their thinking. One student was also *'confident about designing and creating different worlds... my mind has exploded with creativity by doing Kodu'*. Another found *'Kodu helps a lot in writing because in sequencing...you have to put characters in order of the plot'* and a third felt that *'it makes my imagination bigger' ... By doing Kodu I am more creative than I was before'*. For some students in this class, Kodu was difficult to begin with but they were now proud of the fact that they were finding it easier to use. They were keen to continue and many had plans for improving the way they did things in the future.

When asked about the worst thing regarding Kodu, the comments overwhelmingly referred to the computer *'crashing'* and *'losing everything'* when this happens. Computers that were *'going too slow'* were also problematic in many of the classes. A few indicated they were *'bored'* and some found it *'hard'*.

Many, however, were relatively resilient in the face of these difficulties. One, for example, commented:

'Sometimes I didn't exactly get something about it and sometimes it was a bit tricky to understand, like with using a controller was a bit strange for me, because I was unfamiliar with some of the buttons, but finally we worked it out. Some of the things were really confusing and strange to me like how the whole thing set up, but it still was pretty good'

The influencing factors

Difficulties with the technology was the major factor hindering the success of the program in some schools. This included, as highlighted in the students' responses above, the program frequently 'crashing' causing students to lose their work, or the program running very slowly or not at all, particularly on older computers. In addition, some schools had problems when the software expired unexpectedly which meant students lost their work. Lack of technical help, knowledge and advice when certain problems with the software occurred also prevented progress in some schools. Not enough time 'to get it working' properly across the school network before letting the students 'have a go' was also highlighted by one teacher.

Lack of time also limited the activities, particularly where schools relied on access to a computer laboratory. This was further exacerbated by the technical issues above. In one case, for example, students only had one hour a week to use the computers for Kodu. This, according to the teacher, meant that a 'large majority do not understand or like Kodu because they have not had the opportunity to develop the skills'.

In contrast, readily available technical support, regular access to 'up to date laptops' and time release were considered to be strong support factors. The funding was also important. One teacher commented that 'it meant I had time and flexibility to run the pilot properly'. Support from other teachers in the school, as well as the principal, was also valued, along with interaction with other Kodu Pilot schools, via web conferencing, and the support from the KnowledgeBank team.

The approach taken by the teachers also influenced the success of the program. Teachers who structured the program within their curriculum, worked towards specific goals, scaffolded student learning through structured resources and frameworks and used sound teaching practices found it particularly beneficial in supporting them to achieve their specific learning goals.

Moving forward

The pilot provided teachers with a better understanding of how Kodu might fit within their curriculum. Many recognised that it was not just 'an add on' but had the potential to address their teaching and learning needs. All indicated that they would like to use it in their teaching in the future.

They hoped to allow more time for students to play, discover and learn more about the software as well as increase the access to computers. Some also aimed to increase their own skills in using Kodu and their understanding of its potential in their classroom. One teacher intended to spend more time on learning skills, by setting short tasks, and also give more explicit instructions to ensure all students understood what is expected of them. Another will give students more boundaries around what games they are to create as 'no boundaries students meant ideas were sometimes too grand and impractical'. Some also hoped to encourage the use of Kodu more broadly across their school.

Conclusion

The Kodu Pilot provided teachers with an opportunity to explore a very new Web 2.0 teaching and learning tool. Although activities were often stymied by technology problems, the outcomes for lower achieving students in particular has been very positive and in many cases unexpected. Importantly, it has taken many of the teachers to a new level of thinking in regard to working with their students. This is reflected in many of the comments from teachers but exemplified through the following thoughts from teachers in special settings, who feel the program has taught them:

'Not to underestimate the learning that can take place, even in students with learning difficulties'.

'Students will surprise you – expect the unexpected. Students are resilient and can work with a less than perfect environment ... if they are really interested and engaged'.

'I need to keep looking for new ways to help my students find their talents'.