
TEACHERS, TASKS AND TRANSFORMATIVE LEARNING: HOW WELL DOES IT WORK?

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Abstract

The introduction of a 1:1 laptop program in a school carries with it an anticipation that it will be a pivotal step in transforming the medium of teaching and learning. However, it is the pedagogical tools used to underpin the program that also impact on the successful introduction of these programs into schools.

This study investigates the change in teaching and learning outcomes at an independent Catholic school in Queensland which introduced a 1:1 laptop program in 2011. Since its introduction, the school has surveyed both teachers and students to investigate how the learning from using laptops in class is being transferred into skill building across subject areas. In the same timespan the school has implemented the reinterpreted Bloom's taxonomy as a pedagogical tool. Additional teacher interviews were used to gather an indication of the progress of this pedagogical change. The uptake of these two initiatives has precipitated an examination of skill building and skill transfer across key learning areas at the school. This paper outlines the changes arising from the 1:1 laptop program and the concurrent introduction of Bloom's revised taxonomy as a planning tool and examines the extent to which this is building a culture in the school of transformational learning.

Background

In 2011 a Brisbane all boys independent Catholic school, introduced a 1:1 laptop program and in so doing, it demanded of its teaching staff, an immediate expectation that teaching methodology should change, from the very traditional textbook driven teaching that was in use, to the creation of a blended learning environment. The school was looking for change in teaching methodology, assessment options, and student and teacher attitudes towards learning. Research into technology and Education had identified knowing as a process that actively interprets and constructs individual knowledge representations and also that technology needs to be partnered with cognitive tools and authentic activities in order to improve the learning outcomes (Herrington, Reeves, Oliver, & Woo, 2002; D. Jonassen, 2006; D. H. Jonassen, 1991). This decision then to implement the 1:1 laptop program and supplement it with a school wide initiative to implement Bloom's revised taxonomy (Krathwohl, 2002) as a pedagogical tool was a deliberate strategy to support teaching staff and students through a change not only in skill but in attitude towards technology and its uses in Education.

There were multiple driving factors for this change. Firstly, the Assistant- Principal, Curriculum had been seeking a mechanism to drive curriculum change across the college and promote a more academic culture and more positive academic results in the school. Secondly, the Australian National Curriculum had set out for schools its expectation of the use of information and communication technologies as a general capability,

“ to access, create and communicate information and ideas, solve problems and work collaboratively in all learning areas at school, and in their lives beyond school.”
("ACARA," 2011)

Thirdly, the Queensland Core Skills test, a common state wide Year 12 test which contributes

information used to rank students for tertiary entrance, ("Queensland Studies Authority: Supporting Kindergarten to Year 12 curriculum in Queensland," 2013) had indicated that over the past number of years, the students had shown poor results in higher order thinking. In particular the Queensland Core Skills test requires students to think, evaluate and synthesise information. However, data collected since the arrival of the AP Curriculum to the school suggested that the majority of assessment activities were pitched at a low level and did not demand higher order thinking. At the same time it was noted that although the majority of the students were eligible for tertiary entry, the 30% of them who were not, were still in need of problem solving skills. The College Leadership Team a strongly held belief that these boys still needed to have problem solving abilities, to develop the capacity to look at information, question and analyse it.

The school recognised that in order to engender success it also needed to change long set patterns of behaviour and teaching belief and practice and to develop as a professional learning community (Eaker, DuFour, & Burnette, 2002). A feature of the teaching program had hitherto been the school wide use of textbooks, thereby teaching in well organised sequences rather than integrating variety and a range of resources into unit development and lesson planning (Hill & Hannafin, 2001). Therefore developing skills in unit planning and development across the staff became a high priority and the College Leadership Team looked for a framework to support this development. The revised Bloom's taxonomy was decided upon as an accessible, school wide cognitive tool for use in unit and lesson planning (Athanassiou, McNett, & Harvey, 2003; Krathwohl, 2002)

The major school based stakeholders - the school leadership team and the learning teaching staff were keen to record progress 18 months into the program to see whether the school's "mindset," as Weston and Bain (2010) described, was developing as planned. The introduction of a pedagogical framework had been introduced to address both the issues of unit development and the teaching of higher order thinking. Several programs were considered and Bloom's revised taxonomy was thought to be the most accessible for students and teachers, allowing for manageable differentiation of the curriculum (Noble, 2004). This was a framework for teaching and improving the academic skills of students and this pedagogy, inclusive of technology as it is, that would encourage and demand the necessary change in the teaching strategies in use in the college. Thus, together, the revised Bloom's and the 1:1 laptop program provided an opportunity for the school to encourage teachers and students alike to use technology in the classroom as a vehicle for improving teaching and unit planning in order to develop higher order thinking skills in the student body.

Demographics

The school is a well-established independent Catholic boys' school of some 1170 students. The student population and feeder schools are widespread with many students travelling considerable distance by train. It is a very traditional school with a solid sports culture, a burgeoning cultural program and an extensive pastoral care program. It has a strong spiritual mission which encourages immersion in activities which educate the students to the needs of the poor and underprivileged. Many students are involved in the extensive after school sports and cultural programs and actively participate in the Spirit and Mission of the school. The school is also highly regarded in the district for the work of the teachers and students to feed Brisbane's homeless. These extra-curricular and co-curricular activities ensure that much good will flows between the teaching staff and the school community which flows into the classroom.

The school is also located in a very pleasant environment, with extensive sea views from many classrooms and the school grounds. There is a strong camaraderie among the staff built upon athletics, cycling and water sports with many of the staff, including the principal, involved in personal fitness activities and encouraging healthy lifestyles, both for the teaching staff and the families of the college community. The teaching population is very stable with 34 of the 85 teaching staff having had a significant relationship with the school for more than 20 years either as teachers within the school and/or as past pupils. At least 7 of the longer term teaching staff will reach retirement age by 2014,

and in 2012, less than one third of the teaching staff were younger than 40 years old. Therefore, while this is undoubtedly a pleasant environment in which to work, the demographic stability this school enjoys has not encouraged an influx of new ideas and pedagogical change. However, the camaraderie and the professional exchanges with other teachers regarding the extra-curricular activities may have gone some way towards creating some positive variables which contribute to change. (Little, 1982)

Existing technology

Prior to the 1:1 laptop program, technology had not been a large component of the school's academic program. Although all teachers were given the opportunity to implement some use of technology through the provision of laptops for teachers and data projectors in each classroom, there were no interactive whiteboards in the school, and students had used pens and paper until the advent of the 1:1 laptop program. Therefore it was assumed that the 1:1 laptop program would be a significant technological challenge for the staff. Indeed, at the beginning of the program many staff were unsure of many of the possibilities of the technology. Compounding their unfamiliarity with technology was the fact that the students had had little opportunity for the interactive use of technology as part of the learning process and teachers were unused to classroom management of these devices.

Implementation of the 1:1 laptop program

The school has been very cautious in its approach to change. Over an 18 month period, a "drip method" of change was embarked upon. Careful planning and project management of both the 1:1 laptop program and the implementation of a higher order thinking skills program necessitated considerable preparation and change in the areas of workforce planning, software and hardware. This was embarked upon strategically.

Workforce planning

The 1:1 laptop project has been carefully managed from a human perspective with workforce planning constituting a key element of the project. While particular middle management teaching staff have been hired specifically to bring change – the appointment of an Elearning co-ordinator to drive the project, and a teacher librarian with the change management skills necessary to support the growth in teaching skills required, the appointment of general teaching staff has valued those who have demonstrated a prior knowledge of blended learning systems or at interview have shown a capacity to accept change in their pedagogy.

While the IT staff have come from a business rather than an educational background, they have shown a readiness to be guided by the needs of the educational programs. None of the IT staff have a teaching background, and the existence of an ICT committee forum has provided a strong conduit for communication, troubleshooting and developing a shared understanding between the IT staff, members of the CLT and the teaching staff. The committee has been the strategic factor which has ensured that the IT staff have come to recognise that Education drives the technology. That said, the school was very fortunate in that the IT staff were the first to admit that they were not teachers and were not cognisant of the needs of the classroom. Over the course of 2012 they have shown themselves to be very willing to develop a program which suits the needs of the teachers.

Software management

Appropriate software has been installed to drive learning programs throughout the school. Many administrative tasks had been digitized through the use of the school management program, TASS. Microsoft Sharepoint, Version 3 had been in use by some teaching staff for some years as an early Learning Management System. After the first six months, a whole staff training program in the use of OneNote as a unit planning tool proved to be very successful. Follow up sessions were provided for Heads of Curriculum leaders throughout the school and constant support has been available from the Elearning coordinator for the use of this program. In the same vein, Rationale and Inspiration as mind

mapping tools as well as the Microsoft Office suite have been targeted by the staff as software necessary to create a flexible learning environment.

Hardware management

Hardware needs have changed since the onset of the program. The school initially gave laptops to Years 7, 8, 9 and 10. The senior Students have initiated a Bring Your Own Device strategy as they provide their own laptops and peripherals, in spite of the fact that they are not allowed access to the school learning management system or the internet. The number of computer labs has been reduced as the program progresses throughout the school and while the school does not support BYOD, discussions are underway to allow BYOD access to the system. This technology creep is student driven and the school is tacitly supporting it by allowing the Year 12 students to supply their own devices. The Business and Economics department which has not so far been part of the laptop program have not been using OneNote as a planning tool so far but are intending to develop it in 2013, "because the boys use it" (Business Head of Curriculum). The tangible changes in student practice that are occurring as the laptops are appearing throughout the school, constitute a pressure on the teaching staff to change their attitudes to the need for technology in the classroom, whether or not it is actually happening at class level.

Methodology

Interviews were held with some of the key teaching personnel – those curriculum leaders who had teaching staff who were adopting new practices, or were adopting the technology as in their own classrooms as an example to their staff, the teachers themselves, and the AP curriculum who was the major initiator of both the laptop program and Bloom's revised taxonomy as a pedagogical tool. Thereafter, the teaching staff were asked to complete an online survey to ascertain their attitudes and practices. The students in Year 7, 8,9,10 were also asked to complete an online survey to ascertain their attitudes towards the laptops as tools, the teaching programs and their use of the laptops. The interview transcriptions and the results of these surveys were then collated to track changes in attitudes and behaviours which would indicate the uptake of the laptop program, and the uptake of new teaching methodology and student learning behaviours which might indicate a transformation of teaching and learning practices.

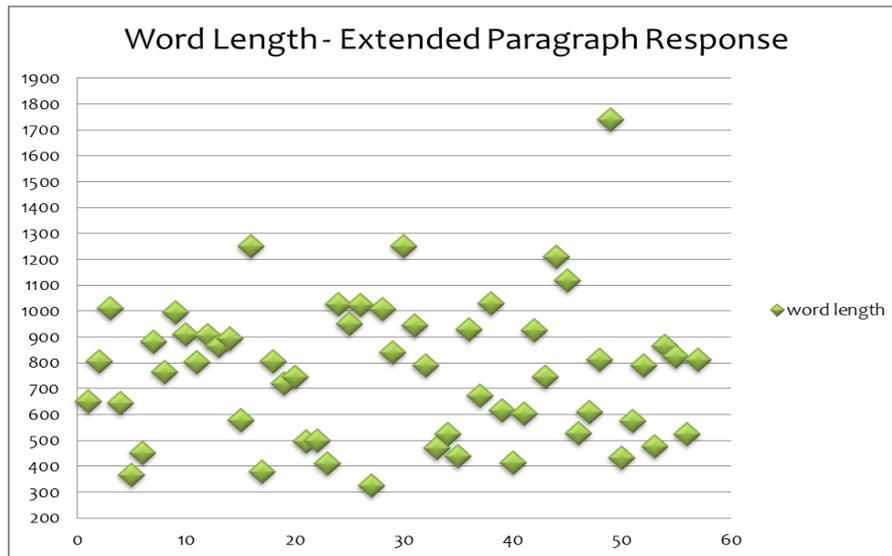
Results

Students

An example drawn from a Year 9 History class provides evidence of the changes wrought by the laptop program when coupled with a pedagogical tool such as Bloom's revised taxonomy. Although this was a classroom task, it contained many of the attributes of an authentic online activity as outlined by Reeves et al (2002).The laptops provided the tool necessary to independently research, collate and synthesize information to create a digital product. Bloom's taxonomy, when applied to the learning, provided the thinking structures – the mind maps, and the higher order thinking that the task demanded. Instead of simply learning and regurgitating the material, the students made sense of the information themselves, sorting it into cohesive grabs of information which together formed the timeline needed for assessment. The evidence of this term's learning can be seen in Figure 1 - the results achieved in the end of term test. This shows the word lengths of a paragraph written by Year 9 boys under examination conditions after completing a unit of work in an online learning environment. The examination task called for a paragraph 300 words long. As can be seen, only one student reached the 300 limit mark, the others very well for this writing task. Regardless of the accuracy of the answers, the length of writing is significant and indicates that the laptop program, coupled with the thinking strategies of the revised Bloom's taxonomy had had a positive effect on the student output.

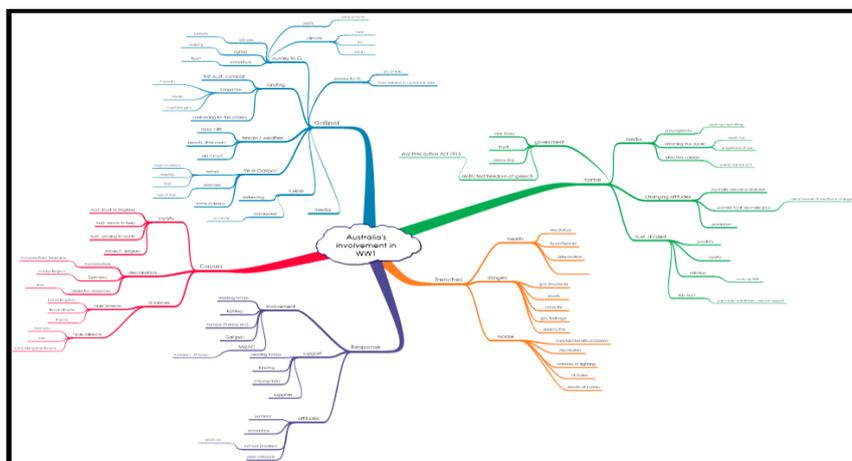
This finding is supported by earlier research of student writing which suggest that on average students who use computers when learning to write are not only more engaged and motivated in their writing, but they produce written work that is of greater length and higher quality(Goldberg, Russell, & Cook, 2003).

Figure 1: Word length – extended paragraph response from Year 9 students in an all-boys class.



The preparatory work for this paragraph was a unit of work given to the students using “bytes” of information from digital resources to create an understanding about the causes of World War 1 and the extent of Australia’s involvement in it. This unit of work was developed as an on line workspace in which the students’ had to develop a mind map of Australia’s involvement in the war and a time line of events, creating a school version of Jonassen’s “mindtools”(2006) to formalise knowledge. By creating s were engaging in “different kinds of critical, creative and complex thinking” (D. Jonassen, 2006, p. 6) to produce a digital product.

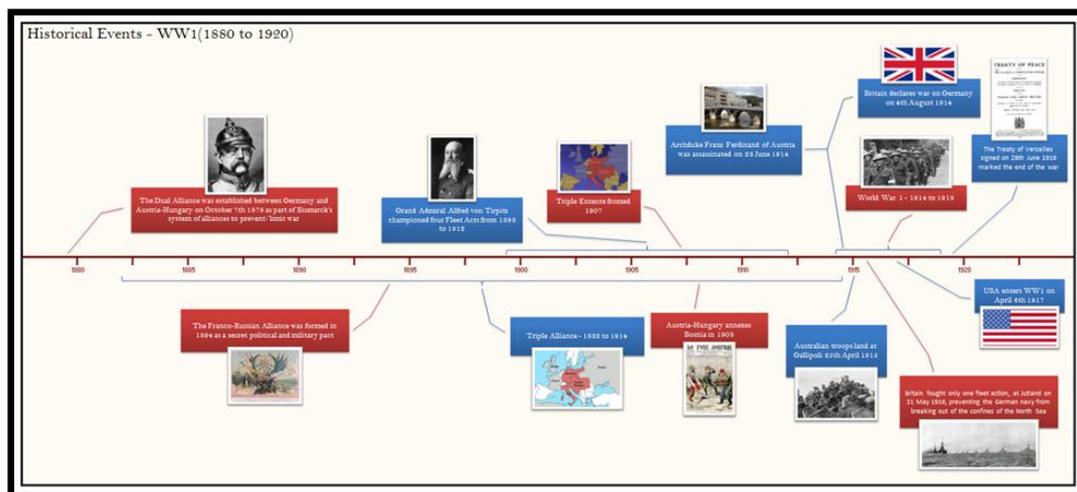
Figure 2: A class created mind map of Australia’s involvement in WW1.



Creating the timeline demanded that students locate, select, collate and organise information while the creation of the mind map demanded an understanding, synthesis and analysis of Australian and World conditions at the time. This higher order thinking was enhanced and enabled by the use of the

software “Inspiration.” A hand drawn mind map would not have produced the same complexity of thought as easily nor as quickly as the digital tool did. The speed of its creation is clearly an example of the way in which laptops assisted the thinking strategies used during the exercise. Figures 2 and 3 show the higher order thinking that took place in the creation of the learning about World War 1. The students’ research task was to create a timeline of the important events in World War 1. In doing so, the teacher created a shift in the locus of control from external to internal - the students took charge of their own learning, facilitated by the teacher certainly but created in a series of non-linear, research based tasks. The students grabbed “bytes” of information which they made sense of. This teaching and learning requires active participation on the part of the students and they take on responsibility and accountability, not only for their own work, but for their own learning. The students work through the chunking of the curriculum into “byte sized” pieces of information gained through research or through manipulating learning objects. These quick grabs of information are non-linear, are varied in purpose, depth, shape and size and potentially indicate that today’s learners process information differently to the more traditional linear, structured learning objects of past years. Higher order thinking is an integral part of the synthesis of these quick grabs into a product.

Figure 3: The class created timeline of events of WW1



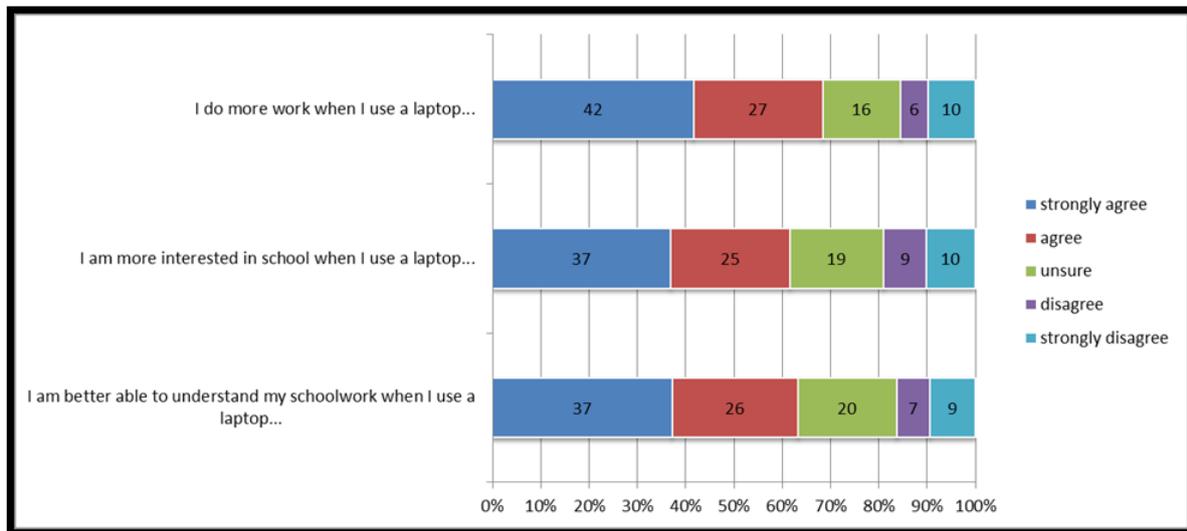
Compiling this timeline shown in Figure 3 was a task which required the students to research the information using at least three sources ordering those into a time sequence, analysing the effect on one incident on subsequent incidents and compiling the whole into a chronological product. The instructions given to the students, while clear, placed responsibility on them to locate, evaluate, and synthesize their results into a final product. The teacher’s role at this point was to orchestrate the proceedings rather than dominate them. The school implemented a strict internet policy which precluded the students from using social networking sites such as Facebook and Myspace and Youtube. Students had very little flexibility to use the laptops for any other purpose than school work-no administrator rights were given so that home printer drivers could not be installed, right click was disabled so that images could not be copied from the internet. Email was confined to teacher-student, student to student email communication was not permitted.

The students indicated a high level of confidence in the use of their laptops and in the effectiveness of the program. For them, despite the technical restrictions put in place over their use of many of the features of the laptops, which ensured that the laptops were for legitimate school use only, the program had been a success.

Overall, the survey of the Year 10 students indicated that students were satisfied with the assistance of the laptops. Of the 100 students who responded to the survey, 77 students felt that the laptop had assisted their learning to some or a significant degree.

The students confirmed the beginnings of transformative learning in that they are doing more, they are more interested and they are understanding better, and felt that they were editing more, are better organised and are producing better quality work.

Figure 4: The transformative nature of technology in the classroom



The boys continued to confirm the transformative nature of technology in that they were gathering data from many sources to solve problem, were using multiple mediums to produce learning artefacts, were creating digital documents, editing digital document and were choosing to use the laptops over traditional mediums such as textbooks.

As a transformative tool, the laptops have altered the manner in which the boys negotiate their academic world as they use technology to assist writing, to make choices of an academic nature and to complete their tasks

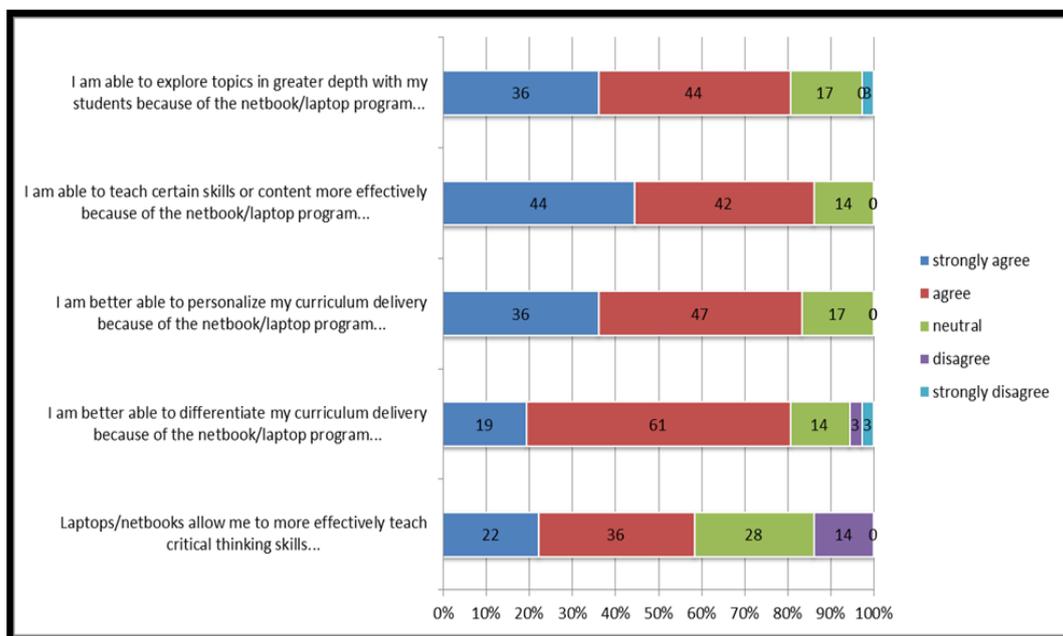
Teachers

In the same vein, those teachers who taught within the year levels in the program showed a high level of uptake of the technology. Although approximately half the teaching staff are not involved in the program, the confidence levels of teachers to use the laptop in the classroom is high. The activities they use their laptops for vary with many not yet showing a high confidence in using the laptops for instructional purposes. However, given that the laptop program has only been in place for 18 months and that not all year levels are involved in the program, the results in Figure at this point in time are understandable. Of the 100 teachers who responded to the survey, 63 said they were highly confident when using the laptop in the classroom, while the remaining 37 were fairly confident. The teachers overwhelmingly declared the 1:1 laptop program a success, with 90 teachers rating it as successful or highly successful, citing pedagogical improvement in their lessons or the responses of the students in their classes. The variety of skill levels is evident with some teachers experienced in blended learning and others being risk averse. There is widespread use of a variety of the easier options for example in the location of resources, there is widespread use of a range of websites and specialised search engines that have been provided by the teacher-librarian but as yet a

low level of use of the Scootle database – the National Resource Collection of digital curriculum resources aligned with the Australian National Curriculum.(2011)

Overall, there appears to be a high level of acceptance by teachers of the laptop program and the associated Bloom’s revised taxonomy, although there is at this point, a caveat. Figure 5 indicates that the majority of the teachers accept the value of the technology but at this point they want to be in control. They are partaking in some types of activities which allow students to work more effectively using the laptops. They are using the laptops as an efficiency tool but do not seem to have yet considered the pedagogy that would allow them to use the technology to build higher order thinking skills with the students.

Figure 5 – Teacher responses



There is evidence of an uptake of Bloom’s revised taxonomy of thinking skills being implemented and widespread evidence of some of the strategies, such as the graphic organisers developed for higher order thinking use by Frangenheim et al (2012), being used across the school. This may mirror the uptake of the digital resource uptake with the easier options being taken up first. Anecdotal evidence from student exclamations of “Not another double-bubble” suggest that this may be the case. There is a common terminology and language is evident throughout the school and pedagogical talk is in evidence in the staffrooms. Staff appear to be rising to the challenge, and are able to articulate their changes in both mindset and pedagogy.

- I have gone from “are my skills going to be good enough to implement this” to being an innovator.
- “Compared to colleagues in other schools, I am doing some really good things”
- “How am I using the skills in the classroom, for example, Rationale – they taught me”
- “The laptops have changed lesson plans, unit planning and assessments items”
- There are “so many more activities for those (classes) which have laptops”
- “Use of OneNote has changed the nature of curriculum planning”
- “Laptops changed the way people are doing things”

- “Understanding of myself as a teacher has changed”
- “Working through a unit is a journey, discovering new things together”

Such reflections are not widespread through the staff but have arisen from those staff members who chose to throw caution to the winds and embrace the use of laptops in the classroom. Those who have done so have been surprised by the suddenness and speed of change as the students themselves participate and take control of their own learning.

Results

The 1:1 project coupled with the introduction of Bloom’s revised taxonomy has produced marked changes in the way classes operate and in the way that units of work are written. The laptops have proven to be popular with the students, improve efficiency in the classroom, and when combined with a program which introduces pedagogical change have improved educational outcomes for students.

Future directions for this project will focus on continuation of the laptop rollout to Year 11 and 12 in 2013-14 and then to Years 5 and 6 in 2016. This will be met by the improvement of technical issues that have arisen within the school over the time period of the laptops and by an increased familiarity of the teaching staff with teaching critical and higher order thinking skills.

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