Helping or Hindering? Technology's Impact on Secondary Students' Self-Regulated Learning

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Abstract: This paper reports on a technology-related theme emerging from a doctoral study examining a whole-school approach to self-regulated learning. An in-depth case study of an Australian secondary school was used to explore approaches taken to developing self-regulated learners and the perceptions of the school community with respect to these approaches. As part of this study, students' and parents' perceptions of the impact of technology on self-regulated learning were examined. Findings indicated that while students were generally positive about the role of technology as a support to self-regulation, particularly for use as a research tool, many students reported that technology was often a distraction from their studies. These perceptions were also reflected in responses from parents. Educators need to address the concerns of students and parents providing support and strategies for maximizing technology as a learning tool as opposed to a negative influence on students' self-regulated learning.

Introduction

Zimmerman (2002) explains that self-regulated learning (SRL) relates to the degree to which students are metacognitively, motivationally, and behaviourally active participants in the learning process. There is widespread agreement that self-regulatory processes are an important factor influencing levels of student achievement (Zimmerman & Martinez-Pons, 1986, 1988). There is also consensus that self-regulation is not a specific personality trait that students either do or do not possess. Nor is it a mental ability or particular academic performance skill. Instead it is a selective use of strategies by which learners transform their mental processes into academic skills adapted to individual learning tasks (Zimmerman, 2002).

The focus of self-regulation research has been on defining and measuring SRL, and subsequently, exploring experimental targeted in-class interventions to foster SRL. However, there is little understanding of how, or indeed if, contemporary secondary schools are approaching SRL development from a broader whole-school perspective.

In Australia there is no nationwide 'self-regulated learning curriculum' or a policy on how schools should approach the development of self-regulation skills. The Australian Government Department of Education, Employment and Workplace Relations website covering school education states "Australia's future depends on a high quality and dynamic school education system to provide students with foundation skills, values, knowledge and understanding necessary for lifelong learning, employment and full participation in society" (Commonwealth of Australia, 2010). However, foundation skills are not defined and, while there are policies for Numeracy and Literacy, 'learning-to-learn' or self-regulation skills are not addressed. As there is not a consistent policy in Australian secondary schools towards the development of these skills, approaches taken by schools vary widely with a notable lack of school-wide procedures. This means that there is no guarantee that the needs of students who enter secondary schools without the necessary 'learning-to-learn' skills will be met. Zimmerman (2002) discusses the increased demands facing students in high school and states "many students respond to these increasing demands for self-regulation by adopting effective learning strategies, but a significant number of students do not adopt them" (p.3).

Technology and Self-Regulated Learning

SRL has been described as one of the key competencies contributing to maintaining life-long learning skills (EU Council, 2002). Almost two decades ago, Weinstein (1996) raised the point that self-regulation is becoming

increasingly important as we move towards technologically driven self-directed learning environments where greater amounts of autonomous learning are necessary. There has been much exploration into the changing nature of the skills needed for students to achieve their academic potential at school given modern curriculum changes, new understandings about the learning process, and the increasing use of technology for learning both at school and home (Palfrey & Gasser, 2009). Anderson and Balsamo (2007) advocate that today's students "require new literacies: cultural, technological, social, and epistemological" (p.245). This suggests that the self-regulated learning strategies needed by today's students may be different from the traditional skills focused on in previous decades.

Anderson and Balsamo (2007) paint a picture of a possible 2020 classroom and pose the question: "How should these institutions change to address this generational disposition?" (p.245). For example, the skills needed to be 'organized' will be very different for a student using papers and folders, as opposed to a student now using a laptop or tablet for their notes. This leads to the question as to whether current approaches to meeting the needs of students as self-regulated learners are still valid.

Previous thinking was that the nature of a self-regulated learner was essentially solitary. Entwistle and McCune (2004) explain that much greater prominence is now being given to collaboration, particularly using Web 2.0 technologies. Indeed, Sharples, Taylor and Vavoula (2007) see education in the mobile age as a way to extend the support of learning beyond the boundaries of the classroom.

Challenges faced by students have also undergone transformation. The incompatibility of (modern) achievement values and (post-modern) well-being values in a post-industrialized society, and the limited opportunities for students to integrate these values (Fries & Dietze, 2007), result in increasing conflicts for students: to do schoolwork or engage in leisure activities. With a wider range of potential distractions available, as well as less parental supervision and control, well-developed self-regulation skills are vital for this generation.

The Study

This doctoral study explores, through the lens of SRL, the whole-school approach of an Australian secondary school to improving student learning outcomes. The study examines stakeholders' attitudes, beliefs, and experiences of SRL in contemporary secondary education and analyzes the role of the school in developing self-regulated learners. The main research questions were:

1. How can secondary schools embrace a whole-school practice approach to developing self-regulated learners?
2. What can we learn from stakeholders' attitudes, beliefs, experiences and perceptions around the development of SRL?
3. How is technology impacting students' self-regulated learning skills development?

This paper focuses on data addressing research question 3.

A social cognitive perspective was deemed to be appropriate for this research, underpinned by Bandura's (1986) view of SRL as a triadic model of personal, behavioral and environmental processes. Secondary school settings provide a suitable social learning environment for investigating these processes.

A mixed-methods methodological approach was used in this interpretive study. This approach allowed the school strategies and attitudes to SRL development to be examined in context, leading to a richer, deeper understanding of the phenomena (Denzin & Lincoln, 2005) while also benefiting from the insights available from quantitative analysis.

Data was obtained across two phases. Phase 1 was an initial online survey of Years 7-12 schools in the Sydney metro region to aid in preliminary data collection and to facilitate case selection. Findings relating to the data obtained by the 54 schools that completed the Phase 1 online survey are reported in Salter (2012). Phase 2 was a case study and the focus of this paper. The case school was selected as a purposeful sample (Patton, 2002) due to the interesting and proactive approaches taken by the school to fostering SRL.

To obtain multiple perceptions and verify interpretations (Stake, 2005), the case study research for Phase 2 used the following methods: online questionnaires for students, parents and teachers, semi-structured interviews of teachers and school executives, observations and document gathering. The data collection was spread across the 2012 school year in order to allow time to incrementally analyze the data and let each stage inform the next (Merriam, 2009). Data was analyzed thematically.

This paper focuses on findings emerging from analysis of the Phase 2 case study online survey data, exploring student and parent perceptions of how technology is impacting the area of SRL. From a student body of 950, 256 (27%) students (age range 12-18) voluntarily completed the online anonymous survey of five open-ended

questions and 59 parents also participated. As part of this 5 item online survey, participants were asked: "How do you think technology is impacting the area of self-regulated learning?". A pilot survey was implemented to test the rigor of the survey instruments and feedback led to the following explanation being added to this question: "Some of the areas to consider might be: Is technology changing the skills needed for students to be self-regulated learners? Can technology be used to support the development of self-regulated learning skills? Is technology impacting on any other areas of self-regulated learning for students?".

Case Background

Students at this co-educational school have traditionally been perceived by teachers as having low self-efficacy and low motivation for their academic studies. Six years ago a new Principal began to instigate widespread changes across the school. For the first time in 2011, the school reached State average in their overall Year 12 Higher School Certificate results and teachers are noticing positive changes in student approaches to learning.

In terms of technology the school has around 600 Mac laptops (for a student body of 950) with laptops being assigned to teachers who then use them with their classes. In addition to this many students bring their own laptop or tablet to school. While a number of teachers have embraced technology in their classroom with, for example, the creation of Apps, exploring iBook authoring, or the use of Wikis or robotics work, many have not or are using technology in more traditional ways such as Powerpoint presentations. The school overall is becoming more relaxed and accepting of the use of personal devices, for example allowing students to take photos of the board with their phone in class. All teachers have had to become competent in the use of Engrade, an online database where parents and students can see student markbooks, comments and attendance information. Engrade also acts as a learning management system, with chat and email facilities that students and parents can use to contact teachers.

Findings

Findings emerging from analysis of the online survey data demonstrated that while the majority of the student and parent respondents expressed positive perceptions of the impact of technology on SRL, students are not leveraging technology to its potential as a learning tool. The majority of students viewed the impact of technology as a speedier and more convenient research tool, with few students taking advantage of the opportunities available in existing and emerging technologies for communication and new approaches to studying. Students and parents were concerned about how much of a distraction from studies technology had proven to be, while parents also had a myriad of other concerns from the loss of handwriting skills to technology dependence. By understanding student and parent perspectives, educators can provide the support needed to ensure students can make informed decisions about their technology use as a learning tool.

Students' Perceptions of the Impact of Technology on SRL

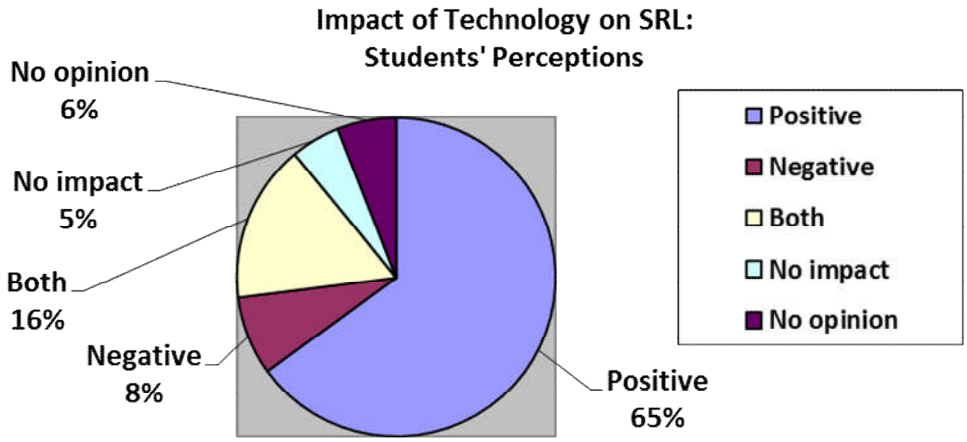

Figure 1: Students' perceptions of the impact of technology on SRL

Of the 256 students who responded to the survey, 65% expressed only positive viewpoints on the way technology was impacting on them as self-regulated learners, while 8% outlined only negative impacts. A number of students could see both sides with 16% expressing both positive and negative responses. A small number, 5% only, stated they did not believe technology has any impact on the area of SRL. The remainder, 6%, did not express an opinion.

Students' Perceptions of Negative Impacts

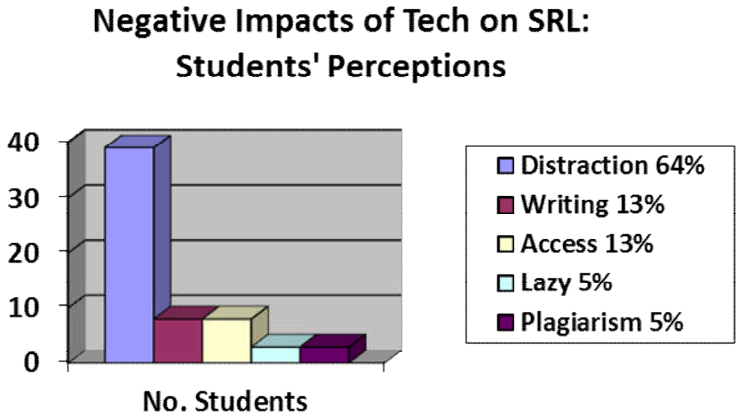

Figure 2: Students' perceptions of the negative impact of technology on SRL

There was a range of reasons expressed as to why students believed that technology was having a negative impact on the area of SRL, however common themes emerged. A few students (5% of the negative responses) stated that technology "is making me lazy". Other students (5% of the negative responses) raised the issue of plagiarism, explaining that "some students just 'copy and paste' rather than putting it in their own words". Some students (13% of the negative responses) were concerned about the inequity that could arise due to unavailability of technology for all students or students with poor technological skills. Two typical responses were: "These days if you don't have the Internet you are at a huge disadvantage" and "some students are not confident in using technology". A student explained that submitting work online "can be daunting for others if they are not tech savvy" and "problems always occur with sending and compatibility with other computers".

The effect on handwriting skills was a concern raised by a number of students (13% of the negative responses). The loss of handwriting skills was seen to be an issue for the external examinations in the final year of school. Students saw handwriting skills to be critical, ensuring they can write neatly and quickly for the examinations that contribute to their university entrance rank. One student explained: "Many have become dependent on technology way too much, which is impacting on their writing skills, spelling, grammar, punctuation and research skills". Another student pointed out the shorthand text abbreviations used by students, viewing this as detrimental to their writing skills. Zimmerman (2002) explains that self-regulated learners select and create environments to optimize learning, and from these student responses it seems students see handwriting skills as an important component of the learning environment.

Despite this range of concerns, the overwhelming response (64% of the negative responses) indicated that technology was perceived as a distraction from students' studies, making it challenging for students to work effectively as self-regulated learners. While many students simply stated blankly that technology was a major distraction (often with added emphasis!), some students discussed their addiction to technology and how it was preventing them from concentrating and focusing on their work, both at school and in the classroom. For example, one student explained: "Students only think about technology". Social networking was frequently mentioned as leading to procrastination and students moving off task: "It is affecting our marks because of Facebook" and "technology does impact my learning as social networking websites have become an addiction to the routine of someone in my age group". The school's policy of blocking Facebook on the school network was pointed out by one respondent to be helping students who abuse technology. There was an awareness that it was not inherently technology or the "limitless amounts of entertainment and leisure activities" available on the Internet that was the issue. It was interesting that one student had the maturity to observe that whether technology has a negative impact

on SRL "depends on the students and their personal motivation". The following response captures the predominant feeling of a number of the students:

> For me personally, and I'll be honest, technology has gotten in the way of my learning at school. Sometimes I don't get to do my homework or assignments until later on because technology has greatly distracted me. It's a hinder and a blessing in one, to be honest.

Students' Perceptions of Positive Impacts

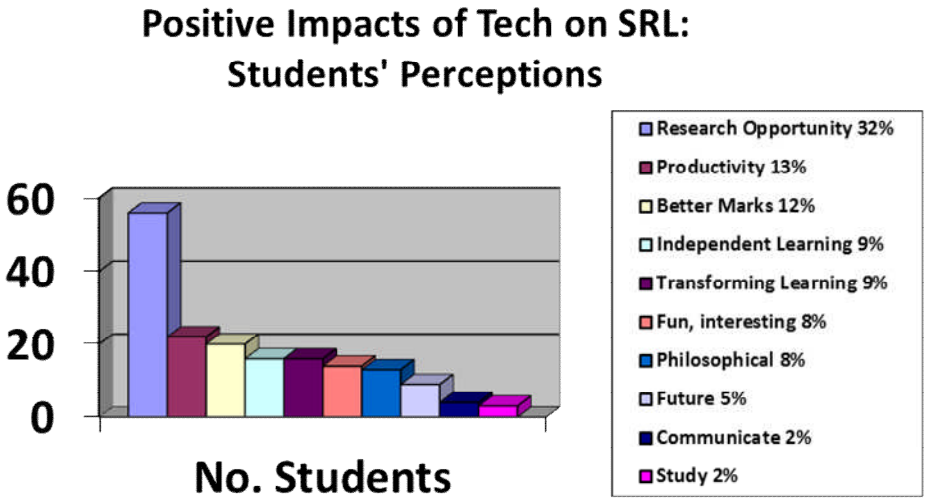

Figure 3: Students' perceptions of the positive impact of technology on SRL

Despite the strong evidence that many students struggled with the distracting elements of technology, the positive responses told a different story:

> I believe that the use of technology has had a good effect on me personally because I find myself working much better. The teachers may have noticed that technology is keeping a lot of the students more on task most of the time.

Yet another student could see the opportunities to become a more self-regulated learner: "By learning to ignore such distractions, most notably Facebook, I believe one builds a stronger self-regulating learning routine in turn benefiting one in the long run".

'Ease of research' and 'timely access to information' were commonly reported benefits (32% of the positive responses). One student explained: "Technology allows us to have better access to information that in turn will help speed up the process of learning, communicating and sharing".

Students looked beyond the compulsory work for school, viewing technology as allowing them to access further knowledge on topics of interest: "The Internet if used correctly can be a big asset of our daily learning. It allows us to seek more in-depth explanations and knowledge". Without technology, this research would be more difficult and time-consuming, likely requiring a trip to the library, and thus, most likely, not undertaken. One student explained a perceived benefit: "Technology allows us to research our own topics independently allowing us to scout our own information".

The ability to work independently with technology was only a minor theme (9% of the positive responses) with students explaining "it teaches us to learn for ourselves and to become more independent". Students liked that they could discover and learn on their own "without the teacher spoon-feeding you", encouraging students to "develop work in our own way". They also liked the flexibility, students could "continue learning within our homes" and use it wherever they were with minimal assistance. One student pointed out that "much of the classwork is going online which is good as it can be easily accessed at home at any given time".

The value to productivity was also highlighted (13% of the positive responses), with students citing the speed and ease at which they could retrieve information and also use technology to be more organized, for example

putting due dates into their phone. One student observed: “Technology is impacting SRL because our generation does heavily rely on it to keep us updated and remind us about certain things”.

Surprisingly few students (8% of the positive responses) mentioned the value of technology was that it was fun or engaging or more interesting. It seems students can look beyond technology as a toy and see the value for learning. Most responses indicated that the value of technology being ‘fun’ was that “the use of laptops and projectors have made learning easier and transformed from a boring way to a fun and more practical way” keeping students interested in what they were learning.

A smaller number of students (5% of the positive responses) were aware of the possible benefits in their future of mastering present day technology with one student explaining the benefits: “Learning how to work through a new set of skills which will benefit us in the future”. Students viewed the use of technology as training them for skills they may need later in life or in the workplace explaining: “It is helping us keep up with the developing world and allows us to expand our horizons to see more”.

Students also recognized that technology had transformed the way they experience their classes at school, for example: “Teachers are able to broaden their teaching activities”. Videos and images and interactive activities were given as examples of ways students could now better understand what is being taught or gain a different perspective on concepts. There were a number of comments (9% of the positive responses) indicating that technology “has changed the learning environment at our school”.

While a number of students (12% of the positive responses) referred to technology as helping them get better marks, there was no explanation as to how technology was providing this benefit. Perhaps students simply assumed it was obvious and no explanation necessary? Interestingly a few students stated it would decrease marks (due to being a distraction).

Unexpectedly few students (2% of the positive responses) mentioned the benefits of technology as a communication tool allowing them to find assistance if they need it. One student mentioned that “it is giving students the option to contact friends about work” but none of the students discussed contacting teachers, despite there being an online mechanism in place at this school (Engrade) to allow students to do so. Similarly only a few students (2% of the positive responses) mentioned that they now use technology to help them study for a test “we now can use our laptop at lunch time to study for up-coming tests”.

Some students (8% of the positive responses) answered the question with statements about their belief around the role of technology, for example: “Technology is not changing the skills I need, it helps me to improve on my skills by being another way to learn things” and “technology allows people to present their work in new, creative ways and also to learn in new ways”.

While many could see both positive and negative aspects, the majority of students had firm and decided opinions. There were only a small number of students who seemed indifferent in their opinions.

Parents’ Perceptions of the Impact of Technology on SRL

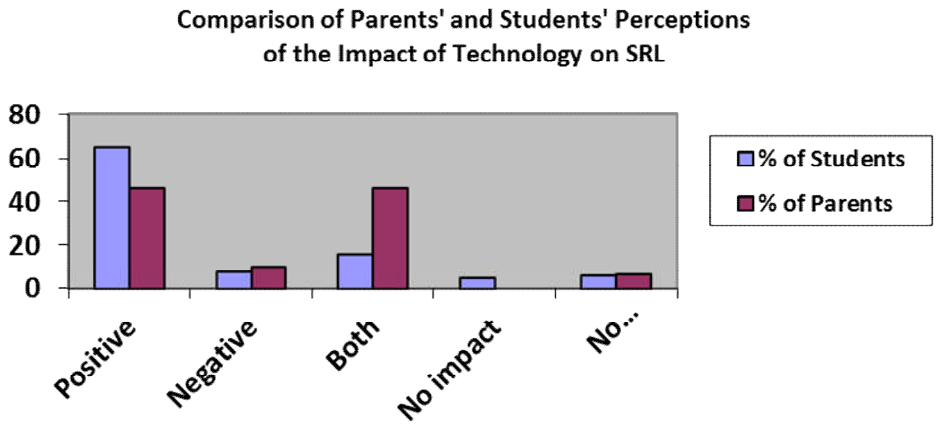

Figure 4: Comparison of parents’ and students’ perceptions of the impact of technology on SRL

A similar percentage of parents, 10%, (compared to 8% of students) expressed reservations that technology was having a negative impact on SRL, while 46% (compared to 65% of students) expressed a positive view and 7% of parents either did not express a view or stated that they did not know (“absolutely no idea”). Over double of the

parents 37% (compared to 16% of students) could see both positive and negative impacts. While most students had a definite opinion, parents were often unsure or divided in their opinion of the impact of technology on SRL, and more able to see both sides of the issue, for example one parent stated: "The use of technology in the educational system is a double edged sword".

Parents' Perceptions of Negative Impacts

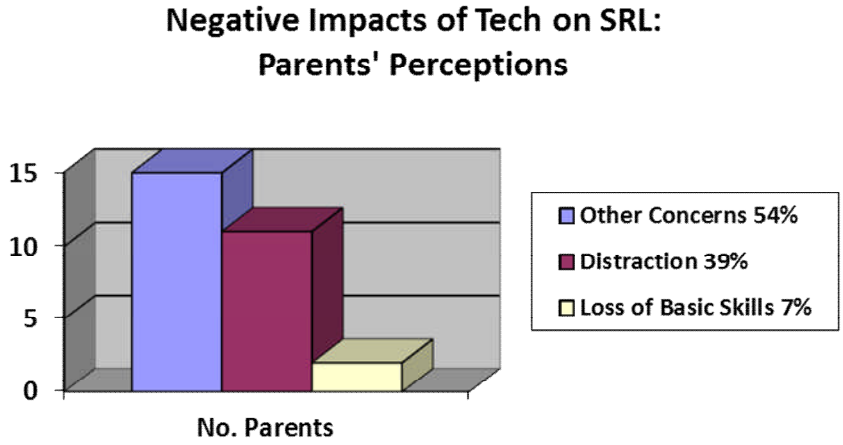

Figure 5: Parents' perceptions of the negative impact of technology on SRL

The following response captures the feelings of a number of parents who responded: "As much as I love technology, I also fear what technology could do to our children".

Parents definitely had a number of concerns around the use of technology as a tool to support students as self-regulated learners. The feeling that technology was making it difficult for students to be self-regulated learners as it was proving to be a distraction was an issue for over double the percentage of parents as compared to students (39% of negative parent responses compared to 15% of negative student responses). Parents had found that technology was a "hindrance to maintaining focus", students tended to stray off task with one parent explaining:

> Sometimes the student will be side-tracked whilst on technology and not much learning is achieved. I also find that it is taking a lot longer to complete tasks as friends are contacting without my knowledge while it is study time.

Parents seemed at a loss to know how to manage this situation: "Students are spending more time in Facebook and other social network sites. School/Parent need to have some guidelines on how to use these sites productively or limit their use".

While students focused on the loss of handwriting skills, this was just one of what parents referred to as "basic skills" that parents were concerned are being lost. A number of parents (7% of the negative responses) were concerned that technology use was impacting negatively on more traditional skills such as spelling while other parents were concerned about the impact on areas such as creativity: "I think technology could reduce a student's ability to create original thoughts and apply them in writing".

With the student responses there were a limited range of concerns emerging, however the parents raised a widespread set of issues. For example, the ease of access to information. As mentioned by students, parents were concerned this would make students lazy, that it "inhibits or stifles the get-up-and-go to meet and discover the practical reality of learning as an experience". Technology and in particular the internet was seen to be a band-aid solution by students with respect to their research needs: "Google makes finding information simple and "cut/paste" is just too easy to do and doesn't help students absorb information". The issue was raised that students sometimes just grab an answer off the web, without doing background readings to gain an insight into the topic.

Other areas of negative impact discussed were pitfalls regarding anonymity, privacy and discretion, the expense, reduced interaction between students and teachers, dependence on technology and lack of resilience when technology fails, lack of scaffolding for technology use, student perception of technology as a toy rather than a tool,

constant changes and difficulty in keeping up, over-reliance on what is just one of many different tools – all of these concerns were raised.

Parents' Perceptions of Positive Impacts

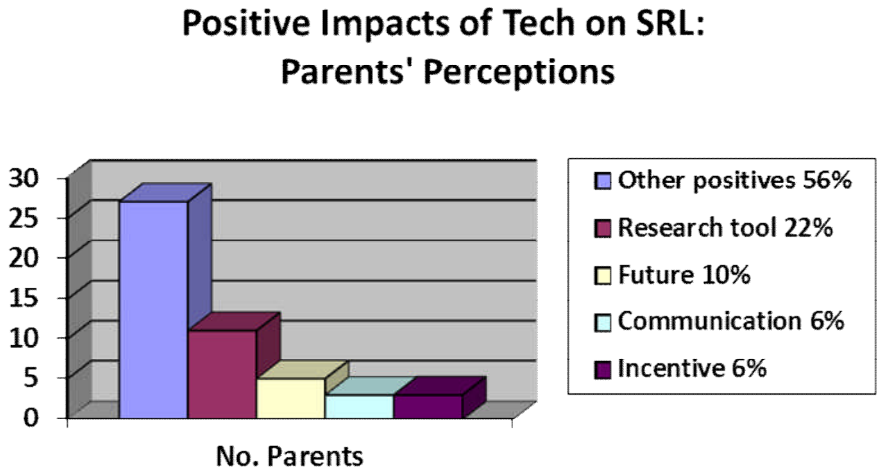

Figure 6: Parents' perceptions of the positive impact of technology on SRL

As with the students, the main advantage of technology for SRL was seen to be as a research tool (cited by 22% of positive parent responses and 32% of positive student responses). While students focused more on the ease of use and speed of accessing research materials, parents also pointed out the advantage of having current information, a contrast for some maybe to the days of printed encyclopedias, and perhaps something taken for granted by students. A number of parents also pointed out that the Internet allows students access to multiple sources of information, allowing them a wider scope to their research.

Like the students, parents (10% of the positive responses) also pointed out the importance of students being kept up-to-date with technological skills they may need in the future. There was also satisfaction in making communication easier (6% of the positive responses) and in particular the introduction of Engrade which allows parents to stay informed about their student's progress: "Engrade is our online service for parents and students to check their progress in class. Students can self-assess and ask for help from teachers if needed with the click of a button".

A few parents (6% of the positive responses) discussed how technology gave students a greater incentive to learn: "it is making the students a lot more independent…working with technology seems to make them want to learn…they enjoy using computers". One parent commented that "I love how technology is used, I love how the students can be creative with schoolwork".

Other positive impacts were giving students equal opportunity to learn, reducing the amount of textbooks they need to carry to school, making planning easier and allowing students to support each other through Facebook.

Discussion and Conclusions

The majority of students and parents at this school see technology as a tool to empower self-regulated learners, with the ease of access to information in a time and manner of their choosing. This in turn enhances student perceptions of self-control and efficacy, building positive self-perceptions that contribute to the motivational basis for self-regulation during learning.

The use of technology to assist in research was widely overshadowed by those who cited the principal benefit was that technology was purely for 'fun'. Students appreciated the opportunities for research and acknowledged that the speed and ease of use led to individual investigations beyond the limits of the curriculum. Anderson and Balsamo (2007) refer to the concept of 'just-in-time' learners. Past experiences have given these students the confidence that when they need to spontaneously locate information, they will find it. The findings

demonstrate that technology has assisted these students to become more self-regulated in their learning, despite the challenges technology may also present.

While it is encouraging to see some students espousing many of the perceived benefits of technology that educators have long aimed for, such as the ability to work independently, it was surprising that a larger number of students did not articulate this in their responses.

Despite the overwhelmingly positive perception of the role of technology in SRL, there were a number of concerns raised in this study. The loss of handwriting skills will continue to be of concern while students need to take pen and paper examinations that determine their university entrance possibilities. Educators need plans in place to ensure handwriting issues are addressed and that these plans are communicated to the parent body to alleviate parental concerns. Equitable access to technology is also an issue that some schools may need to address.

It is clear that students need more assistance in developing strategies to manage the balance between technology used for school work, and technology used for social purposes. While the lines between these may be blurring (students using Facebook to ask friends a question about an assignment), the data reveals that many students are struggling to control their addiction to certain forms of technology: from Facebook, to gaming, to simple web surfing. Ebner, Nagler and Schön (2012) found that students of today are more addicted than ever to Web technologies. Parents are at a loss as to how to manage this issue. As this is something that is happening outside of school hours, it is an area that does not tend to be addressed by educators. In order to help students become more self-regulated in their learning, we need to provide our students with practical support in how to deal with technological distractions (Palfrey & Gasser, 2009).

The research also highlighted areas where the school has an opportunity to further develop students' use of technology in underutilized areas, for example, as a study tool and/or a communication tool. Charsky et.al (2009) explain that even millennials need training in how to use technology as a communication tool that can facilitate teamwork.

As reported elsewhere (Salter, 2012), Phase 1 of this study identified four common approaches across schools taken to developing SRL: explicit teaching in welfare programs, curriculum integration, use of mentors, and a technological approach. However the use of technology-mediated processes focused only on the school intranet, class portal, or Moodle as a tool for helping students become self-regulated. The findings emerging from analysis of the Phase 2 case study online survey data, outlined in this paper, demonstrate that schools need to educate students about ways to use technology (as a learning and communication tool), and manage technology (when it proves to be a distraction), to further foster SRL. Perhaps educators have not seen the need to provide this guidance due to now questionable assumptions of the net generation as technically savvy digital natives (Bennett, Maton & Kervin, 2008). However this research indicates that students are not necessarily using technology in such diverse and innovative ways as might be expected. Empowering students towards a broader engagement with technology will play an important role in a whole-school approach or framework to developing SRL.

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