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Promoting Self-Regulated Learning: the potential of PebblePad+ as a holistic tool for education

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Abstract:

The focus for this article is on the use of Information and Communications Technology to facilitate Self-Regulated Learning and reflection on professional practice through an e-portfolio diary/journal system. PP+ is a third generation e-portfolio development of software initially developed at the University of Wolverhampton in England. PebblePad+ is a transferable e-portfolio system that enables students to track their own professional competences and development over the length of their academic and professional career, as well as supporting their wider learning. It has been adopted in a variety of educational and industrial contexts both in the United Kingdom and Australia. This article will be of particular interest to those educationalists that recognise the importance of reflection in building powerful cognitive structures through Self-Regulated Learning, as well as the potential benefits of using Information and Communication Technology to create an e-portfolio of a student's academic and professional achievements.

Introduction:

This paper is concerned with reporting on the utility of PebblePad+ (PP+) as a developmental tool for self-regulated learning (SRL) and professional practice. PP+ is an evolution of a personal learning and assessment system named as 'PebblePad' and developed by the University of Wolverhampton in the United Kingdom. In the past decade, PP+, and its earlier versions, has developed into a versatile tool for Higher Education, schools and professional bodies. In addition to being an e-portfolio system that is capable to recording notes, it offers the user the capability to submit, and receive feedback on, assessments through a secure network, as well as documenting a life-time of professional training. PP+ can be linked to a variety of software packages, such as Blackboard and Moodle, and to a variety of students' web 2.0 tools to provide a curriculum delivery system. It also has the facility to enable teachers to use it as an analytical tool in order to assess students' performance and generate reports. In short, it has the potential of being a holistic tool for contemporary education. This paper will consider how PP+ could be utilised effectively in relation to four key aspects of SRL: as tool to promote motivation, to set targets; to encourage reflection; and to address the issue of self-efficacy.

Literature review

An overview of SRL literature: The theoretical backdrop to pedagogical issues

The concept, and application, of SRL theory has been approached from a variety of perspectives by researchers. As Boekaerts (1999: 445) acknowledges, self-regulated learning has been informed by writing on learning styles, students' metacognition, and theories of the self. Schunk (2005) refers to Pintrich's definition of SRL in providing an overview of the concept and practice:

An active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behaviour, guided and constrained by their goals and the contextual features in the environment.

SRL places the student at the centre of the learning process and, in doing so, devolves the responsibility for learning onto the student. Research identifies those students who respond positively to a teaching and learning environment predicated on the ideals of SRL as more likely to achieve highly, enjoy studying, and develop life-long learning skills (Wolters, 1998; Zimmerman, 1989; Pintrich and De Groot, 1990; Schunk and Zimmerman, 1994).

It is clear from the literature on SRL, that motivation is viewed as a central issue for researchers and work has tended to focus on the traditional discussion of intrinsic (inherent subject interest) and extrinsic (relationship with teacher) forms of motivation, to explore more specific issues such as the impact such as personal ideals, values and goals, as well as the impact of others, on outcomes. Much of

SRL research is drawn from social constructivist psychology and social constructionist educational theory that considers the role and impact of others in supporting learning- an early example of which is Dewey (1916), and Vygotsky (1936/1984) and his model of the Zone of Proximal Development. For Thoonen *et al.* (2011), motivation incorporates additional three components beyond a general orientation and students' intrinsic/extrinsic drives: these are value, expectancy and affective components. In short, students are regarded as being more motivated to learn where they see a clear benefit from the completion of the task, expect to achieve highly and enjoy their learning.

The notion that targets can be set, managed and their outcomes evaluated is a second major concept associated with self-regulated learning. Sheldon and Elliot (1998) have reported that those students who are more aware of their targets tend to be more effective as self-regulated learners. However, there are weaknesses associated with institutionalised and imposed goal-setting, that must be recognised. Kuhl (1984) reported that although most students started out on a task with commitment, this level of enthusiasm often fell away when confronted with alternatives to study. Students, who are self-aware, may reflect on their progress over a range of tasks and adjust their behaviours in light of their evaluation. Boekaerts (1999) identified a range of motivational controls and volition controls that were subject to change in light of students' reflection. Such a view suggests that motivation is a nexus of complex processes and far more complicated than behaviourist thinkers had originally alluded to.

The impact of reflection in students' learning is a key constituent theme within SRL theory. As Boekaerts (1999: 452) acknowledges, 'students who are meta-cognitively aware of the choices they make and are knowledgeable about how to invest resources to attain a learning goal may, nevertheless, not be willing to invest the necessary resources to regulate their learning in certain contexts. For Zimmerman (1989), self-regulated learning can be defined in terms of a learning model with three phases: forethought, performance and self-reflection. Although the idea of students' control over their learning strategy is central to SRL, metacognition is more important as learning is the product of this iterative reflective cycle. For Zimmerman (1989), this process of self-reflection involves reacting to, observing and judging the learning experience. Boekaerts and Cascallar (2006) have reported that some students adopt a 'maladaptive' position that inhibit their progress and have suggested that students learn to modify their level of motivation and choice of learning strategy in order to maximise their level of achievement. For many students, better time-management may address this issue quite effectively, but for some others, a form of structured support may be required.

Another major theme within the discourse of SRL relates to the importance of self-efficacy- also known as 'academic self-concept' (Rodriguez, 2009). The idea of self-efficacy or academic self-concept is integral to this process of metacognition as students reflect on their learning experience (Baeten *et al.* 2010; Rodriguez, 2009). In part, self-efficacy is as Zimmerman (1998) recognises a consequence of interaction with others and their feedback. For the most part, however, self-efficacy is related to the psychological state of a student, their experiences of learning over their entire educational career, and most importantly, their record of achievements. The implications are clear for teachers. Building-up a student's self-efficacy is a life-long process, as is learning, although Zimmerman (1998) considers that self-efficacy is most closely tied to their most recent results. The importance of constructive feedback becomes ever more important given the cyclical nature of feedback as a reinforcement of self-image.

According to Boekaerts (1999: 453), 'many researchers and educators do not realise there is a bidirectional relationship between learning environment and SRL'; that is 'self-regulatory skills should be viewed as propaedeutic to learning in the context of a powerful learning environment'. It is clear that Boekaerts (1999) conceptualises learning as a dynamic state of interaction and mutual reinforcement between the student and their environment. Moreover, for Entwistle *et al.* (2002: 5) 'it is students' perceptions of the teaching and assessment procedures, rather than the methods themselves, that affect student learning most directly'. As a consequence of this observation, Entwistle *et al.* (2002: 9) have called for a 'constructive alignment' of the student's learning journey, so that 'all the components of the teaching-learning environment work together as a system designed to encourage a deep approach to learning'. In a sense, Entwistle *et al.* (2002) advocated an integrated model of learning that involved both internal and external regulation of students learning. How this end-goal is achieved is problematic but Entwistle *et al.* (2002) argue that a major step forward would be the reform of the curriculum to encourage cognitive development and deeper forms of learning. For example, De Corte

(1995) called for the creation of new forms of learning materials, greater emphasis on teaching that promotes reflection and consistent self-monitoring by students.

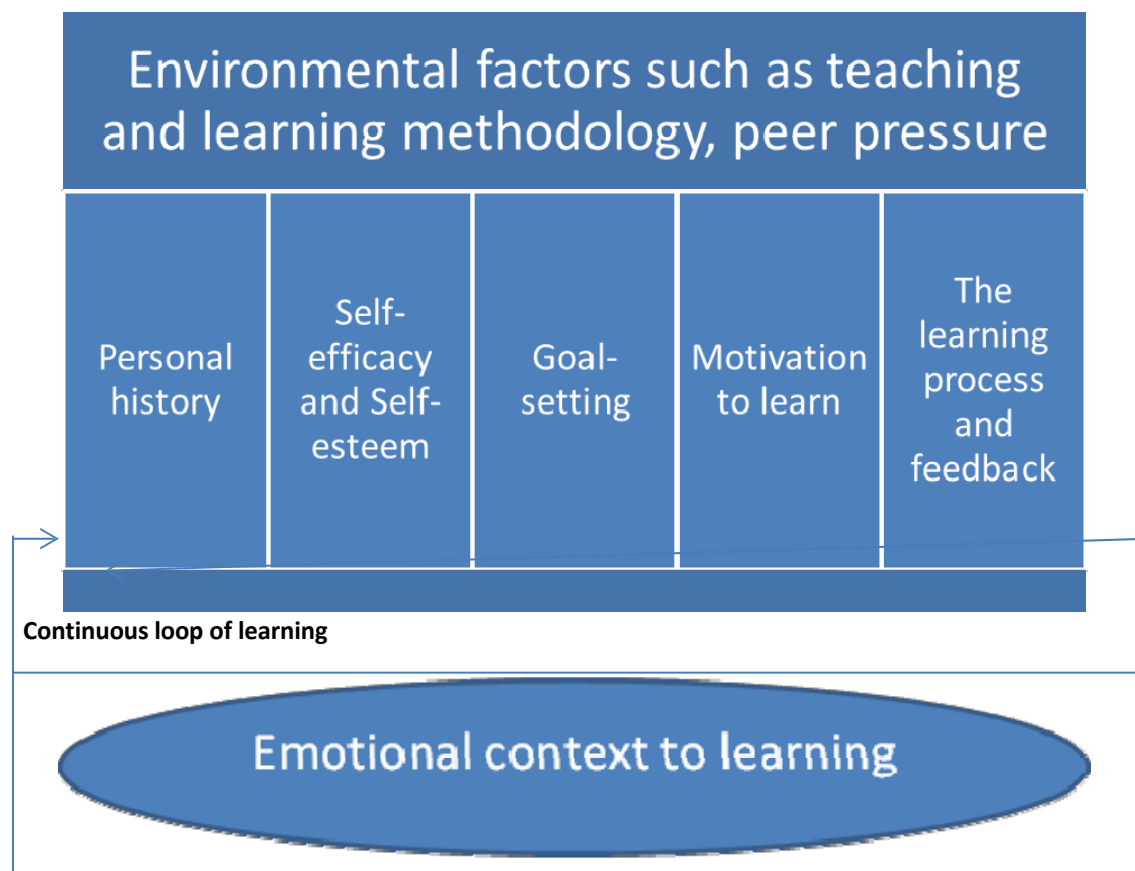


Figure 1. A summary representation of Self-Regulated Learning

SRL applied: critical reflection and professional development

One of the prime responsibilities of an educator is to help students get some form of perspective of where they are in their learning journey and career development. One common theme that has emerged from the literature on reflection is that critical thinking is part of the reflective process. For Black and Plowright (2010: 246), the benefits of reflection are clear:

Reflection is the process of engaging with learning and/or professional practice that provides an opportunity to critically analyse and evaluate that learning or practice. The purpose is to develop professional knowledge, understanding and practice that incorporate a deeper form of learning which is transformational in nature and is empowering, enlightening and ultimately emancipatory. Whereas Harrison *et al* (2003: 138) offer this interpretation of reflective learning:

The ability to reflect on action or observation and respond. Learning through reflection is an important skill, which enables students to progress and improve the quality of their learning experience. A reflective learner monitors, manages and action plans his/her learning effectively.

So, we should anticipate that those students who reflect on their learning are not only more likely to be 'deeper' learners, but active managers of their learning and professional development.

The discourse on reflective learning should not be restricted to school or university students, as it is all too often appear to be in the literature. In their study of mature entrepreneurs, Cope and Watts (2000) highlight the importance of reflective learning in response to critical incidents encountered during the history of a business. Citing the research of Burgoyne and Hodgson (1983), Cope and Watts (2000: 106) identify three forms of learning. Firstly, learning which is little more than the assimilation of facts, which would correspond to the idea of superficial or single-loop learning Secondly, learning information that is

transferable to other contexts and, thirdly, learning that is transformative and that corresponds to double-loop learning (Argyris and Schon, 1978). It is the third form of learning that is crucial for meaningful progress as it infers a higher level of critical analysis and problem-solving skills. Importantly, as Cope and Watts (2000: 107 and 117) recognise: ‘for many entrepreneurs, the articulation of this learning process may be very difficult particularly as they may be very unused to reflecting explicitly.... [But] there is a compelling need for them to develop the attributes of the reflective practitioner’. In a study of adult learners, Cox (2005) refers to the research of Seagraves *et al.* (1996) that differentiated between learning for work, learning at work, and learning through work. In highlighting the importance of work-based learning, Cox (2005) moves the discussion of reflective learning away from the philosophical work of Dewey (1916) and Habermas [1981]/(1984), [1981]/(1987) and towards the practitioner-oriented research of Argyris and Schön (1978) and Kolb (1975 and 1984). In learning through work, not only do managers become more skilled, they understand how they may develop further as expert practitioners.

The benefits of a reflective diary to learning are widely recognised (Thorpe, 2004; Roberts, 2009; Black and Plowright, 2010; Dymont and O’Connell, 2011). For Richardson and Maltby (1995:235):

The exercise of diary writing is seen to promote both the qualities required for reflection, i.e. open-mindedness and motivation, and also the skills, self-awareness, description and observation, critical analysis and problem-solving, synthesis and evaluation.

Moreover, for Dymont and O’Connell (2011: 82):

Through the reflective practice of journal writing, university students can begin to contextualise their experiences in terms of the relationship of these experiences to their current academic and future professional life.

It is clear that the benefits of diaries/journals as a means of professional reflection are widely accepted and in daily use. In the United Kingdom, for example, both the Royal Pharmaceutical Society of Great Britain and the Royal Institute of British Architects requires that training practitioners maintain a professional reflective diary. The use of professional diaries has, however, been pioneered in the Nursing profession where the emotional and practical benefits of reflection are recognised as particularly beneficial. Smith and Tillma (2003) classify reflective diaries into four categories of portfolio, as dossiers of achievement, for training purposes, for reflection and personal development. Importantly, we should differentiate between the portfolio being a product and a process (Orland-Barak, 2005). When we focus on the idea of the portfolio being a process, then it becomes a much more powerful tool for learning.

Research methodology:

This research methodology corresponded to a form of ‘worker-led’ action research (Kincheloe and McLaren, 1998), and its merits and demerits should be viewed in this context. The primary goal for the research was to improve professional practice, and for Easterby-Smith *et al.* (2002: 10): action learning is not so much a research approach, but more of an educational process’. The research for this paper was undertaken in a number of stages. The first stage involved Internet research to ascertain the functionality of PP+. In addition to accessing the propriety site for PP+, a number of university sites were explored to see how the software had been utilised by Higher Education. It was clear from the exploration of university websites that PP+ was already in place and being used for a range of purposes. Once the functionality of the software was established, it was possible to engage with the academic literature on e-portfolios, and reflective learning. There is already a corpus of work dedicated to e-portfolios and their educational benefits. In this sense, the value of this paper is in contributing to the growing consensus that is associated with this technological development. A second limitation of the paper is the relatively small number of participants involved in the primary research sample, who were drawn from one school and one university. In future research, more extensive research should be undertaken either across a sector, such as a range of secondary schools or a number of universities. Nevertheless, despite these limitations, the research did serve to highlight the potential uses of this learning technology.

The second stage of the research involved a series of open-ended discussions with a variety of educational professionals who had used PP+. The key informant was an IT support officer at a university who was not only able to clarify the functional capability of the software but also explain how PP+ had been applied across the university. In this respect, this informant was able to provide a perspective that could only have been achieved by interviewing a larger number of participants. This discussion was deliberately open-ended, as recommended by Revans (1980) in order to enable the informant to introduce areas that the author was unaware of and develop rich insights into the implementation of an e-portfolio across the university. This pivotal discussion was followed-up with a series of further open-ended conversations, firstly with a team from the Law department and secondly with colleagues from the Business School. This series of discussions within the university was supplemented with a series of discussions with three teachers from the school sector that had used PP+. The researcher had chosen to elicit the views of school teachers deliberately in order to ascertain whether PP+ was transferable across educational sectors and age ranges. Again, future research should drill deeper into the wider application of PP+ and establish how the technology can be applied in differing contexts.

A third stage to the research developed the author's insight of PP+ further through attendance at an in-house training event at Northumbria University where the functionality and applicability of PP+ to the Business School's undergraduate dissertation was explained in detail. This training event was followed-up by direct contact with the company that produces PP+, and who were able to provide a much wider range of published research on its application in education contexts. As Peacock *et al.* (2010) have reported, lecturers need to be fully conversant with the capabilities of PP+ and its possible pedagogical merits, particularly in terms of the development of reflective learning and recording the support of supervisors before they embark on its use. It is imperative that in order to be successful, initiatives such as PP+ are supported with sufficient training and the promotion of a 'community of practice' (Lave and Wenger, 1991) where educators are able to support each other.

Findings and discussion:

The views of those who have used PP+:

'D'. A Lecturer in Management at a Business School:

'My thoughts are that we should encourage students to use PP+ with variation on Mozilla 'Badges' to evidence competence and achievements on our undergraduate employability modules. Writing a Curriculum Vitae is increasingly moribund, PP+ is more in keeping with youth culture and their use of technology as part of their learning, and self-identity'.

'I'. An ICT Teacher in a School:

'It is really useful for promoting collaboration between colleagues and sharing ideas. It forces you to reflect and should encourage users to participate more in their own self-regulated continual professional development. ...

It also links in very well with the idea of badges and our college's promotion of self-learning.... I have used this during this academic year- it is a must for those who are have a poor memory or where there is a need for each activity to be reviewed as a story of learning'.

'P'. Technical Support Staff at an English University:

'It is being used in our PGCEs (the main teaching qualification in England) for teachers, nurses, and midwives- it is being used to promote reflection on experiences. Take for example, teaching in classrooms or in hospitals. Within each, you have to do assessments in order to qualify. PP+ has templates to foster reflection. For example a trainee teacher can use it to plan a lesson to meet the needs of learners....

People often do not do reflections properly when using pen and paper- and they lose paper! PP+ encourages students to do the reflection and add materials such as a video. It is taking a range of evidence and placing into one place. It also helps you recall things that you may have forgotten....

PP+ is a major step forward from the original PebblePad. We are planning to have it speak with Blackboard (the University's Virtual Learning Environment system). This will mean we will have a fully

integrated learning and assessment system in place. It even has three levels of moderation, so it will work for when the external examiner comes to visit the university’.

Discussion of findings from primary and secondary research:

The software promotes students creativity through the customisable templates where students may make notes as they wish and then share these with fellow students. PP+ is also a useful tool in developing wikis and group projects through ‘webfolios’. PP+ offers students the facility to use interactive workbooks that can be accessed by other students in collaborative activities, as well as their lecturers. Students may also choose to navigate through a set of lecture notes or problems at their own pace skipping those areas that they already have mastery over using a ‘wizard’ facility. The inclusion of ‘prompting questions’ also requires students to engage in a review of their learning and consider their wider progress, and in doing demonstrate ownership over their learning.

The principle of reflection on target-setting and personal achievement is not simply restricted to the classroom but is carried further through the tracking of their wider professional development. PP+ enables targets to be set, and an archive of achievements known as ‘assets’ to be created which then form part of a life-long Personal Development Plan and Record of Achievement. The software can link to Mozilla’s Backpack ‘badges’ which are widely recognised by employers as evidence of attainment. As such, PP+ offers the potential of a documentation tool for life-long learning.

One possible application of PP+ is to process ethical submissions for students’ dissertations in an efficient and effective manner, as in the example of Northumbria University’s Business School where 850 undergraduates are being supervised using this system. The embedded screens and interactive nature of PP+ enables a conversation to take place between student(s) and their research supervisor. The conversation can take place asynchronously or at the same time. PP+ enables this conversation to take place using a variety of media including Skype, emails, or just jot down minutes of face to face meetings. A second application of PP+ is to act as a log-book of the research process with accurate tracking of contact and support that has proved invaluable in generating an evidence base of a student’s level of commitment, or that of their supervisor. Another use of PP+ as a log-book is during a ‘study-work’ placement. This is particularly useful where students have to record the development of their professional competencies and feedback from host employers, as in the case of Northumbria University’s work-based Business Leadership and Corporate Management degree where students spend almost two years in a placement.

There are also benefits for lecturers in using PP+ as it enables lecturers to re-evaluate how they teach complex topics. For example, Sangster *et al.* (2014) report on how lecturers in a Scottish university re-designed their teaching of double-entry bookkeeping in an undergraduate Accounting degree with improved students’ outcomes.

PP+ provides lecturers with a systematic overview of their students’ progress through a variety of functions, such as milestones, alerts and notices, which facilitate a means of communicating support. For example, tools may be chosen when setting up an assignment to remind students of an impending submission date or to set specific targets for individual students. The software is also capable of identifying particular areas for support such as dyslexia and, in identifying recurring errors, highlight those areas to address. Lecturers can create opportunities for collaborative work, and in setting a ‘gateway’ manage the composition of the task group. Such tools enable a lecturer to maintain an overview of the cohort whilst addressing the specific needs of particular students and supporting personalised learning.

PP+ enables lecturers to mark assignments, record marks and then build a record of a students’ progress both within a module and across their degree programme through an ancillary platform called ‘Active Teaching and Assessment Space’ (ATLAS). ATLAS enables lecturers to create a virtual classroom environment, creating workbooks for students’ research and reporting, as well as specifying the nature of assessment formats, and can be used to set up a moderation system that can be accessed by external examiners. Instead of using a range of paperwork, such as internal and external moderation forms, PP+ provides an auditable system that tracks students’ submissions, records marks and provides a range of

analytical reports for course performance reviews. As such, PP+ facilitates a more reliable assessment system that can feed into an institution's quality system.

The evidence presented suggests PP+ has much to offer those who wish to promote independent and self-regulated learning. The facility to enable students to organise their notes, undertake independent research and share resources collaboratively with others is an important feature of PP+. As a learning tool, it has much to commend. However, PP+ is much more than a sophisticated note-book and personal organiser. Its connectivity to other software, means that PP+ has versatility beyond traditional paperwork-based approaches. In enabling students to link learning to the submission of assignments and feedback, it facilitates a seamless connectivity within the learning process and promotes reflection. PP+ also is of value beyond the learning process itself. As a record of training and professional accreditation, it offers a life-long and transferable e-portfolio of achievement. Finally, for educators, whether at school or university, PP+ offers an integrated system that records students' work and tracks their progress in an ordered and useful fashion.

Conclusion

PP+ has potential benefits not only for students, but teachers and administrators, as well as for those who simply wish to document their professional development. PP+ is a significant step forward for those who wish to bring a range of capabilities under one ordered and accessible e-portfolio system. PP+ offers the potential to address the four key elements within SRL: as a motivational tool; to set targets; to promote reflective learning; and to validate a student's self-esteem as a record of achievement.

There are two learner-centred principles that underpin PP+ and distinguish it from other earlier versions of eportfolio. First, it empowers the student with control over the learning process. Whereas many other virtual learning environments, such as Blackboard or Moodle, are driven by the lecturer, content of PP+ is controlled by the student. The generation of resources as assets encourages students to be creative and redefine the way they learn, instead of relying on materials handed out by the lecturer. Second, PP+ provides a learning space that is owned by the student. In this respect, even after graduation the learning material is still accessible by the student and forms part of their record of learning. This 'record of achievement' is a validation of a person's self-efficacy, which is recognised as important to SRL in the literature.

Importantly, PP+ offers a range of benefits for students, not least in promoting meta-reflection which is fundamental to the management of their learning. It also enables students to archive and validate their work competences to potential employers- and as such can be a powerful motivational tool. The potential benefits of recognition and accreditation through professional bodies is an important feature of PP+ that transforms it into a life-long log of learning. The capability to share resources with others also means that PP+ can be used to promote collaborative forms of learning. The application of PP+ in order to develop communities of learning is an important asset that should be exploited further. In short, PP+ empowers greater student responsibility and life-long ownership over the learning process.

For educationalists, PP+ provides a fully integrated learning and assessment system that can be tied into other systems, such as the 'Blackboard' Virtual Learning Environment. The facility to identify issues to address and track students' progress are invaluable features of PP+. The monitoring of students provides a reliable and authoritative audit of the level of support provided by staff. As such, PP+ can be viewed as being part of the data management quality system installed within an institution. As education administrators across the globe move toward more standardised forms of learning, assessment and record-keeping, systems such as PP+ will become increasingly part of our professional life.

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