Encouraging Self-Regulated Learning Through Electronic Portfolios

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Abstract: At the Centre for the Study of Learning and Performance (CSLP), we have developed Electronic Portfolio Encouraging Active Reflective Learning Software (ePEARL) to promote student self-regulation and enhance student core competencies. We wish to: disseminate the tool without charge to policy-makers, educators, students, and parents; encourage its active and sustained use on a wide scale; and learn about effectiveness, sustainability and scalability as we do. This paper summarizes the literature on electronic portfolios (EPs), describes ePEARL, and documents our research findings to date including analyses of teacher and student reactions.

Rationale

If we are to revolutionalize and dramatically enhance education, it will require engaging students and getting them to think meaningfully and strategically about learning, especially the learning of core competencies such as literacy skills. Students must become active learners capable of dealing with complex problems in innovative and imaginative ways. Student-centered learning is an approach towards achieving this vision and technology can play an important role as a powerful tool in promoting educational change. But how? Among the most interesting and exciting new developments are electronic portfolios, not only because they act as multimedia containers for students and teachers but also because they support student self-regulation and core educational competencies, especially literacy skills.

In Canada, like many industrialized countries, more than 20 percent of primary-school students have to repeat a grade before going on to secondary school and 70 percent of those drop out of high school (Statistics Canada, 2001). Furthermore, rates of functional literacy among Canadian sixteen year olds on the PISA/OECD

1 This research project was supported by funding from the Canadian Council on Learning and the Fonds québécois de la recherche sur la société et la culture (FQRSC).

2 This paper was presented at the E-Learn 2007: World Conference on E-Learning in Corporate, Government, Healthcare, & Higher Education (Chesapeake, VA). Used with permission from the Assn. for the Advancement of Computing in Education. See www.aace.org
(2003) measures shows approximately 25% of our youth are functionally illiterate. In a just released report on the state of learning in Canada, the Canadian Council of Learning (2007) elaborated on the importance of literacy skills and the challenges of dramatically improving our nation’s literacy skills.

Currently, school is too often a place that disengages learners, which fails to encourage honest self-assessment, and where learning and evaluation are not meaningful acts of improvement but detached and punitive symbols of failure. One way to meet this challenge appears to lie in the use of electronic portfolios (EPs) that can be designed to support the process of students’ self-regulated learning and the improvement of reading writing, and other literacy skills. Self-regulation refers to a set of behaviors that are used to guide, monitor and evaluate the success of ones own learning. Students who are self-regulated are metacognitively, motivationally, and behaviorally active participants in their own learning process (Zimmerman, 1989, p. 329) and thus succeed in academic learning (Rogers & Swan, 2004).

**Literature Review**

According to Abrami & Barrett (2005), an EP is a digital container capable of storing visual and auditory content including text, images, video and sound. EPs may also be learning tools not only because they organize content but also because they are designed to support a variety of pedagogical processes and assessment purposes. Historically speaking, EPs are the Information Age’s version of the artist’s portfolio in the sense that they not only summarize an artist’s creative achievements but also illustrate the process of reaching those achievements. An artist, architect, or engineer who displays her portfolio of work allows the viewer to form a direct impression of that work without having to rely on the judgments of others. EPs tell a story both literally and figuratively by keeping a temporal and structural record of events.

EPs have three broad purposes: process, showcase, and assessment. EPs may be designed as process portfolios supporting how users learn through embedded structures and strategies. A process EP can be defined as a purposeful collection of student work that tells the story of a student’s effort, progress and/or achievement in one or more areas (Arter & Spandel, 1992; MacIsaac & Jackson, 1994). Process portfolios are personal learning management tools. They are meant to encourage individual improvement, personal growth and development, and a commitment to life-long learning. The authors are especially interested in the use of EPs as process portfolios to support learning.

Process EPs are gaining in popularity for multiple reasons. They provide multimedia display and assessment possibilities for school and work contexts allowing the use a variety of tools to demonstrate and develop understanding—especially advantageous for at-risk children whose competencies may be better reflected through these authentic tasks. At the same time, by engaging these learners, their deficiencies in core competencies may be overcome. Process EPs may scaffold attempts at knowledge construction by supporting reflection, refinement, conferencing and other processes of self-regulation, important skills for lifelong learning and learning how to learn. They are superior for cataloguing and organizing learning materials, better illustrating the process of learner development. And they provide remote access encouraging anywhere, anytime learning and easier input from peers, parents, and educators, letting them provide feedback through a single electronic container.

According to Wade, Abrami & Selater (2005; see also Abrami et al., 2006), EPs are linked to a student’s ability to self-regulate their learning and to enhance their meaningful learning of important educational skills and abilities, especially literacy skills. Self-regulated learners are individuals who are metacognitively, motivationally, and behaviourally active participants in their own learning (Zimmerman, 2000). A main feature of self-regulated learning is metacognition. Metacognition refers to the awareness, knowledge and control of cognition. The three processes that make up metacognitive self-regulation are planning, monitoring, and regulating. Other aspects of self-regulated learning include time-management, regulating one’s own physical and social environment, and the ability to control one’s effort and attention. Proponents of socio-cognitive models emphasize that to develop effective self-regulated learning strategies, “students need to be involved in complex meaningful tasks, choosing the products and processes that will be evaluated, modifying tasks and assessment criteria to attain an optimal challenge, obtaining support from peers, and evaluating their own work” (Perry, 1998, p.716). When students use portfolios, they assume more responsibility for their learning, better understand their strengths and limitations, and learn to set goals (Hillyer & Lye, 1996). In short, educators believe that portfolios allow students to think critically, and become active, independent and self-regulated learners (Perry, 1998; Mills-Courts & Amiran, 1991).

Zimmerman and Tsikalas’ (2005) review of computer-based learning environments (CBLEs) designed to support self-regulated learning (SRL) provides a framework for development of a tool to support the three cyclical phases of SRL: forethought, performance and self-reflection. While the various processes involved in self-regulation
have been discussed, the lessons of other partially SRL-supportive CBLEs has enabled us to plan for effective SRL-supportive design of ePEARL.

The three cyclical phases of self-regulation include both meta-cognitive and motivational components, providing the foundation for better sustainability of learning and skill development.

- The **forethought phase** includes task analysis (goal setting and strategic planning) and self-motivation beliefs (self-efficacy, outcome expectations, intrinsic interest/value and goal orientation). Tasks involved in the forethought phase are: set outcome goals, set process goals, document goal values, plan strategies, and set up learning log.

- The next phase, the **performance phase**, includes self-control (self-instruction, imagery, attention focusing and task strategies) and self-observation (self-recording and self-experimentation). Tasks involved in the performance phase are: creation of work, and learning log entries.

- Finally, the **self-reflection phase** includes self-judgment (self-evaluation and casual attribution) and self-reaction (self-satisfaction/affect and adaptive-defensive responses). Tasks involved in the self-reflection phase are: reflection on work, reflection on process, and awareness of new goal opportunities.

Unfortunately, evidence to date on the impacts of EPs on learning and achievement and other outcomes is sparse. Carney (2005) states “Electronic portfolios show promise for enhancing learning, but if we fail to critically evaluate our uses of the device, we may find that they will go the way of Papert’s Logo turtles and become yet another educational fad—an innovation poorly understood and often implemented in ways contrary to its theoretical underpinnings” (p. 4). Zeichner and Wray (2001) concluded similarly: “Despite the current popularity of teaching portfolios, there have been very few systematic studies of the nature and consequences of their use for either assessment or development purposes” (p.615). Therefore, our research is designed to study the impact of EPs on teaching and learning processes, especially those related to self-regulation.

**About ePEARL**

The CSLP in collaboration with our partner LEARN, has developed web-based, student-centred electronic portfolio software, entitled ePEARL that is designed to support the above-mentioned phases of self regulation. Developed in PHP using a MySQL database, three levels of ePEARL have been designed for use in early elementary (Level 1), late elementary (Level 2) and secondary schools (Level 3). Features available include: customizing the portfolio; setting outcome and process goals; creating new work; linking to existing work; reflecting on work; sharing work; obtaining feedback from teachers, peers & parents; editing work; saving work under multiple versions and sending work to a presentation portfolio.

ePEARL promotes: The creation of general learning goals for a term or year, or for a specific work/artifact; reflection; and peer, parent and teacher feedback on the portfolio or on a specific artifact. In levels 2 and 3, ePEARL offers two environments: the Work Space and the Portfolio.

The ePEARL Work Space screen guides students through the creation process, allowing enough flexibility for truly creative work and just enough scaffolding to keep students on the right track. The Work Space offers a text editor and an audio recorder for the creation of work. Readings, music pieces, or oral presentations may be recorded. The software also offers the ability to attach work completed using other software, so it can accommodate any kind of digital work a student creates, including scanned images or photographs of paper-based work.

Before work is created, students are encouraged to set their goals for this work, and may attach learning logs, evaluation rubrics and study plans to keep track of their learning process as it takes place. After the creation of work, sharing with peers or teachers is supported so that students may solicit feedback on drafts of work. Students may also reflect on their performance and strategies, and to use these to adjust their goals for the next work. The Work Space template is similar to that of the Portfolio entries so that information is easily transferred from one environment to the other.

The Portfolio environment within ePEARL is where students collect their selected artifacts - created either from the Work Space or from outside of the tool. The selection process allows students to reflect on why they feel a work belongs in their portfolio, its relationship to other work, and on their own advancements. Self-regulation is also supported when students create new goals for future work or modify learning behavior based on their reflections on
a particular piece they have collected. Sharing with peers and parents is encouraged and teachers have automatic access to view all of their students' ePEARLs.

In addition, there are both prose and multimedia support materials (the latter currently in production) for teachers and students to develop a better understanding of the what, why and how of the process of self-regulation using the learning process supported by ePEARL. The professional development just-in-time materials support the demonstration and modeling of student-centred skills and instruction, explanation of those skills, and elaboration of skills through additional support material.

Methodology

Over the past six years, the CSLP has worked with school boards to help integrate use of ePEARL (and previous versions of the software entitled e-portfolio). Building on this experience, in 2006-2007, the CSLP was involved in a collaborative, province-wide project involving LEARN-Quebec, and school board administrators/teachers from English school boards. Phase I of this project answers the question whether the use of the CSLP’s ePEARL tool enhance both teaching strategies, via targeted professional development, and learning processes via an environment that supports self regulated learning.

Participants

Participants in this study were 62 school teachers, mostly from elementary schools, and their students (approximately 1200) from seven urban and rural English school boards across Quebec. All teachers received one day of training on the use of ePEARL from CSLP staff and follow-up training and in-class observations during the school year. At the conclusion of the school year, participating teachers were invited to a “Show and Share” day where they were encouraged to present their experiences using ePEARL. Informed consent was obtained from students' parents following Canada’s Tri-Council Policy on the ethical treatment of research participants.

Design

The design of Phase I was a one-group pretest-posttest design. Teacher questionnaire data were collected in the Fall, 2006 prior to training and prior to the use of ePEARL in classrooms. Teacher questionnaire data were collected again in the Spring, 2007 after ePEARL was used for (some part of) the school year. Student questionnaires plus teacher and student focus groups data were collected in Spring, 2007 only. A sample of student portfolios N = 66) were also analysed.

Instrumentation

Abrami, Aslan, and Nicolaïdou (2007) developed the Teaching and Learning Strategies Questionnaire (TLSQ) as a way for teachers to describe their use of self-regulation strategies and portfolio processes in their classrooms. The TLSQ contains several open-ended and 73 close-ended Likert scale questions, the latter divided into four sections: students’ learning strategies, approach to teaching, portfolio use, and technology experience. Abrami and Aslan (2007) also developed the Student Learning Strategies Questionnaire (SLSQ) as a way to further validate the occurrence of self-regulation processes and portfolio use in classroom. The SLSQ contains several open-ended questions and 19 close-ended Likert scale questions designed to match the learning strategies questions asked of teachers.

Teacher focus groups discussed their experiences with: learning goals; learning strategies; motivation; collaboration and feedback; work space and portfolio environments; support and professional development; and technical difficulties. A scoring rubric was developed and pilot tested for analysing students’ portfolios. It contains six major sections: degree of ePEARL use; writing ability; comprehension ability; self-regulation strategies; presentation skills; and student progress.
Results and Discussion

At the beginning of the school year, we asked participating teachers to use ePEARL about three hours per week or about 12 hours per month with their students. Overall, teachers (N = 21) reported use was less than we hoped: 30% reported using ePEARL 1-4 hours per month; 50% reported using it 5-8 hours; 5% reported using it 9-12 hours; and only 10% reported using it 13 hours or more.

We statistically analysed pretest to posttest differences on the TLSQ. We found a few positive effects (two-tailed t-test, df = 16, p < .10) which included: students identifying strategies for achieving their goals; students documenting the processes they used when working on tasks; teaching students to identify strategies for achieving their goals; students using portfolios to demonstrate their strengths; students using portfolios to identify areas needing improvement. These are fewer positive differences than we hoped for but the results may be limited by our small sample size.

We also examined the posttest mean scores on both the TLSQ and SLSQ for student learning strategies. The mean scores for both teachers and students on all the items were positive, ranging from 3.19 to 4.29 for teachers (N = 21) and 3.65 to 4.32 for students (N = 150). Setting goals, developing strategies for learning, using feedback, and so on were described as part of the routine in those classrooms in which we collected data.

Analysis of the focus groups revealed the need for teachers to introduce processes involved in self-regulated learning and challenges inherent in teaching students learning goals, learning strategies, and collaboration and feedback. For example, not all teachers reported that students were aware of their learning strategies. In addition, teachers felt that learning goals were especially difficult to teach to very young students. Some teachers reported that students wanted to and shared feedback mostly with their friends instead of other classmates. Otherwise, teachers generally valued the self-regulating processes explicit in ePEARL while students were very positive toward certain aspects of the tool, especially the customization features. Finally, teachers discussed their need for extensive support from school staff and administrators.

Analysis of student portfolios (N = 66) did not reveal widespread or extensive use of the tool. The majority of the portfolio pieces were reading responses, stories and poems, language arts presentations, social science or science projects, and music and art projects. Teachers tended to use ePEARL either to collect work or to teach self-regulated learning but not both. Furthermore, there was limited presence of self-regulated learning strategies, such as goal setting, monitoring progress, self reflection and teacher feedback. However, on occasion there were teachers who implemented e-portfolios extensively; in these cases, teachers used ePEARL in both creative and practical ways. As a result, student portfolios in the classroom of these teachers were often richer, and demonstrated that students can learn self-regulation skills in order to improve their work and become better learners.

Conclusion

Using only student and teacher posttest questionnaire responses as a guide, one might conclude that the use of portfolios, and the learning processes they support, were positively viewed and learned well enough to be emerging skills among students. But other evidence suggests otherwise. There were few statistically significant changes from pretest to posttest after teachers used ePEARL for a year. In addition, most teachers used ePEARL infrequently, with the majority of teachers limiting class use to less than the twelve hours per month we had hoped for. The focus groups findings suggested that access to technology might have been a contributing factor. In addition, teachers commented that teaching SRL strategies was new and thus required a change in teaching strategies, strategies which they were not yet accustomed to. The focus groups also revealed the challenges of using portfolios to teach children to self-regulate. And finally, the analysis of student portfolios did not reveal portfolios that evidenced a large amount of student work or high levels of student self-regulation.

We made large efforts to engage teachers and other educators in the design of ePEARL and we are convinced that it is not a technically difficult tool to use. Nevertheless, we know that access to technology prevents some teachers and their students from using it more extensively. The pedagogical principles of self-regulation that underlie the tool are a different matter from technical issues. It is clear we need to go further in providing pedagogical training and support to teachers and their students. In this regard, multimedia support materials are being developed and will be integrated throughout ePEARL to provide ‘Just-in-Time’ support for both teachers and students.

Beginning in Fall, 2007, we will conduct a two-year longitudinal investigation (Phase II) using a non-equivalent pretest-posttest design focusing on changes in student self-regulation and literacy skills improvement. Ultimately, our objective is to learn more about the impact of EPs on student learning.
While teachers and their students see great promise in the use of EPs for learning, there is much that remains to be done to insure this promise is realized. To teach the skills of self-regulation within an EP environment requires commitment, purpose and strategies on the part of teachers and students. It requires both “will” and “skill”. The effective use of EPs isn’t just about the destination but also about the journey—for teachers, students, and researchers. Stay tuned.

References


