ePEARL: Electronic Portfolio Encouraging Active Reflection Learning[*]

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Background

In Québec, like many other places, 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). 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. Over the past several years, the Québec Ministère de l'Education du Loisir et du Sport (MELS) has been phasing in the Québec Education Program (QEP)-a complete reform of the curriculum favoring an integrated, comprehensive learner-centred approach to education based partly on a co-constructed, inquiry-based curriculum that responds to individual student needs and interests. The cross-curricular competencies, which have become central to the reform, are designed to ensure that the skills and knowledge being taught in our schools meet the changing demands of the 21st century workforce (Conference Board of Canada, 2001; MEQ, 2001). One way to meet this challenge appears to lie in the use of electronic portfolios which can be designed to support the process of students' self-regulated learning.

The value of portfolios for exhibiting evidence of learning has been well established and while the research and debate continue over the best vehicles or formats for portfolios, their use has become mandate in Canadian provinces such as Quebec as a means for capturing students' metacognitive processes and evidence of learning. Social cognitive theorists like Bandura (1986) identify personal, behavioral and environmental factors as triadic processes which influence student performance. These processes underlie the self-regulatory processes which Zimmerman (2000) defines as forethought, performance or volitional control and self-reflection. The importance of developing self-regulating ability within students has been extensively researched for the past two decades and is believed to be essential to successful learning within schools and extending self-directed learning into adulthood (Boekaerts, 1999; Corno & Randi, 1999).

Concordia University's Center for the Study of Learning and Performance (CSLP) has identified the potential for portfolios to provide evidence of self-regulation as well as the potential for a an electronic portfolio tool to support and scaffold self-regulation (Wade, Abrami, & Sclater, 2005). As the research continues regarding the effects of portfolios in their various formats, the development of a tool which not only supports the development of a student's portfolio but also of their self-regulative abilities provides opportunities for researching student outcomes in both arenas. This presentation will provide the theoretical background that guided the redesign of the CSLP's bilingual, web-based electronic portfolio, now called ePEARL, along with some of the key features within the software.

Electronic Portfolios

An electronic portfolio (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.

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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, and often serves multiple purposes. For example, a teacher may use EPs to measure student's learning about the course content, their effort, their progress over time, and their self-regulatory abilities. EPs may be designed as *process portfolios* supporting how users learn through embedded structures and strategies. 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. 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; Abrami & Barrett, 2005).

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. In short, the potential of process EPs are nothing short of revolutionary as a dramatic expression of the possibilities of e-learning from cradle to grave as epitomized in the slogan "E-portfolio for Life".

Student Self-Regulation

According to Wade, Abrami & Sclater (2005), EPs may be linked to a student's ability to self-regulate their learning and to enhance their meaningful learning of important educational skills and abilities. 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. 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). Educators believe that portfolios allow students to think critically, and become active, independent and self-regulated learners (Perry, 1998; Mills-Courts & Amiran, 1991). See Figure 1.

EPs may provide important means for student self-regulation. Students may review their own work and then modify learning goals as a result of such reflection. The process of reflection is what makes EPs a tool for life-long learning and professional development rather than a mere collection of work (Foote & Vermette, 2001). The student needs to be able to make a direct connection between each submission in the portfolio and an intended learning goal. The student needs to be able to explain why a specific submission was placed within the portfolio. Barrett (2004) further confirms the importance of this idea when she says, "the artifacts need to be accompanied by the learner's rationale, or their argument as to

why these artifacts constitute evidence of achieving specific goals, outcomes, or standards." (p.3.) Bereiter and Scardamalia (1989) mention that portfolios encourage the pursuit of personal cognitive learning goals, what they call intentional learning. Portfolios prompt students to look back, to digest and debrief, and to review what happened so that they can set new goals and determine next steps (Camp, 1992). In an attempt to demonstrate the effects of reflection, Sweidel (1996) asked students self-reflective questions about their study strategies and found that at the end of the semester they were able to identify relationships between the process and the outcome of their studying.

Wade and Yarbrough (1996) elaborate on the pedagogical value of using portfolios as a learning tool. Portfolios are developmental in their nature, since a portfolio represents a certain period of students' growth and learning. Portfolios should not be solely used for short-term goal attainment since they are the culmination of long-term learning outcomes. Portfolios are dual valued in that they offer both the teachers and the students the opportunity of dyadic interaction. A portfolio allows the student the opportunity to reflect and record learning process while offering teachers an authentic integrative approach of evaluating student growth and achievements as well as acting as a feedback mechanism for their teaching practices. Portfolios are also interactive in that they enable students to share their work with their teachers and peers, thus seeking guidance or suggestions. In this way, the development and establishment of the portfolio may be seen as a form of collaboration. Finally, EPs, as multimedia containers for student work and learning, allow teachers, students and others unique opportunities for contextualized evaluation as well as evaluation during the learning process.

Self-Regulation in Computer-Based Learning Environments

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: set outcome goals, set process goals, document goal values, plan strategies, and set up learning log.

- *The next phase, performance, 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: 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: reflection on work, reflection on process, awareness of new goal opportunities.

Research on EPs

Unfortunately, evidence to date on the impacts of EPs on learning and achievement and other outcomes is sparse. Ten years ago, Herman and Winters (1994) concluded that there was a "dearth of empirical evidence" on the impact of EPs. This sentiment was echoed by Lyons (1998) who stated "there is not yet a body of systematic data documenting their [portfolio] uses or their long-term consequences" (p.247). 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). And finally, Carney (2005) concluded "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).

Methodological complications and controversies challenge researchers in this area. First, there is the question about whether a quantitative or qualitative research paradigm is appropriate for answering questions about EP impact (i.e. Linn, Baker & Dunbar, 1991). Second, there is the question about the instructional sensitivity of traditional learning measures to EP effects, particularly, among those who argue for EPs as alternative and/or authentic tools for assessment. Finally, there is the question about the strength and pervasiveness of the EP treatment. EPs are not curricular content but tools for learning content. They are a pedagogical approach or strategy for learning that needs to be used correctly, widely, and for a reasonable period of time for effects to appear. Research on EP effectiveness, therefore, may need to include measures of implementation fidelity to insure their use by teachers and students is faithful to their purpose.

Expected Outcomes of Further Research

We expect that EPs will enhance teaching and learning processes and outcomes. We hope to show significant and practically important impacts on student learning over time, especially literacy skills and students' regulation of their own learning. We also expect enhanced motivational and cognitive benefits for students due to the use of multimedia for learning; the development of ICT skills in children; improved accessibility to school work from remote locations; enhanced ability to communicate easily with parents; and greater flexibility to carry forward school work from year to year. We also expect that EP, by providing authentic tools for assessing progress relative to oneself rather than others and emphasizing individual efforts to learn, may be especially useful for impacting on these learners and especially those with special needs or who are at-risk of school failure. We expect that EP, by making the assessment meaningful and personally relevant to the learners, will increase their likelihood of success, and hence their motivation. We also expect that teachers using EPs will become more expert users through their use of the tool and because of the scaffolding provided in the professional development that will be embedded in and linked to the tool; in particular, we expect that they will improve their ability to align their assessment measures with how they teach (instructional activities) and with what they intend students to learn (competencies). We believe the tool will help teacher's learn ways to encourage active learning of literacy skills through student construction and refinement of their work and feedback from others. We also believe that teachers will be better able to encourage student self-regulation because of the way the CSLP tool supports self-regulation and because of the embedded teacher professional development. In general, the research and development activities will enhance our understanding of whether and how to use EPs as a means to enhance students' core competencies, skills, and abilities and as a means to provide authentic assessment of those competencies.

Our Prior Research on Portfolios

As a precursor to our involvement with EPs, Kakkar, Zitkute, and Abrami (2000; see also Wade, Abrami & Sclater, 2005) explored whether paper-based educational portfolios assist the processes of self-regulation. To this end, a mixed-method study was employed to investigate student self-regulation in high context, low context, and no portfolio classrooms. The main goals of this study were to a) provide evidence that portfolios encourage students to become self-regulated learners and b) to analyze how different portfolio processes influence student self-regulation. We hypothesized that students will become better self-regulators as they continue to be part of a portfolio classroom and subsequently students in a high context portfolio classroom that foster high self-regulated processes will be stronger self-regulators.

In this study, we noticed some change in the expected direction but not as much as we expected. First, it appears that the transition is not a ready one from more traditional modes of instruction and assessment to portfolio processes and assessment. Despite their willingness, effort, and preparation—which was both genuine and substantial--our sample of teachers in the low context classroom did not entirely abandon more traditional classroom practices. Likewise students in portfolio classrooms struggled, in some ways yearlong, with portfolio activity and responsibilities. Yet, there were significant changes that occurred consistent with students increasing their self-regulation—a sign of hope. We speculate that the demands of the portfolio classroom are greater than in more traditional, teacher-centered classrooms on both student and teacher especially during a time of transition from other ways of teaching and learning. Second, portfolios place greater emphasis on the process of learning and different emphasis on the outcomes of learning than traditional methods of instruction and assessment. The discomfort of students with portfolios may signal their struggle with self-regulating their learning because they have not fully accepted its precepts due perhaps to the demands placed on them externally for traditional achievement gains. Alternately, they may not wish to accept the risks associated with the personal responsibility of regulating their own learning to achieve success. The struggle is difficult and change may neither be asked for nor accepted willingly.

On the basis of this evidence, we believe the following is worth exploring. First, the use of portfolios should be a school-based or board- (district-) based initiative. Students, teachers and administrators should believe that the change to portfolios is widespread and a regular part of the school routine. Second, the use of portfolios should begin early in students' educational experience and not be short-lived. The processes of self-regulation and approaches to pedagogy which portfolios support require time for younger students to learn and effort for older students to make the transition from traditional, teacher-directed methods. Third, teachers need to develop facility with portfolio processes and they should be supported with appropriate professional development. Fourth, EPs may provide additional means to scaffold teachers and students in the portfolio process and better encourage self-regulation. This research and these reasons helped us develop the CSLP's EP software tool, ePEARL, which we describe further below.

Electronic Portfolio Encouraging Active Reflective Learning Software (ePEARL)

ePEARL is bilingual, web-based software designed at the CSLP to encourage self regulated learners within student-centred curriculums. Developed in PhP using a MYSQL database, three levels of ePEARL have been designed for use in elementary and secondary schools: Level I - Grades 1-2; Level II – Grades 3-6; and Level III – Grades 7-12. Features available include: Customizing the portfolio; Setting goals; Creating new work; Linking to existing work; Reflecting on work; Sharing work; Obtaining feedback from teachers, peers & parents; Editing work; and Sending work to a Presentation portfolio.
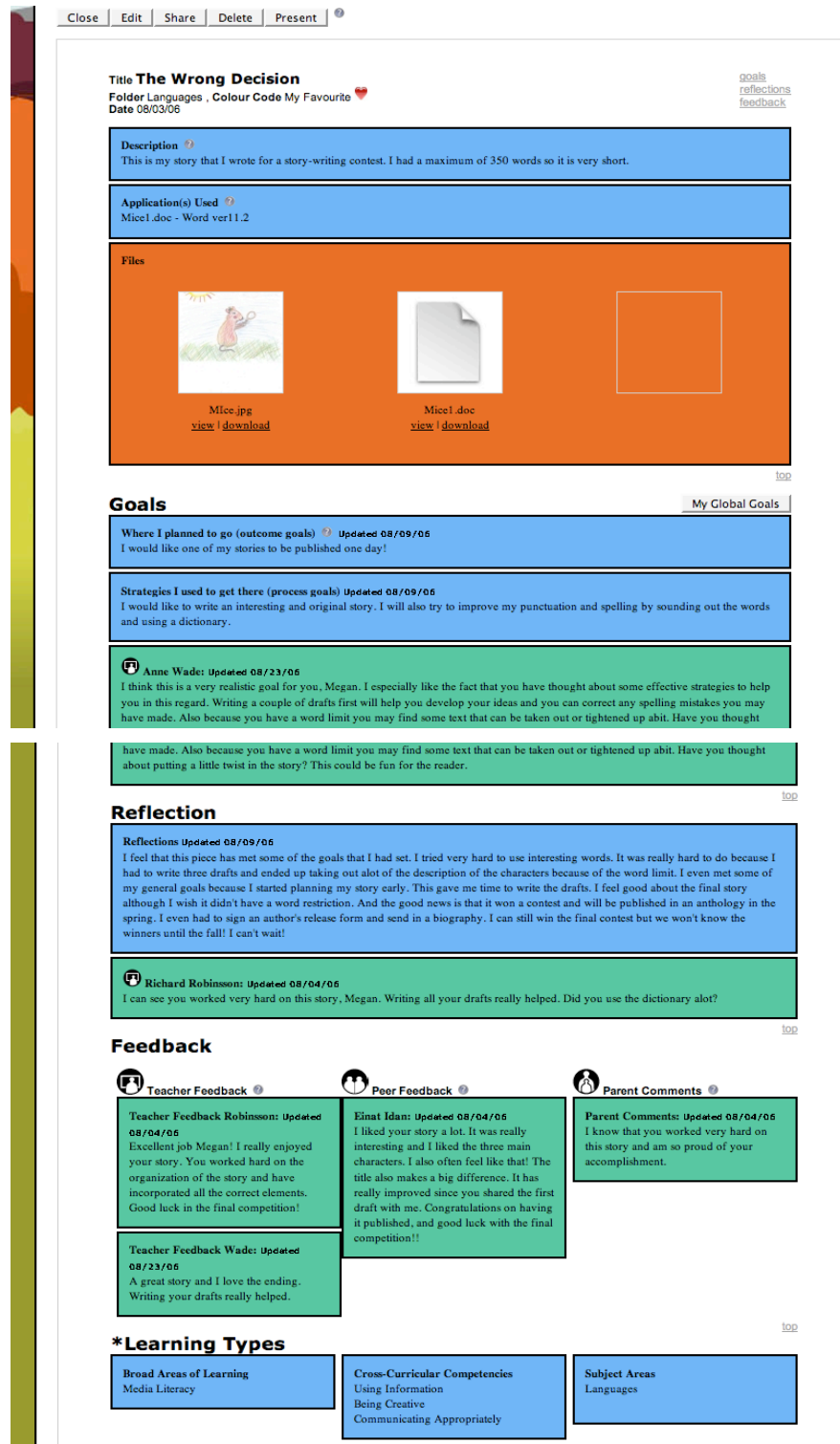
Features

Students can:

- Learn to reflect on their learning meaningfully and to comment constructively on the work of their peers.

- Track their reading and music development, or oral presentation skills by recording directly into the computer;

- Learn basic word processing commands through use of a text editor;

- Archive selected artifacts within a Presentation Portfolio over the course of their education.

Teachers can:

- Create their own portfolios;

- Provide feedback on students' goals, work and reflections;

- Track the development of their students' learning over a term, a year, or a cycle;

- Model effective practices related to goal setting, reflection and conferencing.

Parents can:

- Track their child's learning; and

- Become actively involved in their child's education through the provision of feedback on their child's portfolio or individual work stored within their child's portfolio.

ePEARL's View Artifact page

ePEARL is the result of close work with both the research evidence and the practical classroom requirements. This easy-to-use software was designed to support teachers and students throughout the portfolio process, and is available at no charge for schools who wish to partner with us on this project. For further information visit http://grover.concordia.ca/eportfolio/promo/

Current Research Plans

The current version of ePEARL is the culmination of five years of research, development, and collaboration with our partners in the educational community. The insights we have gained moved us further in the direction of a tool which supports students' self-regulation. And we also came to release that regardless of the technical simplicity and engaging nature of the tool, the underlying pedagogical model it supported represented a radical departure from frontal teaching and transmission models of instruction. We also came to see the value of providing professional development and embedding just in time support in ePEARL, which we plan to do this year. This past year, we spoke with teachers about the use of EPs in their classrooms and analysed the EPs of select students. These baseline data are summarized below.

EP Baseline Data

We contacted teachers from the research schools in six partner English school boards who had agreed to attend implementation meetings. We transcribed and summarized the comments of 14 teachers about their initial reactions to EPs. We also followed up with several of these teachers and obtained parental consent to analyze the contents of 185 student EPs.

Teachers Overall most teachers (12) were in the beginning stage of using EPs. Two had not started using it yet but they indicated that they would like to. Three teachers in one school who used the tool in collaboration with the computer teacher realized that they were using the software inappropriately. Due to technical problems of uploading work or time limitations for creating work within the software, these three teachers were only using *e-portfolio* as a reflection tool for work that was most often done on paper and to which access out of class was very difficult. Teachers' reported use of the software was once per week for three teachers, twice per week for three teachers and three times per week for three teachers. Special circumstances in a specific school had the students start a project with two of the teachers in their classrooms on paper and continued with it while working with a computer teacher in the computer lab once a week. Eleven out of 12 teachers who used the software, did so in Language Arts, while one used it in Catholic Education. Two of the 11 teachers who used the software in Language Arts also used it in Math and one of them also used it in History. Students' grade level ranged from the 1st to the 8th grade. However, the majority of teachers (7) used it in grades 6-8. When the tool was used in a classroom, all students created their own portfolios and they did so individually. No collaborative use of the tool was reported.

Need for Support: Teachers indicated that their students needed a lot of in-class support to use the tool, especially in the early grades. The support required is difficult to provide by a single teacher in a class of over twenty students. In one case, student-mentoring was implemented as a strategy, having those seventh grade students fluent in the use of the software train first graders in its use. Another strategy that was used in upper elementary school involved pairing up struggling students with more competent ones for mentoring. However, most students in upper elementary school or high school were comfortable with using technology, therefore they did not typically have problems with the use of the tool. Difficulties were most often encountered with the pedagogy that underlies the software, for example, writing reflections and setting goals.

Reactions to the Software

Students**:** Overall, teachers reported that students were excited with the tool and asked to use it repeatedly. They liked the ability to personalize their portfolios and the fact that they could share them.

Teachers had very positive comments with regard to the use of the tool with students with special needs. A teacher reported that the tool "has completely changed a child with ADHD", because it acted as "the ultimate motivator". Now the child is focused and engaged. The use of the tool has helped him in having all his work collected in a place where it cannot be lost.

Teachers: Teachers could see the value of electronic portfolios, but reported that it was difficult to integrate use of the software into the curriculum on a daily basis. This was mainly because of lack of time, technical problems, lack of in-class support and in some cases lack of access to equipment.

Parents: Parents' reactions to the tool were also positive. In one case, the teacher noted that she had never seen such good attendance at the school's Portfolio night—an event whereby the students present their portfolios to their parents. She credited the use of *e-portfolio* to this.

Analysis of the Student Portfolios

Students: Students' grade levels ranged from the 1st to the 8th grade. Access was feasible for 152 out of the 185 student portfolios.

Size of Portfolios: Overall, the majority of portfolios (24%) had one piece of work stored, a somewhat surprising finding given portfolios are, by their definition, typically collections of work. Over half of the analyzed portfolios contained from none to three pieces of work.

Goal Setting: The majority of student portfolios (55%) did not use the goal-setting feature of the software. Twenty-nine percent of portfolios had one goal and 16% of portfolios had two to six goals.

Reflections: The majority of portfolios (66%) did not use the reflection feature of the tool. Thirty-four percent of the portfolios contained from 1 to 8 reflections. Reflections indicated:
1. **effort** (I worked hard on it, I am proud of it, I spent lots of time, it is my best project)
2. **external motivation** (I got a good grade)
3. **factors unrelated to learning** (it was fun, liked it, loved it)
4. **sharing** (so that everyone can see, my parents can see, I want people to learn about)
5. **improvement** (I have improved)
6. **quantity** (I wrote a lot)
7. **self-evidence** (e.g. on a piece labeled: "My winter holiday" a reflection such as "because it is what I did on my winter holiday"
8. A **combination** of the above categories ("I liked doing this story and I got a good mark on it. It was very fun and we did a story book with pictures and worked very hard on it")

Conferencing: The conference feature of the CSLP e-portfolio tool was used in 19% of the portfolios, mostly by peers.

Conclusion

Our current focus is to support teachers in their use of the newly released ePEARL and to explore more intensive use of EPs especially in elementary schools. Teachers will be pre-tested and post-tested using a Portfolio Implementation Questionnaire currently under development at the CSLP. This will provide some indication of the quantity and quality of portfolio processes occurring in the classroom. The expectation is that the use of ePEARL will encourage greater and richer use of portfolio processes throughout teacher practise. Additionally, based on what we learned through the collection of baseline data last year, multimedia support materials are being developed and will be integrated throughout ePEARL to provide 'Just-in-Time' support for both teachers and students.

Next year we will conduct a two-year longitudinal investigation 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, students, and parents 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 and purpose on the part of teachers and students. Both "will" and "skill". It isn't just about the destination but also about the journey. Stay tuned.