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Research Article

Self-Regulated Learning and the Use of Online Portfolios: A Social Cognitive Perspective

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Abstract

This study highlights the interrelationship among self-regulated learning (SRL) skills, the use of online portfolios, and social cognitive learning theory. It was conducted as a longitudinal mixed-methods study over one academic year with students enrolled in a postgraduate professional practice programme. The study used both quantitative and qualitative statistical analyses. Results showed a strong positive correlation between SRL skills and the perceptions of the usefulness of online portfolios. Based on these results, the researcher have suggested a new model which integrates students' use of online portfolios; the influence of online portfolios on students' SRL skills and vice versa; and the three social cognitive learning theory factors of person, behaviour and environment and their effect on students' SRL skills across the three phases of forethought, performance, and self-reflection within an online learning environment.

Keywords: Self-regulated learning, online portfolios, social cognitive learning, online learning

1. Introduction

Self-regulated learning (SRL) skills are an important aspect of social cognitive learning theory (Bandura, 1989). They are of primary importance at any study level because they are fundamental determinants of academic success. These skills are believed to be promoted through online portfolio use (Barrett, 2010). In other words, the use of online portfolios can help students to construct and manage their own learning. Further, SRL skills are an important aspect of social cognitive learning theory (Bandura, 1989), which emphasises on the interaction of three learning elements: person, behaviour, and environment. Several studies (Cheng & Chau, 2013; Alexiou and Paraskeva (2010); and Chau and Cheng 2010 have revealed that within an undergraduate student context, online portfolios are related to students' learning behaviours in terms of planning, monitoring, and self-reflection.

However, there is a shortage of research on the link between SRL and online portfolio use in a postgraduate learning context, where students are expected to be highly motivated and value the use of online portfolios. This paper examines whether postgraduate students who used online portfolios regulated and reflected on their learning processes. The overarching question for this study was, within a social cognitive perspective, what is the relationship between postgraduate students' SRL skills and their use of online portfolios, and what factors influence their use of online portfolios.

2. Self-Regulated Learning

Self-regulated learning is defined as the extent to which students control and direct their own thoughts, feelings, and actions to achieve their learning goals through active participation metacognitively, motivationally, and behaviourally in their own learning processes (Zimmerman, 1986, 1989). Self-regulated learning skills refer to the development of learning processes that enable individuals to control and direct their own learning behaviour in order to achieve their learning goals.

Self-regulated learning theorists are interested in why, within similar learning conditions, some students gain academic success while others fail. One possible explanation for this is that the students who are successful show their initiative and determination in achieving their goals (Zimmerman, 2001). They use a range of cognitive and metacognitive skills and adapt these skills to a particular learning situation.

Pintrich (1995) identified self-regulated students as presenting three main characteristics: attempting to control their own learning behaviour, trying to accomplish their own learning goals, and controlling their own actions as individuals. They set goals for a particular task, and they work towards those goals by applying cognitive and metacognitive strategies.

Zimmerman (1989, 2000) pointed out that SRL strategies occur throughout the whole learning process, including before, during, and after a particular learning situation. He developed a model comprising three cyclical phases of SRL – forethought, performance, and self-reflection – and further explained the interrelationship among the three phases. Throughout the three phases, students learn to be aware of their learning performance and monitor their learning progress as an ongoing process. Key characteristics of each phase are described below.

2.1 Forethought Phase

The forethought phase occurs before a learning process and is considered a powerful aspect of learning because it involves students' beliefs and motivation to learn and set goals for their own learning (Zimmerman, 1998b). The important components are goal setting, strategic planning, self-efficacy, outcome expectation, and task value/interest.

Self-regulated learners set goals that are specific and challenging, and they commit themselves to achieve those goals (Locke, 1996; Locke & Latham, 2002). They use strategic planning skills, which are considered effective to achieve their goals (Zimmerman & Moylan, 2009). Self-regulated learners are also highly self-efficacious (Zimmerman, 1998b), meaning they put considerable effort into a particular task, persist longer in that task, and have high expectations that they will achieve their learning goals (Schunk, 2012). Further, they find the task valuable and interesting, which is important in focussing attention on a task (Hidi & Ainley, 2008).

These components in the forethought phase are related to personal factors that influence students' learning behaviour in the performance and self-reflection phases of SRL.

2.2 Performance Phase

The performance phase presents during the learning process and is directly influenced by the forethought phase (Zimmerman, 2002). The important aspects of this phase are self-control and self-observation.

Self-control refers to students selecting specific learning strategies to help them achieve their goals (Zimmerman, 2002) and using self-instruction to guide their thoughts and actions to make progress on a task (Zimmerman, 1998a; Zimmerman & Moylan, 2009). Self-control is also involved when students use time management strategies to accomplish their tasks (Zimmerman & Moylan, 2009), such as prioritising tasks and allocating time for each task, and also structuring their learning environment to maintain their concentration and screen out distractions.

Another important aspect of self-control is asking for help (Zimmerman & Moylan, 2009). Self-regulated learners are willing to ask for help when they face learning difficulties. They are viewed as adaptive help-seekers (Newman, 2008), knowing what they want to ask and who they should ask.

The other SRL performance behaviour is self-observation, which consists of metacognitive monitoring and self-recording (Zimmerman & Moylan, 2009). Self-observation involves students examining their performance in self-control strategies and learning outcomes (Zimmerman, 2002). Self-regulated learners track their learning records mentally (metacognitive monitoring) and physically (self-recording) to understand their learning, and then possibly make changes or try new strategies to make progress.

2.3 Self-reflection Phase

Self-reflection is the last phase in the learning process, after forethought and performance (Zimmerman, 1998b, 2002). Self-judgement and self-reaction are important aspects of the self-reflection phase.

Self-judgement comprises self-evaluation and causal attributions (Zimmerman & Moylan, 2009). Self-regulated learners evaluate themselves on how well they perform a task compared to a standard or others (Zimmerman, 1998b). Self-evaluation leads students to understand what causes their success or failure in a particular learning task (Alderman,

2008; Zimmerman, 2002).

Causal attributions play an important role in influencing students' self-efficacy beliefs in the forethought phase. For example, if students believe that their failure in a particular learning situation is because of their lack of ability, they are unlikely to try hard on the next similar learning task. However, if they think the failure is the consequence of their lack of effort, they are likely to try harder and persist longer on the next task. This also applies in the case of success. Zimmerman (1998b, 2002) asserted that self-regulated learners were more likely to attribute their failures to causes that could be corrected than think that their success came from their ability. This self-judgement behaviour links to students' self-reaction.

Self-reaction relates to students' self-satisfaction and their reaction to their own learning experience (Zimmerman & Moylan, 2009). An increase in self-satisfaction can promote motivation, whereas a decrease can undermine further efforts to learn (Schunk, 2001). This situation results in two self-reactions: adaptive and defensive. When students are satisfied with their learning outcomes they seem to have more motivation and make an effort to increase the effectiveness of their learning strategies, which is related to adaptive behaviour. In contrast, when students feel dissatisfied with their learning experience, they seem to have less motivation so avoid further opportunities to learn (Zimmerman, 2002).

The three phases of SRL outlined above are important in any learning situation because they affect students' learning behaviour and have an impact on academic achievement. Several studies (e.g., DiBenedetto & Bembenutty, 2013; Ding, Sun, & Chen, 2013; Pajares, 2003; Phan, 2014) examined the relationship between the forethought behaviours of SRL and students' academic success, and found that students with high levels of self-efficacy and motivation and who valued the task had increased ability to improve their learning outcomes because they influenced the use of their learning strategies.

The three cyclical phases of SRL were developed based on the social cognitive view (Zimmerman, 1989), which has evolved over the years from the initial work of Bandura (Bandura, 1986).

3. Social Cognitive Theory

Social cognitive theory places emphasis on an individual's motivation, self-efficacy beliefs and responsibility in learning (Bandura, 1989). Bandura (1986, 1997) asserted that students' motivation is influenced by their cognitive processes and their social environment. Students' personal factors, such as their self-efficacy beliefs, can be a consequence of their own learning behaviour, such as their use of learning strategy, and their surrounding environment, such as their teachers and friends. These three factors – person, behaviour, and environment – work as a process of reciprocal influences (Bandura, 1986, 1989). Figure 1 shows the reciprocal relationship between the three factors in the social cognitive view.
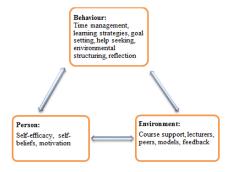

Figure 1: Reciprocal interaction between personal, behavioural, and environmental factors (Bandura, 1986)

Figure 1 shows that students' self-efficacy (personal factor) may affect their learning behaviour, such as goal setting (behavioural factor), and that in turn, this learning behaviour may affect their self-efficacy (Bandura, 1986, 1989). Similarly, students' learning environment, such as peers (environmental factor), may affect their self-efficacy and their learning behaviour, and their self-efficacy and learning behaviour may lead to changes in their learning environment (Bandura, 1986, 1989).

Schunk (2012) further described the reciprocal interaction among personal, behavioural, and environmental

factors, saying that when students believed in their ability to do a particular task, they would put extra effort into that task (person → behaviour). In turn, when they accomplished the task, their self-efficacy was increased (behaviour → person). Further, when they used a range of support from the course, teachers and peers to assist them in achieving their learning goals, their self-efficacy could be increased (environment → person) and would affect other learning behaviours.

Zimmerman (1989) stated that when students were able to control their personal, behavioural, and environmental factors, they were self-regulating. Zimmerman's (2002) theory of SRL and Bandura's (1989) theory of reciprocal interaction of learning, which are related, were chosen as the foundation of this study in order to explore how postgraduate students control these reciprocal factors to regulate themselves in learning and, in particular, when using online portfolios.

4. Online Portfolios

Portfolios are collections of users' artefacts that have been used to demonstrate their learning journey (Johnson, Mims-Cox, & Doyle-Nichols, 2006). Artefacts can be research projects, photographs, videos, observations, and evaluations by others. Recently, physical portfolios have been developed into online versions where digital images, websites, and audio and video files are incorporated (Barrett, 2010). With online portfolios, developers can rearrange, edit, and combine materials easily and connect documents to external sources (Stefani, Mason, & Pegler, 2007).

Online portfolios are increasingly used in higher education to support students' lifelong learning skills (Barrett, 2010; Ehlers, 2009; Stefani et al., 2007). They are Web 2.0 technologies that support independent learning approaches, collaboration, and reflection on learning (Ehlers, 2009). Arguments have been made that using online portfolios can enhance students' engagement in a task and their motivation to learn (Lin, 2008), and can enable them to become more independent and interactive (Abrami & Barrett, 2005).

Interestingly, some researchers (Cheng & Chau, 2013) have claimed that using online portfolios requires some degree of SRL skills. This suggestion has been supported by Barrett (2010), who said that reflection on learning was a key aspect of online portfolio use. This is because reflection on learning enables the online portfolio developers to evaluate their learning in relation to the goals they have set. According to Barrett (2010), the use of online portfolios can be categorised as *product* (showcase of learning) and *process* (reflective learning). If students use them in both categories, they are probably involved in SRL processes. Further, studies by Chau and Cheng (2010) and Alexiou and Paraskeva (2010) show that within an undergraduate student context, online portfolios are related to students' learning behaviours in terms of planning, monitoring, and self-reflection.

However, postgraduate students, who are expected to be highly motivated and value the use of online portfolios, need to be further examined whether they use online portfolios to regulate and reflect on their learning processes.

5. Method

The study was carried out within a university postgraduate professional practice programme. This programme was selected because of its blended (online and face-to-face) and inquiry-based approaches and because it made use of online portfolios. The Mahara open source software platform (http://www.mahara.org/) was the online portfolio used in this programme.

The study applied mixed-methods research, with quantitative and qualitative methods used in combination (Creswell & Garrett, 2008; Creswell & Plano Clark, 2011) to provide a better understanding of students' learning behaviour and their use of online portfolios. The explanatory sequential design (Creswell, 2009) of mixed-methods research was selected because the data needed to be collected and analysed in sequence: the results of the first phase (questionnaire) provided the basis for designing the approach of the second phase (semi-structured interview) and the selection of participants for this phase.

Generally, the explanatory sequential design is presented as a two-phase study (Creswell & Plano Clark, 2011). However, in the current research this was adapted as a three-phase study to include a follow-up questionnaire towards the end of the year.

5.1 Phase One

Phase one of data collection occurred at the beginning of the academic year to examine students' SRL skills and their perceptions of the usefulness of online portfolios. Questionnaire One was used to gather data.

5.1.1 Participants

The sample consisted of 64 postgraduate students who studied in a special and inclusive education programme and who completed the questionnaire. The scores gained from this questionnaire were used to categorise students into three SRL groups: high (23), medium (15), and low (26). The medium group was excluded in order to provide a contrast between the two extreme SRL groups: high and low (see Figure 2).

Students whose scores were equal to or greater than one-third of the standard deviation above the mean formed the high SRL group, and students whose scores were equal to or lower than one-third of the standard deviation below the mean formed the low SRL group. The reason for selecting students with one-third of the standard deviation above or below the mean was to minimise the degree of overlap in scores that often results from the median-split method, which is frequently used to form high and low groups. Another reason to use the one-third of a standard deviation cut-off was to provide an adequate sample size to perform appropriate statistical analysis.
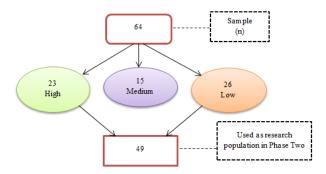

Figure 2: Research sample for Phase One of data collection

Figure 2 shows the students from the high and low SRL groups (49) who were then used as the research population in Phase Two of the data collection.

5.1.2 Instrument

A questionnaire was used as the instrument to gather data in Phase One. The questionnaire consisted of three sections: personal information, SRL skills, and the perceptions of the usefulness of online portfolios. In the first section, students were asked about their gender, age, highest qualifications, experience in online learning, and the extent of their experience in inclusive education.

The second section included questions about learning behaviour throughout the three phases of the SRL framework (Zimmerman, 1998b). As this study involved postgraduate students in a blended learning environment, the questionnaire items were adapted from the Online Self-regulated Learning Questionnaire (OSLQ) (Barnard, Lan, To, Paton, & Lai, 2009), which was developed to examine SRL skills in an online learning context. Questionnaire items were also adapted from the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich & De Groot, 1990), which was developed specifically for school children.

The third section included questions about the usefulness of online portfolios in relation to learning. These were developed based on research on the use and purpose of online portfolios in learning situations, and specifically for the students in this programme.

5.1.3 Procedures

The questionnaire was piloted with postgraduate students who studied in a different course, but one that had similar online and portfolio components. This pilot helped to ensure that the questions were easy to understand and had content validity. At the beginning of the academic year, 162 students in a special and inclusive education programme were invited to participate in the project. Ninety-three students participated in the questionnaire, but only 64 completed the entire questionnaire. Therefore, those 64 students comprised the sample for Phase One.

5.2 Phase Two

This phase involved follow-up interviews with selected students from the high and low SRL groups. Individual semi-structured interviews were used to gather students' views on the usefulness of online portfolios in relation to their learning experience. They were also used to gain a better understanding of students' learning behaviour in a blended learning environment.

5.2.1 Participants

The interview sample was selected from the Phase One sample of 49 students (see Figure 2). Of these 49 students, 30 (16 high SRL and 14 low SRL) volunteered to participate. A nested sampling design (Onwuegbuzie & Leech, 2007) was used to select the sample in Phase Two of data collection (see Figure 3).
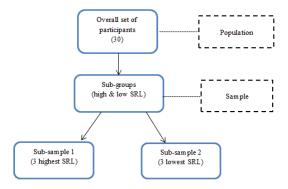

Figure 3: The flow of the nested sampling design used in this study

It has been suggested that the minimum size for the nested sampling design is three or more participants from each sub-sample (Onwuegbuzie & Leech, 2007). Following this suggestion, the three students with the highest SRL scores (sub-sample 1) and the three students with the lowest SRL scores (sub-sample 2) were selected to be interviewed.

The reason for interviewing the high SRL students was to examine their learning approach in relation to their use of online portfolios. The goal of interviewing the low SRL students was to determine which phase(s) of SRL were problematic by discussing their use of learning strategies and asking their opinions about the use of online portfolios.

5.2.2 Instrument

Semi-structured interviews were used to gather information about the students' learning behaviour and their opinions on the usefulness of online portfolios. The questions were developed around SRL skills and the use of online portfolios in relation to the programme. The information gained from these interviews provided opportunities for the high and low SRL students to providing further insight into the questionnaire findings.

5.2.3 Procedures

The first stage of the interview process involved selecting the students to be interviewed. The second stage involved formulating the questions to be asked. In the third stage, these questions were piloted with three students who were studying in a postgraduate programme, but who were not in the special and inclusive education programme.

The fourth stage was arranging the interviews, and a study room in a library at a university in New Zealand, was chosen as the venue. The interview times were arranged to suit the students to be interviewed. The interviews were conducted individually and the interviews were then transcribed and returned to the interview students for checking in order to enhance the content validity of the findings.

5.3   Phase Three

Students' SRL skills and their perceptions of the usefulness of online portfolios were measured again in Phase Three of data collection. The measurement in this phase was used to determine the development of students' learning strategies and their use of online portfolios over the year.

5.3.1 Participants

The same students in the programme were invited to participate in Phase Three. However, of the 92 students who participated in Phase Three, only 14 of the original 23 high SRL students and 19 of the original 26 low SRL students were available to participate.

5.3.2 Instrument

The questionnaire from Phase One was used again to determine the development of students' SRL skills and examine their perceptions of the usefulness of online portfolios in relation to their learning in this programme. However, three open-ended questions were added to gain more information about whether the use of online portfolios helped students to regulate their learning and what the factors were that helped or hindered them in building and using their online portfolios.

5.3.3 Procedures

Phase Three of data collection was conducted at the end of the academic year. Ninety-two students completed the questionnaire.

6.   Results

The results of the study are based on both quantitative and qualitative analyses. The data show that students in both the high and low SRL groups were predominantly women and were mostly between 51 and 60 years old. Most of them had experience working in special and inclusive education. However, more students in the high SRL group had higher qualifications than those in the low SRL group.

Pearson product moment correlations were used to calculate and examine the relationship between students' SRL skills and their perceptions of online portfolios (see Table 1).

Table 1: Correlations Between Students' Self-Regulated Learning and Their Perceptions of the Usefulness of Online Portfolios

	(1)	(2)	(3)	(4)	(5)
SRL (1)	1.00				
Forethought (2)	.92**	1.00			
Performance (3)	.96**	.82**	1.00		
Self-reflection (4)	.83**	.68**	.70**	1.00	
Perceptions of the Usefulness of Online Portfolios (5)	**.60****	.57**	.59**	.48**	1.00

Table 1 shows that there was a strong positive relationship between students' SRL skills and their perceptions of the usefulness of online portfolios (.60), and this relationship was statistically significant ($p < .01$). This result indicates that students who had high SRL skills were more likely to perceive online portfolios as being useful for their learning across the three phases of the SRL framework than students who had low SRL skills.

Similarly, results from the interviews also found that students with higher SRL perceived an online portfolio as a useful tool to help them regulate their learning, and they tended to use it for their personal development. However, students with lower SRL reported that using an online portfolio was added extra work for them, and they perceive that it was just a storage tool for their work.

The study further examined the development of students' SRL and their perceptions of the usefulness of online portfolios throughout the year. A two-way analysis of variance with repeated measures was used. The between-groups factor was the SRL group (high, low SRL) and the within-groups factor was Time (Questionnaire One, Questionnaire Two). The results are presented in Table 2.

Table 2: Respondents' Mean Scores and Repeated Measure Analyses of Variance Test for Self-Regulated Learning and Perceptions of the Usefulness of Online Portfolios

Variables	SRL groups							
	High (n = 14)				Low (n = 19)			
	Q1		Q2		Q1		Q2	
	M	SD	M	SD	M	SD	M	SD
<u>SRL</u>	423.79	26.35	431.14	23.00	318.58	34.77	349.63	48.84
Forethought	123.50	10.34	126.21	10.82	90.05	13.11	102.42	14.10
Performance	194.64	16.85	195.00	10.44	141.58	19.93	153.32	28.92
Self-reflection	105.64	9.10	109.93	10.15	86.95	11.63	93.89	12.49
<u>Perceptions of the usefulness of online portfolios</u>	94.50	26.61	102.29	20.43	66.16	26.71	83.58	26.21

The results show that the SRL scores for both high and low SRL groups increased over the year, but tended to increase at a different rate. There was a tendency for the scores for the low SRL group to increase more than the scores for the high SRL group, but it was not statistically significant. An examination of the data showed that the high SRL group improved by 7.35 points on their SRL skills, whereas the low SRL group improved at a markedly greater rate of 31.05 points. The reason these results were not statistically significant is due to the relatively small sample size.

Similarly, the perceptions of the usefulness of online portfolios scores for both the high and low SRL groups also increased over the time period. However, the low SRL group appeared to increase at a greater rate than the high SRL group, but these increases were not statistically significant.

The study also sought to determine what factors had helped students to construct and use their online portfolios, and what factors had hindered them. Results showed that course support – such as technical support, motivation, peer support, and lecturer support – were important factors in helping students construct and use their online portfolios. However, lack of technology skills and time constraints were critical factors in hindering students' construction and use of their online portfolios.

7. Discussion

This study examined the relationship between postgraduate students' SRL and their perceptions of the usefulness of online portfolios. Results from both quantitative and qualitative data showed that SRL related positively to perceptions of the usefulness of online portfolios. Students from both high and low SRL groups perceived that using online portfolios allowed for convenience (accessibility) and that they could be manipulated (flexibility) for their personal needs. Further, they made it easy to share their work and other related links.

High SRL students tended to value online portfolios to help them regulate their learning and they identified benefits related to self-reflection. Low SRL students, however, seemed to believe that an online portfolio was a storage tool for keeping their work together and sharing it with others, but they did not identify the metacognitive aspects of self-reflection.

In effect, low SRL students seemed to use online portfolios as a *product* (storage tool) rather than as a *process* (self-reflective tool), whereas high SRL students tended to use it as both a *product* and a *process*.

Further findings showed that students from both SRL groups found that course support, their motivation, peer support and lecturer support helped them to construct and use their online portfolios. They reported that having support from the programme – technical support and examples of online portfolios – helped them to learn step-by-step, and they gained more confidence in using a new technology tool. Talking to peers and lecturers about issues relating to online portfolios also helped them to increase their knowledge of using online portfolios to support their learning.

However, they said that using online portfolios was challenging. The big obstacles for them in constructing and using their online portfolios were lack of technology skills and time constraints. This was particular true for the low SRL group.

Throughout the year students from both SRL groups reported an increase in their SRL skills and perceptions of the usefulness of online portfolios in terms of a self-reflective tool. This evidence was related to the reciprocal interaction (Bandura, 1986) of students' motivation, their behaviour, and their learning environment.

In summary, SRL skills have a positive relationship with the use of online portfolios. Students who show the effective use of an online portfolio are likely to have higher SRL skills. To improve students' use of online portfolios, students need to get sufficient support from the university course in order to develop their learning strategies through

three learning factors: Person, behaviour, and environment.

8. Implications of the study

Self-regulated learning cyclical phases (Zimmerman, 1998b) are aligned with the use of online portfolios as a *product* and a *process* (Barrett, 2010). Further, both SRL and online portfolio use are influenced by the reciprocal interaction of learning (Bandura, 1986) of person, behaviour, and environment. These three learning approaches can be integrated, as demonstrated in Figure 4.
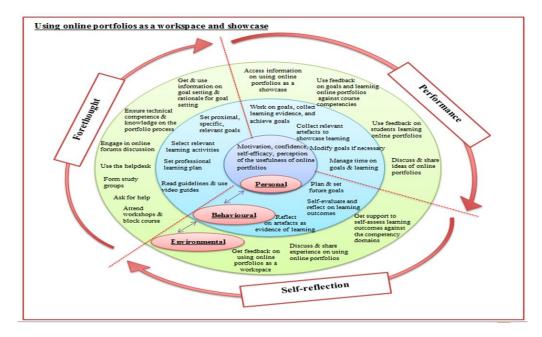

Figure 4: The integration of self-regulated learning and the use of online portfolios within a social cognitive approach

Figure 4 shows that students' learning behaviour of forethought, performance, and self-reflection relate to the use of online portfolios throughout the stages of collection, selection, and reflection. This relationship can be further analysed by examining the interaction of students' personal, behavioural, and environmental factors.

Bandura's (1986) framework of social cognitive theory is represented as three layers of the circle in Figure 4. In the social cognitive view, learners' beliefs, thoughts, and values are important in influencing their behaviour (Schunk, Meece, & Pintrich, 2014). The processes of SRL and the use of online portfolios are conceptualised in this model as being influenced by students' personal factors (placed in the centre of the circle in Figure 4), including motivation, self-efficacy, and their perceptions of the usefulness of online portfolios.

The personal factors influenced both the behavioural and environmental factors in using online portfolios and related back to the three phases of SRL. When students were motivated, they perceived online portfolios as being useful for their learning, and believed in their ability to create and use them (personal), they made an effort to use a range of learning strategies (behavioural), and used course support provided (environment) to ensure the effective use of their online portfolios.

9. Conclusion

Students' skills across the three phases of SRL (forethought, performance, and self-reflection), the use of online portfolios (collection, selection, and reflection), and the three elements of learning (person, behaviour, and environment) are interrelated. In other words, SRL skills are positively related to the use of online portfolios, and they both could be

influenced by the three learning factors within a social cognitive perspective. The integration of these three learning approaches can be used for both students and course coordinators to enhance students' SRL skills, and to make better use of online portfolios for teaching and learning in a university online learning context in order to improve postgraduate student learning outcomes.

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