Scaffolding for success in e-learning: Self-regulation of the online learner using the LASSI inventory.

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Abstract: This study examined the effects of self-regulation and scaffolding on graduate students in E-learning. Participants took the Learning and Study Strategies Inventory (LASSI) for online learners in the beginning (pre-test) and at the end of a semester course (post-test). They were also required to write a reflection based upon their LASSI results in order to identify their strengths and limitations. Course instructors provided students with techniques to improve their areas of weakness as scaffolding. Findings suggested that participants’ scores significantly increased on the post-test. It appears that participants developed self-regulating skills when provided with scaffolding opportunities.

Keywords: E-learning, scaffolding, self-regulation, higher education, LASSI

Background

When college students decide to register for an online class they need to be aware of the requisite abilities that learning in this format demands. Online learning requires a certain genre of student, or perhaps more definitively, a student who is prepared for an online learning environment. Smith (2005) noted the relevance of this issue in web-based course delivery by observing that, “assessing student readiness for online learning is an issue facing many education and training providers as more learning opportunities are made available online in varying formats” (p. 3). While higher education institutions have become increasingly interested in assessing readiness through measuring such student traits as self-management and self-direction (Smith, 2005; Smith, Murphy, & Mahoney, 2003) in an attempt to better fit students with online and traditional learning environments, the question arises as to whether more students could thrive in the
online learning environment given proper supports or what has been termed *scaffolding*.

This paper describes the outcome of a mixed-methods research that focused on college student self-analysis of readiness to participate in online learning and the affects that scaffolding could potentially play in supporting students in online coursework. Given the increasing progress of institutions of higher education in moving toward web-based distance delivery methods as a cost effective and convenient means of providing opportunities for more learners to continue their educations (Richardson & Swan, 2003; Pan, 2003), this paper intends to illustrate how universities and colleges may help their students adapt to online learning in lieu of many students being unprepared to experience this form of instructional delivery.

**Online Learning and Online Learners**

The first question at hand is what exactly embodies the term online learning. As Smith (2005) observed:

> At one end of a spectrum it can mean that learning materials are available to learners electronically for them to read on screen or download, but without any communication between instructor and learner. At a similarly basic level it can mean merely the occasional exchange of emails between learner and instructor, with no other learning resources or experiences provided in electronic form. At a much more sophisticated level it can mean that learning resources are available electronically, and supported by a groupware system where learners can interact together and interact with their instructor. (p. 3)

The academic rigor of e-learning in higher education has been questioned (Schweizer, Whipp, & Hayslett, 2003). Schweizer, Whipp, and Hayslett (2003) urge that quality can be designed into online courses by having students analyze authentic real world tasks through multiple means and lenses of analysis, establishing a learner-controlled learning community with definitive goals, encouraging the social negotiation of meaning through both formal and informal exchanges, and providing assistance for learners at various levels. Schweizer, Whipp, and Hayslett (2003) further note that successful online learning is highly dependent on “training instructors to establish a supportive climate, providing constructive feedback, and asking critical and probing questions” (p. 37).

Smith (2005) observed that there are dispositional variables that influence online learning engagement; that is, personal characteristics of the online learner that are conducive or detrimental to their learning in an online format. Such characteristics include efficacy of Internet use and communication. Since web-based delivery requires online learners to utilize the Internet to access resources, including readings and communication tools, it is obvious that both Internet
efficacy and strength in the generation of text-based communication are required characteristics of the online learner. Anderson (2004) noted that “a strong sense of Internet efficacy allows users to adapt effectively to the requirements of working in this environment” (p. 36). Anderson further observed that there is a spectrum of communication skills online learners may utilize from their repertoire of skills: “they will exercise their mastery of communication norms and tools, some of which will not be appropriate to an educational online context” (p. 36).

Communication in e-learning, or web-based course delivery, functions differently than in the traditional classroom setting. For instance communication can be in an asynchronous and synchronous format using text, audio, and video (Anderson, 2004). In terms of asynchronous communication, this denotes that students learning in this web-based format must be comfortable with lags in time between communicating with each other and the instructor. Synchronous communication would be equivalent to communicating with each other in real time using some form of web-based tool or interface (chat, streaming audio and video, or other live virtual classroom environments). This type of communication interface may be challenging to some students because of the lack of visual cues, such as in the case of streaming audio and text-based synchronous communication, lack of familiarity with these tools in general, or that the interface does not easily breed social ties between students (Ellis & Romano, 2008).

Another factor that takes a large focus in E-learning literature that revolves around communication is the idea of social presence. Social presence has been defined as the ability of online learners to project themselves into the web-based environment which has few visual or contextual cues (Stacey, 2002) as a great deal of resources remain to be text-based. “In any social group, individuals participating in distance education must feel like they belong. This sense of belonging or ‘presence’ enables students to interact comfortably with peers as well as instructors” (Beldarrain, 2006, p. 148). The E-learning literature points to the importance of social learning conventions being built into course design. Stacey (2002) points to the social context of group interaction, in developing consensus knowledge through communicating different perspectives as being the primary goal in online communication between peers and with the instructor. The idea is that through the dialectic process the individuals participating will construct ideas, be confronted on their opinions, and reconstruct their knowledge from the exchange. This aspect is not unlike the traditional classroom as students debate points of view with each other and the instructor, but it does differ in that since this is frequently accomplished in a text-based format online through the use of discussion boards, wikis, and blogs, it requires the online learner to have a fluidity of text-based communication. Tu and McIsaac (2002) have discussed several factors that facilitate the fluidity of communication between course participants including the tone of communication being pleasant, immediacy of responses, and written work that promotes responsiveness.

Online learning has been termed on-demand education because of the flexibility of time and space experienced by students. To a large degree students
choose online classes because they are not tied to a class schedule or a physical location. This being said, students who engage in this form of autonomous learning require time management skills not associated with traditional classroom learning (Song, Singleton, Hill, & Koh, 2004).

Learner motivation has also been seen as a contributing factor in student success in online learning. Muilenburg and Berge (2005) define motivation in terms of E-learning as “the psychological processes that cause students to persist in meeting their learning goals” (p. 32). Muilenburg and Berge (2005) observed that student motivation in E-learning environments could be influenced by (a) procrastination, (b) lack of personal motivation for online learning, (c) more responsibility for learning, and (d) the lack of the possibility of selecting less demanding aspects of assignments. Thus, students who do not find computer use and online interaction engaging may struggle with attention, concentration, motivation to participate, and in preparing study aids and engaging in other strategies such as self-testing to enhance academic performance.

The LASSI and Scaffolding as a Self-regulation Strategy

As a pioneer in social learning theory Vygotsky (1978) suggested two levels of student performance; the actual level of the child and the potential level. This theory he coined as the Zone of Proximal Development. As such, he stipulated that through supportive educational methods, including peer engagement, learners are capable of accomplishing much more through teacher and peer supported learning than on their own. Further, Bruner (1978) suggested teachers assist learners through creating an instructional scaffold in the classroom. That is, teachers actively search out ways to reduce student failure by breaking tasks into accomplishable units, drawing student attention to critical features, and demonstrating solutions (Bruner, 1978).

Zimmerman (2002) stated “although teachers also need to know a student’s strengths and limitations in learning, their goal should be to empower their students to become self-aware of these differences” (p. 65). Participants in this study were required to perform a self-analysis in order to discover their strengths and limitations as online learners. Scaffolding was used to support students who needed to improve on specific skills as outlined by the LASSI inventory. In this sense, learner-centered strategies were used in the form of diagnostic tools and activities, so that pre-existing knowledge structures were made visible to both the teacher and the student (Anderson, 2004) and supports to help learners learn through activity were suggested (Tabak, 2004).

Methodology

This paper used mixed-methods in the collection of data in order to identify the weaknesses of the participants taking online courses. Both quantitative and
Qualitative data collection methods were employed in this study in order to fully understand the participants’ needs as online learners. The quantitative data collected identified the areas in which participants needed to improve upon while a narrative self-reflection allowed for a more in-depth analysis of their requirements and strategies implemented to improve the quality of their online experiences. Participants were asked to fill out a pre and post survey as well as to write a pre and post personal reflection of their online skills. This section of the paper will discuss the participants, instruments used to collect data, and data analysis.

A total of 55 graduate students enrolled in an education program at a private four-year university participated in this study. Students enrolled during the summer semester in either one of the two required classes; Special Education Law or Principles of Instructional Technology. These classes were offered web-based using the Angel Learning Management System or WebCT courseware as a platform for the online environment. During the first week of classes students were asked to take a survey online; the LASSI for Online Learners. According to H&H Publishing (2006) the Learning and Study Strategies Inventory is composed of 11 scales that aims to identify areas in which students may need additional assistance in order to be successful in an online classroom.

After taking the Learning and Study Strategies Inventory (LASSI) for online learners students reviewed their results and wrote a reflection focusing on their main weaknesses demonstrated on the assessment. Professors reviewed all the data (survey results and narratives) presented by the students and prepared a list of suggestions that could be incorporated by the students throughout the semester in order to help them improve their online course experiences. Strategies were suggested for every category of the LASSI assessment. Online communication was an area in which most of the students identified as an area of weakness. The strategies suggested included the following directives: (1) make sure to become familiar with e-mail system, chat rooms, Wimba, & discussion boards, (2) team discussion areas and blogs have been created for students to discuss case studies and legal issues. Please use these environments to interact with peers, (3) students can “meet” online in the chat rooms to have real life discussions, (4) professor will be available during assigned online office hours. Please feel free to drop in, (5) when participating in discussion boards or blogs students may feel overwhelmed. It is always a good idea to read the postings in a chronological format in order to understand the sequence of the discussion, and (6) when reading postings on discussion boards make sure to read them as they are posted. Avoid leaving it for later. Actively participate in the discussion! If you are slow to post on discussion boards, make sure to develop a “posting schedule” to ensure that you read and post in the discussion boards during that time.
Time management suggestions included the following directives: (1) set goals and priorities, (2) tackle your most difficult assignments during peak concentration times / when you are most productive, (3) divide your project into small, manageable pieces, (4) use a schedule/planner and make sure to schedule time for studying and completing assignments, (5) follow the course syllabus, and (6) learn to identify procrastination. In the category of selecting main ideas, directives included: (1) in order to identify important information in this online course so that you can focus your attention and information processing strategies on appropriate material follow the Introduction section of each chapter, (2) always make sure that if there is a corresponding Flash Lecture archive noted in the introduction of the chapter, that you look at that material in its entirety, (3) before attempting to do any of the assignments make sure to read the assignment rubric.

At the end of the course, participants were asked to take the LASSI again and write a reflection focusing on what strategies helped them to improve their skills as online learners. Survey results were aggregated and analyzed using t-tests for dependent samples. Anecdotal data were used to triangulate participants’ survey responses with the quantitative data in order to provide a more in-depth scope of results.

**Results**

T-tests for dependent samples were performed to assess the difference between the pre and post LASSI for online learners’ assessments. A significant statistical difference (p< 0.05) was found in all eleven categories. See Table 1 for complete details of all categories.

<table>
<thead>
<tr>
<th>Pair (pre &amp; post)</th>
<th>T</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>Std. Error Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>4.369</td>
<td>54</td>
<td>.000</td>
<td>3.509</td>
<td>.803</td>
</tr>
<tr>
<td>Attitude</td>
<td>5.664</td>
<td>54</td>
<td>.000</td>
<td>2.655</td>
<td>.469</td>
</tr>
<tr>
<td>Communication</td>
<td>5.091</td>
<td>54</td>
<td>.000</td>
<td>2.818</td>
<td>.554</td>
</tr>
<tr>
<td>Concentration</td>
<td>5.354</td>
<td>54</td>
<td>.000</td>
<td>2.636</td>
<td>.605</td>
</tr>
<tr>
<td>Information Processing</td>
<td>4.119</td>
<td>54</td>
<td>.000</td>
<td>2.382</td>
<td>.578</td>
</tr>
</tbody>
</table>
Narrative data has been included to flesh out the nature of the quantitative results described above. Matching pre and post reflections for three different participants have been included in an attempt to illustrate the affect of self-analysis of deficits on guiding self-regulating behaviours given proper scaffolding opportunities. Participants’ general responses held with the following narrative response from one of the participants:

It was extremely helpful to take these surveys before and after the course because it really brought our weaknesses to the forefront and allowed us to work on them throughout the course. Many of us may have known that we had these weaknesses, but push them to the back hoping they will go away. Knowing that we have to confront them is a powerful combating agent.

Participant 1

Pre-reflection

I was not surprised to learn that information processing is an area for improvement. I am one that usually looks at the facts but I know I need to move towards becoming a learner that not only looks at the facts, but also looks at applying those facts to actual situations in the world of education. If I do not, it could become detrimental to my studies. I know that I need to work on making the information “real” and “applicable” to my own experiences in the profession. . . . Communication is an area that is also considered a weakness of mine. . . . I would say I am a very good communicator with my professor during online courses, but need to work on taking advantage of online interactions/discussions with classmates. This problem could be potentially detrimental to my learning if I do not. I think this is a problem with me because I find that discussion boards can be somewhat overwhelming when I log-on to Angel and see that there are 29 new discussion posts. I feel as though I don’t know where to begin.

Post-reflection

My LASSI post-survey showed that I had some improvement in some areas! I was better able to use study aids this time around to help with my learning, and prepare for quizzes using testing
strategies. For study aids, I found that copying and pasting key points into a Word Document helped me learn and keep track of important information. It was the information I went and reread before the quiz. I found I continued to be pretty good at identifying the key points and important information as I went. According to [the] LASSI, I improved a little bit in communication. I found it easier to keep up with discussion posts since you broke us down into teams. There were only 4 or 5 posts I would have to read when I logged on, rather than 20 or 30 like I had with my last class. Having fewer allowed me time to thoroughly read through my classmates’ answers, and respond when I felt necessary. It was not as overwhelming to me as it has been in the past and I really appreciated that!

Participant 2

Pre-reflection

The LASSI survey gave great insight into my online learning strengths and weaknesses. Prior to taking the survey, I was aware of some of my weaknesses because I have dealt with them throughout my college career. My two lowest areas were Anxiety (50) and Time Management (45). I wish I could say that these two areas have not plagued me for several years, but indeed they have been the skeletons in my closet. I do feel that throughout my academic career I have made steps in the right direction in correcting these issues; however they still rear their ugly heads every now and again.

Post-reflection

The suggestions that were e-mailed to us at the beginning of the session were very enlightening and helpful, even in the areas that may not have been my lowest. My two lowest scores were in Anxiety and Time Management. . . . Not only did my time management improve with doing assignments, but also in general. . . .In the suggestions e-mailed to us, you had said to do school work when we were most productive and focused. I also think that this was one of my main problems. I had a tendency to do homework when I came home from work at 11:00pm. Realistically, after being at work for 12 hours or so, homework was the last thing I wanted to be doing. I would not put forth as much effort as I should have because I was so tired. I decided that instead of working out in the morning, I would do my homework. Then, when I left work I would go to the gym because I was already up and ready to go.

Participant 3

Pre-reflection

I found the LASSI quiz very informative, and I learned a lot about how my learning style can affect my success in this class. There were a number of areas where I fell under the 50th percentile. I have reflected on these areas as well as all the areas and have thought of ways to make myself a more successful learner. . . . I have a lot of anxiety when it comes to tests as well as when I am working with technology. This problem can have a serious effect on the outcome of my work. To avoid having problems with this, I will
begin working on my assignments early to ensure that I will be able to get them done and turned in on time, even if I do have a problem. I will also seek help and know where to turn if/when I have a problem.

Post-reflection

On my original survey, I did not score well in any of the areas of the test. In the anxiety section I scored in the 5th percentile. To help myself with my anxiety about this class, I worked to really focus on my improvements and successes. Every time I got an assignment done, I got to cross it off my list, and that really helped me to see how well I was doing. I also rejoiced at every small thing that I did right. I thought that this class was going to be really hard for me, but once I changed my attitude about it, I really started enjoying myself. On the second survey I ended up scoring in the 80th percentile.

For most of the participants, these online courses represented their first endeavor in E-learning. As such, the LASSI pre-test allowed them to reflect upon their learning strategies and identify the areas of weakness which needed to be improved.

Discussion

Zimmerman (2002) defined metacognition “as the awareness of and knowledge about one’s own thinking” (p. 65). Further, students’ deficiencies in learning could be “attributed to a lack of metacognitive awareness of personal limitations and an inability to compensate” (Zimmerman, 2002, p. 65). By initially taking the LASSI inventory at the beginning of the course, participants were able to reflect upon their strengths and weaknesses, and to identify their personal limitations in online learning. In this study, scaffolding took the form of a list of suggested resources, sorted by area of weakness, that were aligned to the 11 categories of the LASSI. Results indicated that significant gains were made in all categories by participants.

From the qualitative data, it appears that participants made good use of scaffolding strategies offered by the course instructors. Quite interesting though, was the fact that several participants also noted coming up with their own novel strategies, having become aware of their weaknesses in E-learning. This marks a solid step toward their self-regulation of learning. As Zimmerman (2002) observed, “self-regulation is not a mental ability or an academic performance skill; rather it is the self-directive process by which learners transform their mental abilities into academic skills” (p. 65). He further clarified that “learning is viewed as an activity that students do for themselves in a proactive way rather than as a covert event that happens to them in reaction to teaching” (p. 65).

As higher education institutions progressively incentivize and utilize E-learning, findings would suggest that institutions should work from a more inclusionary perspective; that is, instead of excluding students from qualifying for
online instruction because of failure to meet readiness criteria, institutions should focus on training instructors on how to scaffold through instructional design to serve a more heterogeneous group of learners.

References


