The International Journal of Research and Review

Volume 10, March 2013

The International Journal of Research and Review is an international interdisciplinary journal that publish empirical reports in the various fields of Social Science.
Submission Guidelines

The empirical reports featured in the TIJRR are diverse considering the varied fields it can accommodate. The types of empirical reports include:

1. Research Article – ranges from basic and applied research empirical studies employing complex methodologies such as experimentation, survey, evaluation etc. using qualitative or quantitative studies.
2. Literature Review and Metanalysis Studies – synthesis of reviews from journals are viable in this category.
3. Commentary article on theories and models – Issues on previous theories and models are acceptable.

Articles are submitted to the editor at tijrr@yahoo.com. A cover letter indicating contact information of the author(s) is submitted together with the manuscript in word format.

Manuscript Preparation

Submitted manuscript should be typed single spaced. Consult the “Publication Manual of the APA” (latest editions) for detailed guidelines in writing and formatting the manuscript.
<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Use of Self-Regulated Learning, Formative Assessment, and Mastery Learning to Assist Students Enrolled in Developmental Mathematics: A Demonstration Project</td>
<td>John Hudesman, Nicholas Millet, Grazyna Niezgoda, Sandie Han, and Bert Flugman</td>
</tr>
<tr>
<td>18</td>
<td>The Mediating Effect of Academic Self Efficacy on Relatedness, Autonomy, and Academic Engagement</td>
<td>Christina S. Sison and Sr. Praseena Sebastian'</td>
</tr>
<tr>
<td>34</td>
<td>College Self-Efficacy and Academic Satisfaction Moderated by Academic Stress</td>
<td>Jasmine Nadja J. Pinugu</td>
</tr>
</tbody>
</table>
The Use of Self-Regulated Learning, Formative Assessment, and Mastery Learning to Assist Students Enrolled in Developmental Mathematics: A Demonstration Project

John Hudesman
New York City College of Technology & Center for Advanced Study in Education, CUNY Graduate School and University Center

Nicholas Millet
New York City College of Technology

Grazyna Niezgoda
New York City College of Technology

Sandie Han
New York City College of Technology

Bert Flugman
Center for Advanced Study in Education, CUNY Graduate School and University Center

Abstract
This paper outlines a program that combines traditional content formative assessment together with self-regulated learning (SRL) and mastery learning features, to assist at-risk students from two-year and four-year colleges that were enrolled in a developmental mathematics course. The program results support a relationship between the students’ level of engagement in the program and their academic success. We also found that both successful and unsuccessful students had very positive perceptions of the program, in contrast to their previous experiences in mathematics classes.

Keywords. Formative assessment, self-regulated learning, developmental mathematics, student engagement

Introduction
The mathematics readiness of students entering college is a major concern. In a recent study from the American Diploma Project (2010) it was reported that 81% of twelfth graders were rated as having below a basic level of performance in Algebra I, and 98% of twelfth graders needed additional preparation in Algebra II. As a result there is an overflow of demand for developmental mathematics courses at the college level. For example, Lutzer, Rodi, Kirkman, and Maxwell (2007) found that in some community college mathematics departments, developmental coursework comprised half of all of the department offerings. However, once enrolled in a developmental mathematics course, the picture becomes still bleaker. Bailey (2009) reported that as a consequence of the students’ lack of preparation they can require up to two years of developmental mathematics course work. As a
result, most of these students are unable to endure the challenge and leave school. These findings parallel those reported by the Carnegie Foundation (2009) in that between 60% and 70% of developmental mathematics students do not successfully complete the prescribed sequence of required courses.

This paper described how a self-regulated learning (SRL), formative assessment, and mastery learning program can provide an effective and supportive environment for students, many of whom have failed developmental mathematics courses multiple times. We will describe how the program was implemented, how it emphasized the constructive use of feedback, and how students’ reacted to and were affected by it.

**Formative Assessment.** Formative assessment programs can be of significant assistance in helping students to improve their academic performance. Black and William (1998a, 1998b, 2009) have dramatically highlighted formative assessment’s contribution to pre-college student learning. They concluded that achievement gains generated by using formative assessment across a range of content domains were among the largest ever reported for an education intervention, with the largest gains realized among low achievers. Similarly, Hattie and Timperely (2007) reviewed 196 K – 12 formative assessment and feedback studies and found a positive mean effect size of 0.79 for achievement measures - an effect greater than students’ socioeconomic background, and reduced class size.

However, it should be noted that not all formative assessment programs are equally successful. For example, Heritage (2010) emphasized the need to include formative assessments as part of the ongoing instructional process as opposed to just relying on the information provided to students by a quiz or other instrument. Similarly, Sadler (1989) describes successful formative assessment programs as starting with an assessment instrument but then requiring instructors to use the assessment to change their instruction. It is also necessary that students demonstrate that they can use the feedback generated by the assessment to make changes in how they approach their learning. Furthermore, Hattie and Timperely (2007) cautioned that the effect sizes for formative assessment programs varied widely depending upon the type of feedback that instructors provided for their students. For example, positive or negative reinforcement feedback alone was far less effective than feedback that included specific guidance on how to improve performance.

**Self-Regulated Learning (SRL).** To date, almost all of formative assessment interventions have emphasized content competency to the exclusion of “learning how to learn” or metacognitive, and self-regulatory skill development. We believe that formative assessment related to course content can be significantly improved upon when students’ self-regulatory and metacognitive competencies are also explicitly targeted for development during the assessment process.

The SRL approach guiding our work is based on models of self-regulated learning developed by Zimmerman (2000, 2002, and 2006) and Grant (2003, 2008).
Our approach uses a psycho-educational model characterized by continuous feedback cycles where each feedback cycle is broken down into three main phases, as illustrated in Figure 1. The first is a planning phase, in which students review their past efforts, conduct academic task analyses, select those strategies that best address their specific learning challenge, set identifiable goals, and make self-efficacy and self-evaluation judgments to assess the accuracy of their level of understanding and content mastery. Next is a practice phase, in which students implement their plans, monitor their progress, and make real-time adjustments to their learning plans. This is followed by an evaluation phase, in which students assess each strategy’s effectiveness in progressing towards the goal. Students then build on the successful strategies and/or modify or replace less effective ones. The students’ responses from the evaluation phase become the basis for the planning phase of the next SRL cycle.

The power of SRL competence is highlighted in a classic study in social learning theory by Zimmerman and Bandura (1994). They demonstrated that students’ SRL skill levels were more highly correlated with their college grade point average than were their scores on standardized tests such as the SAT. More recently, Zimmerman, Moylan, Hudesman, White, and Flugman, (2011), Hudesman, Zimmerman, and Flugman (2010), and Blank, Hudesman, and Zimmerman (2008) demonstrated that an SRL program with formative assessment and mastery learning features can improve the performance of students in developmental mathematics and other STEM disciplines.

Feedback: A Key Element in Both Models. Implicit in an SRL program with formative assessment and mastery learning features is that feedback is a key element in these approaches. For example, in formative assessment, both students and teachers are expected to use the feedback from classroom assessments to change their behaviors: teachers by changing their instruction and students by acting constructively on the feedback to change how they learn. Similarly, SRL derives much of its ‘power’ as a function of its iterative process: each time students complete an SRL cycle, they acquire more feedback and therefore, come closer to achieving their learning goals. Students begin to understand that learning is directly related to experimenting with different strategies, a notable shift from the common student perception that academic success is simply a function of innate ability or some other external factor (Zimmerman 2002).

The Research Questions

1. Is student engagement (as indicated by their use of a self-reflection and revision form and their attendance) related to the successful completion of a developmental mathematics course?
2. Do students develop positive perceptions of a developmental mathematics course that includes a variety of SRL, formative assessment, and mastery learning supports?
The SRL Program Method

The Setting

This demonstration program was implemented at a large urban university with multiple community (two-year), comprehensive (two year and four year), and senior level (four year) college campuses. As part of the university admissions procedure all undergraduate students are required to take placement tests in reading comprehension, writing, and mathematics. The mathematics section of the placement examination consists of the pre-algebra and algebra sections of the Computer-Adaptive Placement Assessment and Support System (COMPASS), i.e., the mathematics portion of the ACT (1997, 2006). Any student who failed either portion of the COMPASS was required to take a noncredit developmental mathematics course. After passing this course, the student was again eligible to retake the COMPASS. Students who passed this examination were then eligible to take a variety of credit bearing courses. Students who again failed the COMPASS were generally expected to retake the developmental mathematics course before they could retake the test. As a consequence, these students would also not be eligible to register for a variety of other college-level courses.

Program Participants

Each undergraduate college hosts a university funded program that provides additional educational support, counseling, and financial aid to at-risk students. Twenty-eight special program students from eight different campuses participated in this study, including students from three community colleges, two comprehensive colleges, and three senior colleges. Eleven percent of the participants were male and 89 percent were female. University wide women represent 61.3% of the special program enrollees. All of the students were either black or Hispanic. University wide, Black and Hispanic students represent about 65% of the special program enrollees (Office of Institutional Research, 2012). All the program participants had previously failed the COMPASS test, most of them multiple times. These participants were not typical incoming developmental mathematics students in that they had already attempted a mean of 32 credits and had a mean GPA of 2.11. Implicit in these statistics is that this student group was not eligible to take a variety of STEM related course, many of which are required for graduation.

During the orientation and initial phase of the program, almost all of the students indicated that they were ‘not good at mathematics,’ and referred to their COMPASS results as well as their performance in prior mathematics classes in high school and college. Therefore, a major focus of this demonstration program was to structure a supportive environment based on the constructive use of feedback, as reflected in SRL, formative assessment, and mastery learning, e.g., that students
learn that quiz errors are not measures of failure but rather they should be viewed as starting points for additional learning.

The Class

There were two sections of SRL developmental mathematics, each with 14 students. This low number of students per section is typical for special program summer session developmental mathematics courses. Each mathematics section met four days a week for five weeks for a total of 20 sessions. Each session lasted three hours. At the end of the course, students were again eligible to retake the COMPASS.

Instructors

Two instructors, GN and SH, who are also co-authors of this paper, each taught one section of the course. Both instructors had previously taught SRL developmental mathematics classes. Prior to the start of class there was one day of training for the instructors during which program features were reviewed along with the particular needs of this student group. Throughout the program instructors were observed on a regular basis. Post observation discussions with instructors were focused on optimizing the implementation of the program interventions. Discussions with instructors were also used to obtain suggestions on how to improve the program.

Counseling

The program included the services of a special program counselor (NM), who is also a co-author. His role was to explain and reinforce the instructor’s use of metacognitive and SRL features throughout the course. For example, during class he engaged students in a variety of exercises designed to demonstrate the relationship between SRL behaviors and academic outcomes. Some examples of the exercises are described in a later section of this paper. He also worked with students individually to support their use of good academic behaviors and SRL strategies.

Tutoring

Traditionally tutors are considered to be part of the instructional team at all special program summer mathematics courses. The role of the tutor is generally defined by the instructor. In our program, the tutor was responsible for scoring and returning the quizzes within the same class period, working with students on their reflection and revision forms, and being available for general assistance.
The Five Step Enhanced Formative Assessment Program Using SRL

This section summarizes the five step SRL, formative assessment, and mastery learning program and then describes each portion in more detail. Similar program descriptions can also be found in the work of Zimmerman, Moylan, Hudesman, White, and Flugman (2011), and Hudesman, Crosby, Flugman, Everson, Isaac, and Clay (2012). The five steps of the EFAP-SRL program are summarized as follows:

1) Instructors administer specially constructed quizzes that are designed to assess both the students’ mathematics and SRL competencies;

2) Instructors (or tutors) review and grade the quizzes in order to provide students with feedback about both their content and SRL competencies; instructors also use quiz feedback to adjust their instruction;

3) Students complete a specially constructed Self-Reflection and Mastery Learning Form for each incorrectly answered quiz problem. This procedure affords them an opportunity to reflect on, and then improve, both the mathematics content and SRL processes that were incorrectly applied;

4) Instructors review the completed Self-Reflection and Mastery Learning Forms to determine the degree to which students have mastered the appropriate mathematics and SRL skills. Based on the instructor’s evaluation of their work, students can earn up to the total value of the original quiz question. Based on the data, instructors also have an additional opportunity to make changes to the mathematics content and SRL topics to be covered in upcoming lessons;

5) Instructors use the feedback provided by the quiz and self-reflection/mastery learning form as the basis for ongoing class discussions and exercises, during which students discuss the relationship between their mathematics content and SRL skills. These discussions are the starting point for students to redesign a plan to improve both skill areas.

The implementation of each step is described below.

1. Mathematics Quizzes. At least once a week students took a short specially formatted quiz. The procedure for each quiz was as follows. When completing the top portion of the quiz, students were asked to predict their quiz grade and to enter the amount of time they spent preparing for the quiz. Once they started the quiz, the students were asked to read each question, but before answering it, they were asked to make a self-efficacy judgment indicating how confident they were that they could correctly solve the problem. After attempting to solve the problem, students were asked to make a second self-evaluation judgment, indicating how confident
they were that they had correctly solved the problem. A sample quiz formatted with the self-efficacy and self-evaluation judgments is illustrated in Appendix A.

2. Scoring the quizzes and providing feedback. By reviewing both the students’ mathematics content together with their SRL judgments, instructors assembled information that they could use to provide feedback for students. As a consequence, and, after determining those areas that students struggled with the most, instructors could modify their instruction. The quiz also provided the instructors with information about the relationship between the students’ quiz scores (i.e., content competencies) and the self-efficacy and self-evaluation judgments (i.e., SRL competencies). Having access to both the students’ academic content and metacognitive information is important because struggling students frequently make more optimistic predictions about their knowledge than are warranted by their actual quiz scores, indicating that they often do not recognize the difference between “what they actually know” and “what they think they know” (Tobias & Everson, 2002). As a result of this false belief, these students often do not feel any need to remedy the situation by changing their “learning how to learn” behaviors. As a result, they continue a destructive cycle of poor planning and poor academic outcomes. Being able to provide students with ongoing feedback about the relationship between their actual performance, i.e., quiz score, and their SRL competencies, e.g., predicted scores, and the relationship between their preparation time and their self-efficacy and self-evaluations judgments is critical to improving the students’ mathematics and metacognitive skill sets.

3. The SRL Mathematics Self-Reflection and Mastery Learning Form. For each incorrectly answered quiz question, students were expected to complete a separate Self-Reflection and Mastery Learning Form. This form was designed to further assist students in assessing the relationship between their content knowledge and their ability to use critical SRL tools. In the first section of this form, students were asked to: 1) compare their predicted quiz score and their actual quiz score and explain any significant discrepancy; 2) evaluate the accuracy of their academic confidence judgments, i.e., their self-efficacy and self-evaluation judgments, and compare them to their actual quiz score; 3) based on the instructor’s written feedback and/or prior class discussions, indicate which strategies were incorrectly applied when they attempted to solve the problem.

In the second section of the EFAP-SRL Reflection and Mastery Learning Form, students were again required to solve the original problem, but this time they also needed to include a written description of the specific mathematics strategies and procedures involved in their work. Students were also required to use these same mathematics strategies to solve a similar problem. A sample self-reflection form is illustrated in Appendix B.

4. Scoring the Self-Reflection and Mastery Learning Form. The SRL Reflection and Mastery Learning Form is based on a mastery learning approach in
which students are given multiple opportunities to use feedback in order to improve their performance. By completing the form, students had an opportunity to demonstrate the degree to which they could constructively use feedback to master both the mathematics and metacognitive competencies necessary to solve the problem. Students who demonstrated a complete mastery on this self-reflection and mastery form could earn up to 100% of the original credit for a problem. Instructors again used the information from the Reflection and Mastery Learning Form to plan lessons that demonstrated the relationship between mathematics content and metacognitive competencies.

5. Classroom Discussions and Exercises. Instructors are expected to have ongoing class discussions that focus on the relationship between how students effectively learn mathematics content while enhancing their self-regulation skills. One such example involves having students create individual graphs that illustrate the relationship between their SRL judgments (self-efficacy and self-evaluation judgments) and their quiz scores. In another exercise, instructors might ask students to graph their quiz predictions together with how much time they spent preparing for the quiz against their actual quiz grades. The students’ responses are then listed on the board and graphed. The results often demonstrate an obvious correlation between the students’ preparation time and their quiz scores. Students are then asked to use the feedback from this exercise to design a revised plan for improving their work.

Results

Of the 28 students who started the program, one student dropped out for medical reasons at the start of the program, one student left after she was accepted at another university, and three other students had already passed the COMPASS at the start of the course, but two of them elected to stay and use the course as an opportunity for further review. Eleven of the remaining 23 (48%) students passed the course and the COMPASS examination. According to the Carnegie report (2009) only 30% to 40% of the students enrolled in developmental mathematics courses can be expected to pass. Similarly, the range of pass rates on the COMPASS at one (participating) college was from 25% - 49%, a statistic similar to that report by the Carnegie Foundation. However, the project participants cannot be considered to be typical enrollees since most of them had already failed the course multiple times and would reasonably be expected to have lower pass rates. However, it was not possible to verify this information since no university-wide statistics were available for special program students who failed the course on multiple occasions.
Table 1

Descriptive Statistics, Percentages, and Chi-Square tests for Academic Progress Measures by Groups in Developmental Mathematics

<table>
<thead>
<tr>
<th>Academic Progress Measures</th>
<th>Passed the Course (11)</th>
<th>Failed the Course (12)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n  M ( %)</td>
<td>n  M ( %)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-COMPASS – Pre-Algebra</td>
<td>10  26.90</td>
<td>7  26.86</td>
<td>0.01</td>
<td>.989</td>
</tr>
<tr>
<td>Pre-COMPASS – Algebra</td>
<td>10  20.50</td>
<td>6  18.83</td>
<td>0.95</td>
<td>.361</td>
</tr>
<tr>
<td>Post-Compass - Pre-Algebra</td>
<td>4   37.50</td>
<td>7  30.57</td>
<td>1.47</td>
<td>.176</td>
</tr>
<tr>
<td>Post Compass - Algebra</td>
<td>10  38.40</td>
<td>12  22.00</td>
<td>6.80</td>
<td>.001</td>
</tr>
<tr>
<td>Mean Quiz Score - Algebra</td>
<td>11  39.45</td>
<td>12  24.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Revision Score</td>
<td>11  88.39</td>
<td>12  77.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Periodic Exam Score</td>
<td>11  56.54</td>
<td>12  33.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pass rates for the COMPASS</td>
<td>11  (48%)</td>
<td>12  (52%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. 1Some of the pre COMPASS scores were not available from the different colleges. 2 Students only had to retake that section of the COMPASS that they failed.

The data in Table 1 indicate that there were no differences in the pre COMPASS scores for the students who passed the course when compared to the pre COMPASS scores for students who failed the course, $M = 26.90$ vs. $M = 26.86$ for the pre COMPASS pre-algebra scores for the passing and failing groups respectively, $t = .014$, $p=.989$, and $M = 20.50$ vs. $M = 18.83$ for the COMPASS algebra scores for the students passing and failing the course respectively, $t = .953$, $p=.361$.

Students’ academic progress in the program was tracked using four measures, (1) their mean quiz scores, (2) their periodic examination scores, and (3) their scores on the quiz reflection and revision forms (4) their pre-algebra and algebra scores on the post-test COMPASS. As reported in Table 1 the passing group exceeds, or almost exceeds, the failing group on the four program measures. There is a marginal statistical difference in the overall mean quiz scores for the two groups, $M = 39.45$ vs. $M = 24.97$ for the passing and failing groups respectively, $t = 1.97$, $p = .06$. There is a statistically significant difference in the mean revision scores for the two groups, $M = 88.39$ vs. $M = 77.26$ for the passing and passing student groups respectively, $t = 2.69$, $p=.014$. There is also a statistical difference in the mean scores earned by the two groups on the three periodic examinations, $M = 56.54$ vs. $M = 33.40$ for the passing and passing groups respectively, $t = 2.96$, $p = .007$. Finally, as expected, those students who passed the course had higher scores on the algebra section of the post- COMPASS examination, $M= 38.40$ vs. 22.00 for the passing student group and failing student group respectively, $t = 6.80$, $p = .001$. There was no difference in the pre-algebra scores for the two groups. We believe that this lack of significance is a consequence of the small number of students who were required to retake this portion of the COMPASS. We would also conclude that
these results suggest that it is the students’ active participation in the self-reflection and revision process that significantly contributes to better academic outcomes, as reflected in their scores on periodic exams.

Implicit in these outcomes is that successful students are putting in sufficient ‘time on task,’ a behavior that we view as one reflection of their engagement, as well as their motivation and attitude. Students who passed the course completed a mean of 5.3 reflection and revision forms vs. a mean completion rate of 4.1 reflection and revision forms for those students who failed the course, \( t = 2.20, p = .04 \).

Eighty-two percent of the students who passed the course adhered to the attendance policy and 50% of the students who did not adhere to the attendance policy passed the course, \( \chi^2 = 1.35, n.s. \) (continuity correction).

These results parallel those of Zimmerman, Moylan, Hudesman, White, and Flugman (2011) who found that within the SRL classes those students who completed more reflection and mastery learning forms also did better than the less engaged students. We believe that despite the small number of students in this program, there is some support for a relationship between the students’ level of engagement and their academic outcome.

At the end of the course all 23 students completed a short six question anonymous survey in which they shared their reactions to the program. The survey questions and tallies of the student responses are described in Table 2.

We believe that the tallies in Table 2 indicate that students had very positive reaction to the SRL developmental mathematics course; this despite the fact a majority of the students did not pass the course and most of these students had reported negative experiences in their prior mathematics courses.

**Discussion**

The purpose of this demonstration project was to implement an SRL program with formative assessment and mastery learning features with special program students who had previously been unsuccessful in passing the COMPASS examination – with most of these students failing the course on multiple occasions. Most of these students reported on their previous negative experiences which left them with poor expectations, and thus poor levels of engagement and motivation. A major focus of the program was to create a structure that optimized the students’ engagement in the program’s activities including attendance, using feedback from their daily quizzes as a starting point to improve their learning activities, e.g., by working on their self-reflection/mastery learning forms, going to tutoring, etc.
Table 2

**Student Responses to the End-of-the-Course Survey**

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Positive Responses</th>
<th>Neutral or Negative Responses</th>
<th>Sample Student Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How would you rate your experience in this program compared with other college mathematics courses that you have taken?</td>
<td>22</td>
<td>1</td>
<td>1. It has been the best mathematics class — - - encouraged me to follow through with the (program) steps and improve in other subjects and everyday life</td>
</tr>
<tr>
<td>2. Compared to other mathematics courses how do you feel about the use of quiz format where you make pre and post judgments</td>
<td>23</td>
<td>0</td>
<td>1. You can see how you felt before and after and if your confidence was too high 2. A very sweet idea. It tells me where I need help</td>
</tr>
<tr>
<td>3. Compared to other mathematics courses how do you feel about the use of the revision form</td>
<td>20</td>
<td>3</td>
<td>1. I love/hate the revision form. Makes me realize that I make careless errors. 2. Writing out the steps helps me remember how to do it in the future.</td>
</tr>
<tr>
<td>4. Compared to other mathematics courses how do you feel about the use of tutoring</td>
<td>22</td>
<td>1</td>
<td>There were a large number of ‘It’s great’ comments from students</td>
</tr>
<tr>
<td>5. The part of the program you liked most, describe</td>
<td>23</td>
<td></td>
<td>Some of the most cited positive parts of the program included: the revision process, everyday quizzes, and tutoring.</td>
</tr>
<tr>
<td>6. The part of the program that could use some improvement</td>
<td>Nothing (16)</td>
<td></td>
<td>Some of the suggestions included requests for more quizzes, and add an additional day of classes.</td>
</tr>
</tbody>
</table>

Program results indicated that there was a difference in academic outcomes depending upon the students’ level of engagement. Students, who engaged in the reflection/mastery learning process, were more likely to have successful academic outcomes compared to students who were less engaged. As indicated, these results are in keeping with those reported by Zimmerman, Moylan, Hudesman, White, and Flugman (2011) who found that within this SRL course, students who were more engaged in the revision process were more likely to pass the course and COMPASS examination than students who were less engaged.

The students’ responses to the survey indicated that they thought the SRL program created a positive environment for learning. Even though the surveys were unsigned, it was clear that the overwhelming majority of all students, i.e., those who passed the course as well as those who did not pass the course, found the program to be a positive educational experience. This point was well illustrated in
the students’ response to the last question which asked them how the program might be improved. Those students who did make suggestions often indicated that they would like to see additional class time and additional quiz work. We believe that this type of student response is reflective of their engagement in the course, regardless of whether they passed the course or not.

While implementing the program, the issue of student engagement became more complicated. As we indicated earlier, the original attendance policy stipulated that anyone who missed more than two classes would be dropped from the program. However, the program staff did, in fact, allow students to continue after two absences. It seemed to us that even many of the students with excessive absences were genuinely interested in the program against the backdrop of very difficult personal and family challenges, e.g. the hospitalization of a family member, or having a work schedule shifted so that they had to work all night before coming to class in the morning. Under the circumstances, we wonder whether students who exceeded the absence limit were better served by barring them from continuing or whether they should be allowed to continue coming to class. In reviewing the overwhelmingly positive responses from all of the program students, we would suggest that even the unsuccessful students derived some benefit from their program experience.

Study limitations and suggestions for future research

The main purpose of this paper was to describe an SRL program with formative assessment and mastery learning features and how it could be implemented with developmental mathematics students. Given the small number of students in this program there is an obvious concern about the analysis of the data, especially since it was not possible to construct a suitable comparison group of special program students. Furthermore, it would be important to further clarify the connection between students’ level of engagement and their motivation/attitude. Perhaps the use of the LASSI (2012) might be helpful in establishing such a relationship.

Finally, it should be noted that new instructors are often ‘put off’ by the extra time required when implementing the SRL program. They are concerned about having enough time to complete the regular course requirements, let alone the time commitment required to implement the special features in our program. Our experience has been that there is indeed an ‘upfront’ time issue at the start of the semester; however, as students become more efficient learners, they make up the time during the semester. In fact, we have never encountered a situation where an instructor has reported not having enough time to complete the course curriculum. Of course, any modifications that can make the SRL program more effective would be important. For example, Hudesman, Carson, Flugman, Clay, and Isaac (2011) reported some success in using a tablet PC to administer the quizzes and provide immediate feedback to both the student and instructor.
There are significant issues that must still be addressed in the future development and implementation of the SRL program; however, we believe that when this work is viewed as part of a larger programmatic initiative, e.g., with the work of Zimmerman, Moylan, Hudesman, White and Flugman (2011), Hudesman, Crosby, Flugman, Isaac, and Everson (2012), and others, there is continued support for the use of the SRL, formative assessment, and mastery learning approach to assist students in becoming more engaged in as well as in improving their mathematics achievement.

References


Figure 1

The SRL Model: Plan It, Practice It, Evaluate It

Hudesman, White, Moylan, and Crosby (2005)
Appendix A: A Sample EFAP Mathematics Quiz

<table>
<thead>
<tr>
<th>Before solving each problem, how confident are you that you can solve it correctly?</th>
<th>REMEMBER! Show all your work. Simplify all your answers.</th>
<th>After you have solved each problem, how confident are you that you solved it correctly?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>0%</strong></td>
<td>1. Factor completely: (10x^2y^3 + 4xy^3 - 2y = )</td>
<td><strong>0%</strong></td>
</tr>
<tr>
<td><strong>25%</strong></td>
<td>25%</td>
<td><strong>25%</strong></td>
</tr>
<tr>
<td><strong>50%</strong></td>
<td>50%</td>
<td><strong>50%</strong></td>
</tr>
<tr>
<td><strong>75%</strong></td>
<td>75%</td>
<td><strong>75%</strong></td>
</tr>
<tr>
<td><strong>100%</strong></td>
<td>100%</td>
<td><strong>100%</strong></td>
</tr>
<tr>
<td><strong>0%</strong></td>
<td>2. Divide: (\frac{8a^2b^2 - 12a^2b^2c + 4ab^2}{4ab^2} = )</td>
<td><strong>0%</strong></td>
</tr>
<tr>
<td><strong>25%</strong></td>
<td>25%</td>
<td><strong>25%</strong></td>
</tr>
<tr>
<td><strong>50%</strong></td>
<td>50%</td>
<td><strong>50%</strong></td>
</tr>
<tr>
<td><strong>75%</strong></td>
<td>75%</td>
<td><strong>75%</strong></td>
</tr>
<tr>
<td><strong>100%</strong></td>
<td>100%</td>
<td><strong>100%</strong></td>
</tr>
<tr>
<td><strong>0%</strong></td>
<td>3. Express answer in scientific notation: a) 6700000  b) 0.000015</td>
<td><strong>0%</strong></td>
</tr>
<tr>
<td><strong>25%</strong></td>
<td>25%</td>
<td><strong>25%</strong></td>
</tr>
<tr>
<td><strong>50%</strong></td>
<td>50%</td>
<td><strong>50%</strong></td>
</tr>
<tr>
<td><strong>75%</strong></td>
<td>75%</td>
<td><strong>75%</strong></td>
</tr>
<tr>
<td><strong>100%</strong></td>
<td>100%</td>
<td><strong>100%</strong></td>
</tr>
<tr>
<td><strong>0%</strong></td>
<td>4. Compute and express in scientific notation: (\frac{(3.6 \times 10^{-7}) \times 6 \times 10^3}{12 \times 10^5} = )</td>
<td><strong>0%</strong></td>
</tr>
<tr>
<td><strong>25%</strong></td>
<td>25%</td>
<td><strong>25%</strong></td>
</tr>
<tr>
<td><strong>50%</strong></td>
<td>50%</td>
<td><strong>50%</strong></td>
</tr>
<tr>
<td><strong>75%</strong></td>
<td>75%</td>
<td><strong>75%</strong></td>
</tr>
<tr>
<td><strong>100%</strong></td>
<td>100%</td>
<td><strong>100%</strong></td>
</tr>
<tr>
<td><strong>0%</strong></td>
<td>5. Multiply: ((5x - 3)^3 = )</td>
<td><strong>0%</strong></td>
</tr>
<tr>
<td><strong>25%</strong></td>
<td>25%</td>
<td><strong>25%</strong></td>
</tr>
<tr>
<td><strong>50%</strong></td>
<td>50%</td>
<td><strong>50%</strong></td>
</tr>
<tr>
<td><strong>75%</strong></td>
<td>75%</td>
<td><strong>75%</strong></td>
</tr>
<tr>
<td><strong>100%</strong></td>
<td>100%</td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Appendix B: A Sample EFAP Reflection/Revision Form

SRL Math Revision Sheet, Quiz #____ Item # ___ Date: ______
Instructor: ____________________

Now that you have received your corrected quiz, you have the opportunity to improve your score. Complete all sections thoroughly and thoughtfully. Use a separate revision sheet for each new problem.

PLAN IT

1. a. How much time did you spend studying for this topic area? _______

b. How many practice problems did you do in this topic area ____________________in preparation for this quiz?
   (circle one)  0 – 5 / 5 – 10 / 10+
c. What did you do to prepare for this quiz? (use study strategy list to answer this question)

2. After you solved this problem, was your confidence rating too high (i.e. 4 or 5)? yes no

3. Explain what strategies or processes went wrong on the quiz problem.

PRACTICE IT

4. Now re-do the original quiz problem and write the strategy you are using on the right.

5. How confident are you now that you can correctly solve this similar item?
   1  2  3  4  5

6. Now use the strategy to solve the alternative problem.

7. How confident are you now that you can correctly solve a similar problem on a quiz or test in the future?
   1  2  3  4  5

Definitely not  Not confident Undecided Confident Very confident confident
The Mediating Effect of Academic Self Efficacy on Relatedness, Autonomy, and Academic Engagement

Christina S. Sison  
De La Salle-College of Saint Benilde

Sr. Praseena Sebastian  
De La Salle University, Manila

Abstract  
The present study looks into the mediating effect of academic self-efficacy on the influence of relatedness and autonomy as it impacts academic engagement. Using self-determination theory framework, it shows how a motivational outcome such as academic engagement is brought about by satisfying the psychological needs such as relatedness and autonomy. This is provided that the individual as a result of the enabling through relatedness and autonomy leads to self-efficacious belief about one’s ability. Data were gathered from 334 College students by answering the Relatedness Questionnaire (Gillis, 2011), Autonomy Scale (Reeve, Nix, Hamm, 2003), College Academic Self-Efficacy Inventory (Barney & Finney), and Student Course Engagement Questionnaire (Handelsman, Briggs, Sullivan, & Towler, 2005). A mediational path analysis was conducted to determine the mediating effect of academic self-efficacy. Key results showed that (a) academic self-efficacy has partial mediating effect between relatedness and academic engagement; (b) academic self-efficacy has full mediating effect between autonomy and academic engagement and (c) the model without the direct effect from autonomy to academic engagement yielded the best model fit.

Keywords: Self-efficacy, Academic Engagement, Relatedness, Autonomy

Introduction  
Academic engagement is considered an important variable in the field of education because of its impact on academic achievement (Graham, Tripp, Seawright, & Joeckel, 2007; Lee, Tek, Hashin, & Meng, 2011; Sbrocco, 2009; Handelsmann, Briggs, Sullivan, & Towler, 2005). This is particularly important in the context of higher education today as it turns learner-centered and inclusive. With the high demand, many students are found to disengaged and unmotivated in their school life (Appleton, Christenson, & Furlong, 2008). The high demand for learning and achievement, as well as the challenges of transition and integration for learners of different culture and orientation require one to be academically engaged. When a student given the high demands for learning is disengaged, it can result to negative outcomes such as failure or worst, drop out.

Academic or student engagement refers to one’s enthusiastic participation in a given task (Reeve, Jang, Carrell, Jeon, & Barch, 2004). Such participation is manifested through the person’s effort and positive emotion while actively involved in the task (Hu & Kuh, 2011; Reeve et al., 2004). Academic engagement can be traced from the self-determination theory through motivation. In particular, it serves as motivational outcome.
Self-determination theory is a theoretical framework of motivation that is used in educational setting (Katz, Kaplan, & Gueta, 2010). This theory asserts the need to satisfy the basic psychological needs for autonomy, relatedness and competence in order to lead to intrinsic motivation. In satisfying all these needs, it helps optimize the performance of an individual resulting to various motivational outcomes (Ryan & Deci, 2000). When all these psychological needs are met, it drives an individual to become self-motivated and determined. Intrinsic motivation occurs when a student engage in an academic task because of the desire to learn and improve oneself, or from the pure enjoyment or interest derived from the academic activity or task (Katz et al, 2010). Research have shown that the more intrinsically motivated one feels, the higher is the quality of engagement that will be manifested (Deci & Ryan as cited by Katz et al., 2010).

As a form of motivational outcome, academic engagement requires the satisfaction of the students' psychological needs in order for them to optimize their performance and maximize their learning.

Psychological needs in the context of self-determination theory include relatedness, autonomy and competence. Relatedness is a sense of belonging and feeling of connectedness to persons, group or culture. Autonomy refers to the perceived control in freely choosing something. Competence is the sense of one's ability or skills. When these needs are not met, students may not perform to their full capacity and may result to problems in motivation and well-being (Ryan and Deci, 2000).

Previous studies, relatedness and autonomy have found to be related with student engagement (e.g., Fuller & Skinner, 2003; Hardy & Bryson, 2009; Ryzin, Gravely, & Roseth, 2009; Jang, 2008). In particular, both feeling of peer-related belongingness and teacher-related belongingness as well as one's perceived academic autonomy have positive effect on one's engagement in learning (Ryzin et al., 2009). These serve as social and environmental factors that can result to motivational outcome such as academic engagement.

However, feeling of belongingness/connectedness and feeling of autonomy does not automatically happen when provided. There occurs the variability in how individuals may perceive such social and environmental factors. This variability occurs through cognitive processing brought about by self-efficacy (Schunk, 1991).

Self-efficacy is defined as one's perceived competence in doing particular tasks. A person’s self-efficacious beliefs about one’s capabilities can affect one’s choice of action or activities as well as effort and persistence (Bandura as cited by Schunk, 1991). This suggests that when a student provided with support from teachers and peers in school as well as the autonomy to complete assigned tasks, but does not judge his competency positively, he or she may still avoid the task or may choose to be disengaged in the class activity.

This suggests that psychological factors such as relatedness and autonomy should not be looked into only as predictors of academic engagement. The variable of self-efficacy should be included in the model that explains academic engagement.
In particular, self-efficacy serves as a variable that links both psychological needs and academic engagement.

Several researches have established the impact of academic engagement on achievement. However, some studies have verbalized the need to further study this variable in terms of how and why it contributes to achievement and other positive educational outcomes (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008).

Engagement and academic motivation are outcomes of self-efficacy (Schunk, 2012). This suggests that in order for engagement to occur, one needs to feel self-efficacious. Self-efficacy is a measure of one’s belief about his/her capabilities to complete a particular task at a given situation (Warwick, 2008; Schunk, 1991). This concept is equally important with academic engagement when it comes to higher education. Given the high demand to cope with expectations and tasks from the school, it necessitates one to feel confident and feel in control of how he/she intends to learn (Suarez-Orozco, Pimentel, & Martin, 2009).

Warwick (2008) explained the link of self-efficacy with engagement through its actual manifestations such as behavioural, cognitive, and motivational engagement. Behavioral engagement is the tangible and observable actions in one makes in a given task. When a student has self-efficacy, their engagement results to increased attendance, effort, and persistence in completing assigned task. It also makes a student determined and persevering in completing even difficult tasks by asking support from other people.

When a student is self-efficacious, it can also result to cognitive engagement, wherein one becomes mentally engaged, keeping on tasks when instructed or needed. Researches have shown that students who are confident in their capability will persist on task in spite of difficulty. However, when one feels incapable, they are less like to continue being cognitively engaged when they fail in trying or success is not immediate (Warwick, 2008). However, once strong self-efficacy is developed, failure will not have much impact on the student (Bandura as cited by Schunk, 1991).

Motivational engagement also occurs when one has self-efficacy. It drives a student to become academically engaged in a subject matter in spite of non-interest or difficulty. Motivation occurs through self-efficacy when one sees its personal gain, utility of the learning from a subject and alignment of outcomes to long term goals (Warwick, 2008).

In relation to autonomy, self-efficacy is believed to regulate it. According to Gillis (2012), when students feel in control over an activity it helps increase their beliefs about their own capability. Also, it drives them to exert more effort to do something that needs to be done. This in turn, increases their confidence on their ability to perform specific tasks.

On the other hand, there has been less direct research linking relatedness with self-efficacy. Researches have been directly linked with academic engagement (e.g., Furrer & Skinner, 2003). But according to Schunk (1991), there are two sources of self-efficacy beliefs about oneself. A person may judge their capabilities through information from other people or from appraisal of their personal
accomplishments and experiences. In schools, students get information about their capabilities through their teachers and peers. At the same time, they may also appraise their efficacy through their appraisal of one’s performance.

In a previous study on attributional feedback, it was found that effort feedback given for prior successes supports one’s perception of their progress (Schunk, 1991). This means that when a student receives support from a teacher in a form of feedback related to the effort they exert on a task, it can affect his/her belief on his/her effort. It can also help sustain motivation, increase efficacy for learning (Schunk, 1991). This implies that students tend to create their efficacy beliefs through feedback from teachers and peers in school. Accordingly, successful assessment of one’s effort can lead to strong self-efficacy. But if they are not successful, it may result to them avoiding such task or gain low appraisal of their ability (Bandura as cited by Schank, 1991).

This present study will look into the mediating effect on the relationship of relatedness, autonomy and academic engagement. Previous studies on academic engagement have recommended further understanding the concept by clarifying the specifics on how and why it contributes to achievement. This study attempts to describe the dynamics of academic engagement through self-determination theory. In particular, investigate how paths from relatedness and autonomy can particularly lead to academic engagement through self-efficacy. Previous studies have been studying psychological needs and self-efficacy in relation to academic engagement independently. This time, self-efficacy is not only seen as independent variable but mediating variable for relatedness and autonomy. Also, there are only indirect researches available that investigates relatedness in relation to self-efficacy. This variable has been more investigated in relation to academic engagement.

Based on previous studies, it is believed that when a student feels a sense of support and connectedness with peers and teachers; and experiences autonomy, it will result to active involvement in doing school activities and requirements. This is provided that he/she feels confident in completing assigned tasks.

This study determines the mediating effect of self-efficacy on the influence of relatedness and autonomy on academic engagement. In particular, the present study aims to: (a) determine which from the path of relatedness and autonomy will have greater impact on self-efficacy and academic engagement, (b) which from the path of relatedness and autonomy will lead to full mediation, and (c) test if the overall model have a good fit, thus explain a self-determination framework the leads to College academic engagement.

Method

Research Design

This study used cross-sectional explanatory research design to test a model that describes the mediating effect of academic self-efficacy. It also determined the
causal factors that influence the endogenous variable through one time collection of data from the participants.

**Participants**

There were 334 college students from a private College in the Philippines who participated in this study. With 66.6% female (f=222) and 33.2% male (f=111), their age range from 14 to 35 years old (M=19.75; SD=3.19) across first year to fifth year. The respondents were from criminology, psychology, tourism, and nursing courses.

**Instruments**

**Relatedness Questionnaire.** This is a 9-item questionnaire which measures the perceived feeling of belongingness and connectedness to teachers and peers (refer to Appendix A for the items). Originally by Pazcarella and Terenzini (1980), this study used the modified form by Gillis (2011), using only the subscales for teacher relatedness and peer relatedness and excluding the subscale for family relatedness. Participants answered the items using a five point scale (1=strongly disagree, 2=disagree, 3=agree sometimes, 4=agree, 5=strongly agree). The subscale on teacher related and peer relatedness has a Cronbach’s alpha of 0.81 and 0.77 respectively (Gillis, 2011). For this study, the Cronbach’s alpha for teacher relatedness was 0.74, 0.67 for peer relatedness and 0.71 for overall relatedness.

**Autonomy Questionnaire.** This is a 9-item questionnaire which measures the feeling of being in control of one’s actions and choice (refer to Appendix B for the items). Its factors include locus of causality, volition and perceived choice. Originally by Reeve, Nix, and Hamm (2003), the items were modified based on the focus of the study. The participants answered the items using a seven point scale (1=not at all true to 7=very much true). The factor on perceived locus of causality has a Cronbach’s alpha of 0.83, while for volition it is 0.81 and 0.85 for perceived choice. In this study, Cronbach’s alpha for perceived locus of causality was at 0.27, 0.45 for volition, 0.72 for perceived choice and 0.67 for overall autonomy.

**College Academic Self-efficacy Scale.** This is a 13-item measure of one’s confidence in performing tasks related to College activities and requirements (refer to Appendix C for the items). Originally by Solsberg, O’Brien, Villareal, Kennel and Davis (1993), this study used the modified form by Barry and Finney (n.d.), with 3 subscales namely: (a) course self-efficacy, (b) roommate self-efficacy, and (c) social self-efficacy. But in this study only the subscales of course self-efficacy (7 items) and social self-efficacy (6 items) were used. This instrument is answerable by a ten point scale (1= not at all confident to 10=extremely confident). The Cronbach’s alpha of course self-efficacy is 0.91 while for social self-efficacy, it is 0.89 (Barry & Finney,
n.d.). In this study, the Cronbach’s alpha for course self-efficacy is 0.80 and 0.85 for social self-efficacy while overall academic self-efficacy is at 0.90.

**Academic Engagement Measure.** This is a 23-item scale that measures the degree of students’ involvement in their college course by Handelsman, Briggs, Sullivan, and Towler (2005). In particular, this looks into the behavioural and affective participation of the students inside and outside the classroom using the following factors: (a) skills engagement, (b) emotional engagement, (c) participation/interaction engagement, and (d) performance engagement (refer to Appendix D for the items). The participants answered this measure using a five point scale (1=not at all characteristic of me, 2=not really characteristic of me, 3=moderately characteristic of me, 4=characteristic of me, 5=very characteristic of me). The Cronbach’s alpha coefficient for skills engagement was 0.82, for emotional engagement was 0.82, for participation/interaction engagement was 0.79, and for performance engagement, 0.76 (Handelsman, Briggs, Sullivan, & Towler, 2005). The results of the exploratory factor analysis have reported four factors of academic engagement with 42.69% of the variance being accounted for. In the present study, Cronbach’s alpha for skills engagement is 0.82, for emotional engagement at 0.81, for participation/interaction engagement at 0.78, and performance engagement at 0.84. The internal consistency of the overall academic engagement is 0.90.

**Demographic Profile.** The participants were asked for their age, sex, year level and course to establish their general characteristics.

**Procedure**

Upon approval from the Academic Deans of the College, three hundred and fifty questionnaires were fielded in the subject school and 334 accomplished forms were returned. The participants were from the subjects holding classes during the schedule of the questionnaire administration. Before answering the multiple-part questionnaire, they were given instructions on how to accomplish it. Part of the instructions asked their consent before answering the form. The participants were guided with the following information: (a) there are no right or wrong answers, thus they were encouraged to respond honestly to all the questions, (b) they were reminded of the confidentiality of their responses. It took the participants around 15 to 20 minutes to accomplish the form.

**Data Analysis**

Mean, standard deviation, and reliability coefficients were computed to describe the responses in all the manifest variables and its corresponding factors. The required sample size was generated using a-priori sample size calculator for structural equation modelling. In particular, it was computed with anticipated effect size set at 0.5, probability level at 0.05, and desired statistical power set at
0.80. The correlation was also generated to check the relationships among the manifest variables used in the path analysis.

The mediating effect of academic self-efficacy on relatedness, autonomy and academic engagement were computed using AMOS. To describe the mediating effect of self-efficacy, indirect effect was generated. Before proceeding with the computation, bootstrapping was performed in order to address the assumed non-normality of the data as it affects the confidence limits of the reported mediation. Based on research, resampling, in particular, bias-corrected bootstrapping is the best method to improve the confidence limit of the indirect effect which served as guide in determining the mediating effect (MacKinnon, Fritz, Williams, & Lockwood (2007); MacKinnon, Lockwood & Williams (2004). After establishing the mediating effect of self-efficacy, the model was tested for its goodness of fit.

Results

The descriptive statistics of the manifest variables are presented using mean and standard deviation. The internal consistencies of the scales were also determined using Cronbach’s alpha. The intercorrelation of relatedness, autonomy, academic self-efficacy and academic engagement were also obtained. The mediating effect of self-efficacy was tested using path analysis. Also, the goodness-of-fit of the proposed model was determined.

Table 1
**Descriptive Statistics of Age, Relatedness, Autonomy, Academic Self-efficacy, and Academic Engagement**

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>19.75</td>
<td>3.19</td>
<td></td>
</tr>
<tr>
<td>Relatedness</td>
<td>4.04</td>
<td>0.48</td>
<td>0.71</td>
</tr>
<tr>
<td>Teacher relatedness</td>
<td>3.77</td>
<td>0.62</td>
<td>0.74</td>
</tr>
<tr>
<td>Peer relatedness</td>
<td>4.38</td>
<td>0.61</td>
<td>0.68</td>
</tr>
<tr>
<td>Autonomy</td>
<td>4.81</td>
<td>0.74</td>
<td>0.67</td>
</tr>
<tr>
<td>Perceived locus of causality</td>
<td>4.88</td>
<td>0.88</td>
<td>0.27</td>
</tr>
<tr>
<td>Volition</td>
<td>4.60</td>
<td>0.96</td>
<td>0.45</td>
</tr>
<tr>
<td>Perceived Choice</td>
<td>4.95</td>
<td>1.18</td>
<td>0.72</td>
</tr>
<tr>
<td>Academic Self-efficacy</td>
<td>7.51</td>
<td>1.23</td>
<td>0.90</td>
</tr>
<tr>
<td>Course self-efficacy</td>
<td>7.47</td>
<td>1.28</td>
<td>0.80</td>
</tr>
<tr>
<td>Social self-efficacy</td>
<td>7.55</td>
<td>1.42</td>
<td>0.85</td>
</tr>
<tr>
<td>Academic Engagement</td>
<td>3.83</td>
<td>0.48</td>
<td>0.90</td>
</tr>
<tr>
<td>Skills engagement</td>
<td>3.84</td>
<td>0.53</td>
<td>0.82</td>
</tr>
<tr>
<td>Emotional engagement</td>
<td>3.92</td>
<td>0.59</td>
<td>0.82</td>
</tr>
<tr>
<td>Participation/interaction engagement</td>
<td>3.70</td>
<td>0.66</td>
<td>0.78</td>
</tr>
<tr>
<td>Performance engagement</td>
<td>3.91</td>
<td>0.69</td>
<td>0.84</td>
</tr>
</tbody>
</table>

*Note. N=334*
The mean scores, standard deviation and internal consistencies of the different factors of relatedness, autonomy, academic self-efficacy, and academic engagement are presented in Table 1. The participants of the study reported high sense of connection with teachers and peers in school although they reported higher sense of support from their peers. With autonomy, they students have higher perceived choice relative to perceived locus of causality and volition. The students also reported high confidence in their capacity in accomplishing tasks related to both for course and social activities. In terms of academic engagement, the students have higher emotional and performance engagement.

The highest reported Cronbach’s alpha are overall academic self-efficacy and academic engagement, while the lowest alpha coefficient is at 0.27 for perceived locus of causality.

Table 2

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Relatedness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Autonomy</td>
<td>.317**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Academic Self-Efficacy</td>
<td>.348**</td>
<td>.511**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Academic Engagement</td>
<td>.360**</td>
<td>.420**</td>
<td>.699**</td>
<td></td>
</tr>
</tbody>
</table>

**p<.01 (two-tailed)**

Table 3 describes the intercorrelations among relatedness, autonomy, academic self-efficacy and academic engagement. The results indicate highly significant, moderate to high correlation coefficients. Moderately strong correlation was found between relatedness and academic self-efficacy. This suggests the one’s sense of belonging in schools is associated with one’s confidence in completing assigned tasks. Also, the students’ connectedness with peers and teachers is also associated with one’s level of involvement in school activities as shown by the moderately strong correlation between relatedness and academic engagement.

Autonomy and academic self-efficacy have shown high and strong correlation suggesting that one’s feeling of having a choice and control over the situation is associated with one’s confidence in completing assigned academic tasks. Also, autonomy and academic engagement has reported a moderately strong correlation indicating positive association between one’s feeling of having a choice and one’s participation in doing academic tasks and requirements. Lastly, academic self-efficacy and academic engagement were found to have a highly significant and highly strong correlation indicating that students who are confident in their ability to complete assigned tasks tend to participate more actively in the course activities and requirements.

Path analysis was used to determine the mediating effect of academic self-efficacy on the influence of relatedness and autonomy on academic engagement.
This analysis intends to verify the significant results of the intercorrelation. It also allows the determination of goodness-of-fit of the proposed path model for relatedness and autonomy. Figure 1 displays the standardized parameter estimates indicating the direct effect of relatedness and autonomy on academic engagement. Both of the unmediated or direct effect on academic engagement are significant at $p<.001$.

Figure 2 shows the corresponding change that happened when academic self-efficacy as mediating variable was introduced in the model. There has been an apparent decrease in the direct effect of relatedness to academic engagement from 0.25 to 0.12, but it still significant at $p=.003$.

*Figure 1.*
Standardized parameter estimates of Relatedness and Autonomy and its effect on Academic Engagement
A big drop in the direct effect of autonomy on academic engagement has been observed from 0.34 to 0.06 and the effect is no longer significant (p=.188). The results suggest the partial mediation of academic self-efficacy between relatedness and academic engagement wherein the direct effect continues to be significant but decreases in its value. On the other hand, academic self-efficacy has full mediation between autonomy and academic engagement wherein the significant direct effect lose its effect when the mediating variable was introduced in the model.

The standardized mediating effect of relatedness on academic engagement is at 0.130 which indicates the increase in academic engagement by 0.130 standard deviation (SD) when there is 1 SD increase in relatedness. This is also observed in the standardized mediating effect of autonomy on academic engagement at 0.279 which indicates a 0.279 increase in the SD of academic engagement when there is increase in autonomy. Both indirect effect are significant at p<.001. The results of the indirect effect further show the significant mediating effect of academic self-efficacy on relatedness, autonomy and academic engagement.

The proposed mediation model was tested for goodness-of-fit and it attained a good fit using CFI=1.00 and NFI=1.00 but RMSEA=.348 indicates a poor fit. Because academic self-efficacy has reported full mediation, direct effect of autonomy to academic engagement is no longer significant. The proposed mediation model was revised by removing the path indicating the direct effect of autonomy on academic engagement. Figure 3 shows the revised proposed mediation model of academic self-
efficacy. When it was tested for goodness-of-fit, it reported a good fit: GFI=.997, AGFI=.973, NFI=.995, TLI=.987, IFI=.998, CFI=.998, RMR=.005, RMSEA=.049. This suggests that the third proposed model of mediation has greatly improved when the direct effect of autonomy on academic engagement was removed.

Figure 3.
Proposed Path Model for the effect of Relatedness, Autonomy, and Academic Self-Efficacy on Academic Engagement

Discussion

The study was undertaken to determine the mediating effect of academic self-efficacy on the influence of relatedness and autonomy on academic engagement. It was hypothesized that academic self-efficacy will mediate the relationship of relatedness and autonomy on academic engagement. Based on the results, it was found that the impact of autonomy on academic engagement is fully mediated by academic self-efficacy. But for relatedness to academic engagement, academic self-efficacy has partial mediation. Although it did not totally support both hypotheses, the results have highlighted the importance of relatedness not only in academic engagement but as well as in bringing about academic self-efficacy.

This places relatedness as an important variable in further understanding self-efficacy. There has been limited, direct, updated, and accessible literature linking self-efficacy with relatedness. On the other hand, partial mediation of self-
efficacy implies the impact of relatedness to both self-efficacy and academic engagement. A portion of relatedness feeds into self-efficacy which in turn results to academic engagement. This has confirmed the need to acquire information from external sources (i.e., teachers and peers) to appraise one’s capacity. At the same time, it has direct impact on academic engagement. McInnis and James (1995) have highlighted the importance of connectedness in bringing about engagement.

This further implies the importance of feeling connected and having a sense of belonging in Filipino college learners. Not only it allows one to develop and assess their skills and ability, it also gives them the boost to look forward to and become enthusiastic in their participation in school and social activities related to their course.

References


Appendices

Appendix A
Relatedness Questionnaire (modified by Gillis, 2011)
Instructions: The following section contains items about your relationship with your teachers and peers. Please indicate the number that best corresponds to your answer.

1 – Strongly Disagree
2 – Disagree
3 – Agree Sometimes
4 – Agree
5 – Strongly Agree

1. Teachers in my school care about their students.
2. There is a teacher here I can talk to about academic problems.
3. Teachers in my school respect me
4. Teachers here are interested in my success
5. There is a teacher here I can talk to about my personal problem
6. I have friends here at school
7. I have friends I can talk to about important decisions
8. There is a friend here in school that I can depend on for help
9. I have no friends here in school I can depend on.
Appendix B

Autonomy Scale (Reeve, Nix, & Hamm, 2003) [with revisions]

Instructions: The following section contains items about your sense of autonomy or control in choosing things related to your course. Please indicate the number that best corresponds to your answer.

1. Not at all True
2. Very much True
3. True

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. I feel that I am doing only what the teachers want me to do
2. I feel that I am doing what I want to be doing in my course
3. I feel that I am pursuing goals that are my own.
4. I feel a sense of personal freedom in doing the activities and requirements of this course
5. I feel free in doing the activities and requirements of this course
6. I feel pressured in the activities and requirements of this course
7. I believe I have a choice on how to do the activities and requirements of this course
8. I make my own choice and decisions on how to do the activities or requirements of this course.
9. I feel I have control in deciding which goals to pursue in this course.
Appendix C
College Self-Efficacy Inventory (CSEI)

Instructions: The following section asks about your confidence in completing tasks related to various aspects of college life. Please indicate the number that best corresponds to your answer.

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Extremely</td>
</tr>
<tr>
<td>Confident</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Confident</td>
</tr>
</tbody>
</table>

1. Make new friends at college.
2. Talk to college/university staff.
3. Manage time effectively.
4. Ask a question in class.
5. Participate in class discussions.
6. Research a term paper.
7. Do well on your exams.
8. Talk to your professors.
9. Ask a professor a question.
10. Take good class notes.
11. Understand your textbooks.
12. Keep up to date with your schoolwork.
13. Write course papers.
Appendix D
Student Course Engagement Questionnaire
(Handelsman, Briggs, Sullivan, & Towler, 2005)

Instructions: This section asks the extent to which the following behaviors, thoughts, and feelings describe you in your course. Please indicate the number that best corresponds to your answer.

1 – Not at all characteristic of me
2 – Not really characteristic of me
3 – Moderately characteristic of me
4 – Characteristics of me
5 – Very characteristic of me

1. Making sure to study on a regular basis
2. Putting forth effort
3. Doing all the assignments/homeworks
4. Staying up to complete the readings
5. Looking over class notes to make sure I understand the materials
6. Being organized
7. Taking good notes in class
8. Listening intently (carefully) in class
9. Coming to class everyday
10. Finding ways to make the course materials relevant to my life
11. Applying the course materials to my life
12. Finding ways to make the course interesting to me
13. Thinking about the course between class meetings
14. Desiring to learn the materials in my course
15. Raising my hand in class
16. Asking questions when I don’t understand the instructor
17. Having fun in class
18. Participating actively in small-group discussions
19. Going to the professor’s office for consultation
20. Helping fellow students
21. Getting a good grade
22. Doing well in the tests
23. Being confident that I can learn and do well in class
College Self-Efficacy and Academic Satisfaction Moderated by Academic Stress

Jasmine Nadja J. Pinugu
Mapua Institute of Technology

Abstract
The study sought to investigate if there are significant associations among self-efficacy, academic stress, and academic satisfaction. The study further postulates that academic stress moderate the association between self-efficacy and academic satisfaction. Based on the statistical analysis conducted, there is a positive association between self-efficacy and academic satisfaction, and negative associations with academic stress. However, no interaction effect was observed between self-efficacy and academic stress, leading to the lack of a moderating effect on academic satisfaction. Conclusions and recommendations are presented based on these findings.

Keywords: self-efficacy, academic stress, academic satisfaction, moderation analysis

Introduction

When entering college, students face a number of tasks that not only challenge their academic capabilities but their social and emotional competencies as well. Academic tasks such as conducting research, writing reports, attending classes, reciting in class, problem solving as well as social expectations as interacting effectively with peers, reaching out to mentors, and empowering their personal potentials are only some of the responsibilities that these students are expected to complete. In order to face and overcome these challenges, students need to be equipped with skills and knowledge to ensure their academic success. However, believing in one’s capability is of primary importance. The present study posits the crucial importance of self-efficacy in ensuring not only survival but triumph as well.

Self-efficacy is defined as “the belief in one’s capabilities to organize and execute the courses of action required to manage prospective situations” (Bandura, 1977). It refers not to the skills itself but to one’s subjective belief of his capabilities of accomplishing tasks. It affects one’s motivation and behavior. If a person believes he is capable of facing tasks, then he would readily face this task. However, when his self-efficacy is low, then he tends to avoid the situation. When behavior was explained in the context of behavioristic conditioning, the introduction of self-efficacy sparked a revolution which upholds the cognitive aspects of goal setting and accomplishment. Thus, one’s perception of a situation can trigger the success or failure of enterprise. The same can be applied in establishing academic satisfaction.

Few studies have focused on academic satisfaction as an education research variable (Ojeda, Flores, & Navarro, 2011). Nevertheless, academic satisfaction is a crucial factor worthy of study since it is a major basis in determining student well-being and optimal academic achievement. A student who is academically dissatisfied with his educational experience may opt to drop out of school altogether and discontinue their studies. On the other hand, students who enjoy and find
satisfaction in their academic roles would persist and ultimately find academic success. The satisfaction that students find in their academic experience may be traced to their level of perceived efficacy; the challenge of college, their belief in their own abilities, the social and academic reward they obtain out of these experiences may lead to their respective academic success.

However, the presence of stress can greatly impact the perceived relationship between self-efficacy and academic satisfaction. While the presumption is that self-efficacy leads to academic satisfaction (Rayle, Arredondo, & Kurpius, 2005), the presence of stress can negate this relationship. Simply put, if a student strongly believes in himself, which leads him to find satisfaction in his academic endeavours, then stress can prevent this from occurring.

It is the purpose of this study to establish the extent to which academic stress can impact the expected association between efficacy and academic satisfaction. In an fast-paced academic institution such as Mapua, stress can seriously undermine students’ efficacious belief and their level of satisfaction for the institute’s academic environment. It is expected that at the end of the study, the results can serve to guide the administrators and stakeholders in ensuring the academic achievement of the students by addressing their stress, efficacy, and over-all academic satisfaction.

Review of Related Literature

Since the advent of Bandura’s self-efficacy theory, a number of studies have been generated that centered on efficacy either as a predisposing factor of academic performance or an outcome variable from a myriad of sources. Either way, it posits the value of studying efficacy across several domains.

Efficacy has been adjudged to be a contributory factor to academic success (Ojeda, Flores, & Navarro, 2011). Further, family background, specifically family expectations has been a source of one’s efficacy. The role of families in encouraging their children to pursue academic success has been consistently espoused in literature. Efficacy has also been found to correlate with personal academic adjustment (Thijys & Verkuyten, 2008), stress and health (Chemers, Hu, & Garcia, 2001), organizational and training commitment (Tannenbaum, Mathieu, Salas, & Cannon-Bowers, 1991), and self-regulated learning (Zimmerman & Martinez-Pons, 1995). It has also been found to be negatively associated with procrastination, positing that when students feel they are not capable of finishing the task, they fail to manifest self-regulated learning, which leads to procrastination (Tan, Ang, Klassen, Yeo, Wong, Huan, & Chong, 2008). Self-efficacy has also been seen as a significant predictor of academic success, more so than academic stress (Zajacova, Lynch, & Espenshade, 2005). Across these findings, one can surmise that personal efficacy plays a great role not only in academic endeavours but in all situations which challenge personal capabilities.

Efficacy has been seen to be a major predictor of academic satisfaction. In a study conducted among Mexican-American university students (Ojeda, Flores, & Navarro, 2010), self-efficacy has been directly linked to positive affect, academic
progress, environmental support, and academic satisfaction. Specifically, high decision-making efficacy predicted better outcome expectations, which resulted to higher academic satisfaction. Thus, one’s confidence in completing tasks needed to be accomplished resulted in positive perceptions of progress, which led to students perceiving their academic experiences as positive rather than negative.

Specific academic tasks also contribute to one’s academic satisfaction. In a study conducted among international graduate students, writing was seen as a contributory factor to achieving academic satisfaction. Access to resources, coupled with efficacious beliefs in certain abilities strengthened the academic satisfaction experience by these students. This points to the valuable role of academic administrators and faculty personnel in enhancing efficacy of students as well as imbibing academic satisfaction in their school activities (Colombo, 2011).

Aside from academic services provided to students, program courses and grades also predict academic satisfaction. In a study conducted among college students in Ohio, perceived grade point average, satisfaction with major predicted academic satisfaction, while the isolation index (the extent to which the student felt alone) negatively correlated with the same construct. While efficacy was not included as a separate construct of the study, the value placed on perceived GPA can be surmised as an indicator of the students’ perceived ability in the subject. The study concluded that these factors significantly contributed to student persistence and retention in college and that the structural equation model used can serve to aid educational institutions in ensuring positive academic experiences for their students (Aitken, 1982). One such practical implication is coming up with appropriate workload models for students to ensure that despite the academic challenges they face, they maintain their efficacious beliefs, transform these beliefs into academic skills, and guaranteeing their positive academic experiences along the way (Vardi, 2008). Further, domains such as faculty instruction, course advising, availability of courses, and access to small classes were also found to comprise students’ academic satisfaction (2002). Academic satisfaction can also be used as an indicator for internal system evaluations of educational institutions; by assessing how students perceive their educational experiences, colleges and universities can use this improve on their procedures and systems (Aldosary, 1999).

Self-efficacy has been studied in conjunction with stress as negatively correlated constructs. That is, higher levels of efficacy are associated with lower levels of stress. This can be observed in studies relating optimism and stress, where a negative association was observed (Huan, Yeo, Ang, & Chong, 2006). However, Dwyer and Cummings (2001) concluded that stress was not associated with self-efficacy and this may be attributed to the utilization of coping strategies that allowed students to successfully hurdle academic tasks, which in turn led to higher levels of self-efficacy.

In collectivistic Asian cultures, it was also observed that Asian students are more inclined to academic competition as means of fulfilling parental and familial expectations, rather than their American counterparts. This can also result to development of self-expectations, where it is common for Asians to imbibe societal
beliefs and expectancies (Ang, Huan, & Braman, 2006). Likewise, they also have a greater likelihood of being anxious and depressive (2006). The same finding was observed among Taiwanese high school students, where increasing academic demands and familial expectations were identified to be major sources of stress (Soong, 2011). Aside from family and personal expectations, academic expectations from teachers and significant mentors also predicted academic stress (Tan & Yates, 2009). Depression has also been found to mediate the relationship between academic stress and suicide ideation among Singaporean adolescents (Ang & Huan, 2006). In this context, stress can be a result of failure to meet societal and family expectations that an individual in a collectivistic culture aims to achieve. Aside from cultural and educational factors, modes of interaction are significant sources of academic stress among Asian students studying in Western universities (Yan & Berliner, 2009). This may lead to poor physical and mental health. In the study conducted among university students in Hongkong, it was found that compared to a Canadian sample, they were more stressed and that a negative relationship was observed between academic stress and health outcomes. The same negative association was observed with optimism and academic stress (Huan, Yeo, Ang, & Chong, 2006). In a study conducted among athletes, academic stress was seen to decrease one’s self-efficacy in a purely academic context but enhanced performance in a sports setting (van Raalte, 2012). Even among teachers, efficacy and stress’ negative association was evident (Vaezi & Fallah, 2011). Among Indian graduate students, academic stress was believed to cause headaches, sleeplessness, nervousness, and moodiness (Pandaya, Deshpandi, & Karani, 2012). Gender was also perceived to relate to stress, with male students experiencing higher levels of stress as compared with female university students (Akram & Khan, 2012). On the other hand, in a study conducted among American students, females reported greater amounts of stress (Misra & Mackean, 2000). In the same study, time management and leisure enjoyment were seen to have a buffering effect on the perception of stress. Thus, development of programs that would enhance time management skills of students as well as allow enjoyment of leisure activities will ensure reduction of stress, subsequently leading to greater well-being and academic enjoyment.

However, self-efficacy was not observed to have a mediating nor moderating effect on stress and health. The researchers further postulate that self-efficacy as used in majority of theoretical reviews are anchored on Western paradigms; thus, future researches should specifically tackle the impact of self-efficacy, coping, and health among Asian samples that will highlight cultural differences between the two groups (Chan, 2009). Other studies have also focused on course grade, coping, and motivational processes that can reduce academic stress of students (Struthers, Perry, & Menec, 2000). Social support was also cited as seen helping variable to stress, whereas greater perceived social support allowed the individual to manage his academic stress more effectively compared to others with reduced social support (Rayle & Chung, 2007; Baquitayan, 2011). The same can also be said for parental
support, although in some studies it can have negative effects on academic stress (Leung, Yeung, & Wong, 2009).

The above literature highlights relevant literature of efficacy, stress, and satisfaction in an academic context, in both Asian and Western environments. All three variables have been a focus of study in aiming to suggest programs that will enhance student well-being and optimal academic performance. Further, all literature cites the sources of efficacy, stress, and satisfaction but differ in the levels and manifestation of such constructs. For Asian samples, stress is higher since it imbibes familial and societal expectations, which can affect efficacy and academic satisfaction as correlating constructs. Further, social support of family and friends as well as perception toward the academic environment and atmosphere seem to differ between the two samples.

However, the difference of the present study lies on how the variables are treated. Whereas majority of past studies have used self-efficacy as a moderating construct, the present study focused on stress as a moderating factor between the association of self-efficacy and academic satisfaction. Self-efficacy as an intrinsic construct triggers beliefs and behaviors that result in academic satisfaction. In this study, the assumption is that higher levels of self-efficacy lead to high levels of academic satisfaction. However, the question that this study intends to answer is the outcome association of college efficacy and academic satisfaction should academic stress moderate the relationship. Finally, the study also intended to incorporate the negative association between efficacy and stress, which is a frequent methodology in past research. Similarly, the study surmises that higher levels of self-efficacy result to lower levels of stress.

The present study intends to identify levels of college self-efficacy and academic satisfaction and how they are associated with each other, with academic stress as a moderating variable.

It sought to specifically answer the following questions:
1. Does college self-efficacy positively affect academic satisfaction?
2. Does college self-efficacy negatively affect academic stress?
3. Do the interaction of college self-efficacy and academic stress affect academic satisfaction?
4. Does academic stress moderate the association between college self-efficacy and academic satisfaction?

**Theoretical / Conceptual Framework**

The present study is based on the social-cognitive model of well-being proposed by Lent (2004). According to the model, self-efficacy, outcome expectations, environmental supports, and perceived goal progress contribute in varying levels to academic satisfaction. It integrates cognitive, behavioural, social, and personality variables that are hypothesized to promote positive adjustment across various domains. In this study, academic satisfaction is assumed to be dependent on self-efficacy; however, when academic stress is present, the assumed association might
have been altered. Self-efficacy is construed to be a cognitive and behavioral construct while perception of academic stress may be underlined by social and personality factors. When all of these are aligned, then one can assess academic satisfaction. Given the above framework, the diagram shows the conceptual framework of this study. The study aims to determine whether college self-efficacy positively affects academic satisfaction. Further, would combination of college self-efficacy and academic stress influence academic satisfaction. Lastly, the study would attempt to answer whether the association between college self-efficacy and academic satisfaction is moderated by academic stress.

Method

Research Design

This study intends to make use of the descriptive explanatory design, wherein significant associations among the variables of college self-efficacy, academic stress, and academic satisfaction are explored. The proponent hypothesized that college self-efficacy affects academic satisfaction but can be moderated by perceived academic stress.

Participants

The study included one hundred ninety eight students enrolled in basic courses at Mapua Institute of Technology, an engineering school that has approximately ten thousand students enrolled in twenty courses. Majority of the respondents have been enrolled for at least two terms in Mapua, while a significant number has been studying in the institute for more than a year. Given that the study was coordinated with the Dean of Basic studies, sampling was purposive since the sections included were assigned.

Instruments

The present study employed following instruments in measuring the variables included:

**College Self-Efficacy Scale (CSES).** This twenty-two (24) item instrument is a self-report measure that has a 4-point likert scale, ranging from unconfident (1) to most confident (4). It assesses a student’s ability to accomplish college-related tasks. Based on obtained Cronbach’s alpha of .93, .92, and .90 using principal component analysis, it has been deemed to be appropriate, given the significant correlations with academic performance and persistence. With computed Cronbach’s alpha of .92, .93, and .90, the instrument has demonstrated strong correlations with academic performance and persistence.
Student Academic Stress. The Student Academic Stress Scale (SASS) is a fifty-item instrument that measures students’ attempts to maintain balance through affective, cognitive, physiological, and behavioural means. In a specific study, it has been deemed to be useful in predicting specific academic stress problems among college students. Internal consistency was established, with Cronbach’s alpha obtained ranging from .65 to .96.

Academic Satisfaction Survey. Using a seven-item scale, the instrument developed by Lent (2004) assesses the degree of contentment a student has toward aspects of his academic experience. Using a four point Likert scale, ranging from strongly disagree (1) to strongly agree (4), the instrument has been found to possess internal consistency with a Cronbach’s alpha of .86.

Procedures

Upon identification of the research design to be employed as well as the variables constructs to be included, a letter was sent to the Dean of the School of Liberal Arts, Humanities, and Social sciences to obtain permission in securing the sections to be included in the study. After securing approval and recommendation, data gathering began. In data gathering, the students were briefed as to the purposes of the study and instructions were given as to how to answer the instruments. Results were then tabulated and analyzed, which became the basis of the findings, conclusions, and recommendations made toward the end of the study.

Data Analysis

In subjecting the raw data to statistical treatment, the mean scores and standard deviations were obtained for the variables of college efficacy, academic stress, and academic satisfaction.

To compute on whether significant associations exist between academic efficacy, student academic stress, and academic satisfaction, Pearson r was employed.

Prior to doing moderation analysis, the data were subjected to Analysis of Variance (ANOVA) in order to categorize the independent variable (College self-efficacy) and moderator (Academic stress) into high and low levels to facilitate moderation, after which it was used to determine whether interaction effects can be observed between these variables. If an interaction effect was observed, the data would then be subjected to moderation analysis by Baron and Kenny.

Results

The following results were obtained from one hundred ninety eight college students, enrolled in basic courses at Mapua Institute of Technology. Out of the total respondents, there were one hundred two (102) females and ninety six (96) males. The mean for the ages was 17.8, which was understandable considering
that these students were in their first or second year of college.

Table 1 presents the mean and standard deviation of self-efficacy, academic stress, and academic satisfaction, as follows:

Table 1  
*Descriptive Statistics of Self-Efficacy, Academic Stress, and Academic Satisfaction*

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy</td>
<td>2.89</td>
<td>.37</td>
<td>1-4</td>
</tr>
<tr>
<td>Academic Satisfaction</td>
<td>3.17</td>
<td>.47</td>
<td>1-4</td>
</tr>
<tr>
<td>Affective Stress</td>
<td>2.65</td>
<td>.64</td>
<td>1-5</td>
</tr>
<tr>
<td>Behavioral Stress</td>
<td>2.41</td>
<td>.57</td>
<td>1-5</td>
</tr>
<tr>
<td>Physiological Stress</td>
<td>2.40</td>
<td>.54</td>
<td>1-5</td>
</tr>
<tr>
<td>Cognitive Stress</td>
<td>2.38</td>
<td>.65</td>
<td>1-5</td>
</tr>
</tbody>
</table>

Based on the range of scores, the mean scores for self-efficacy and academic satisfaction fall in the high end of the range, indicating high levels while the mean scores for the domains of stress (affective, behavioral, physiological, and cognitive) fall within the middle/average range.

To determine whether significant associations exist between college self-efficacy, academic stress, and academic satisfaction, Table 2 is presented:

Table 2  
*Correlation Matrix among Self-Efficacy, Academic Satisfaction, and Academic Stress*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Self-Efficacy</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Academic Satisfaction</td>
<td>.24*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Affective Stress</td>
<td>-.17*</td>
<td>-.26*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Behavioral Stress</td>
<td>-.31*</td>
<td>-.29*</td>
<td>.77*</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Physiological Stress</td>
<td>-.021*</td>
<td>-.24*</td>
<td>.70*</td>
<td>.72*</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6 Cognitive Stress</td>
<td>-.23*</td>
<td>-.36*</td>
<td>.72*</td>
<td>.77*</td>
<td>.78*</td>
<td>1</td>
</tr>
</tbody>
</table>

*p<.05

Based on the above table, there is a positive association between self-efficacy and academic satisfaction, with a correlation coefficient of .24 which is significant at the .05 alpha level. Thus, self-efficacy influences one's academic satisfaction. The more an individual perceived himself as capable, the perception toward academic experiences is more likely to be positive.

With regard to self-efficacy and the four domains of academic stress, it is hypothesized that higher levels of self-efficacy is associated with lower levels of stress and vice versa. The obtained correlations between self-efficacy and stress are -.17 (affective), -.31 (behavioral), -.21 (physiological), and -.23 (cognitive).

The same results were also obtained for stress and academic satisfaction:
that is, higher levels of stress are associated with lower levels of academic satisfaction and vice versa. With obtained correlation coefficients of -.26, -.29, -.24, and -.36, this is not surprising considering the positive correlation between self-efficacy and academic satisfaction and the negative association between self-efficacy and academic stress.

To determine whether there are interaction effects between college self-efficacy and each domain of academic stress, the following table is presented below:

Table 3
Interaction Effects of Self-Efficacy and Academic Stress

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy</td>
<td>.62</td>
<td>.62</td>
<td>3.01</td>
<td>.084</td>
</tr>
<tr>
<td>Affective Stress</td>
<td>1.54</td>
<td>1.54</td>
<td>7.427</td>
<td>.007*</td>
</tr>
<tr>
<td>SE*AFF</td>
<td>.163</td>
<td>.163</td>
<td>.79</td>
<td>.37</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>.27</td>
<td>.27</td>
<td>1.35</td>
<td>.25</td>
</tr>
<tr>
<td>Behavioral Stress</td>
<td>1.92</td>
<td>1.92</td>
<td>9.32</td>
<td>.002*</td>
</tr>
<tr>
<td>SE*BEH</td>
<td>.12</td>
<td>.12</td>
<td>.57</td>
<td>.45</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>.67</td>
<td>.67</td>
<td>3.16</td>
<td>.07</td>
</tr>
<tr>
<td>Physiological Stress</td>
<td>.58</td>
<td>.58</td>
<td>2.73</td>
<td>.09</td>
</tr>
<tr>
<td>SE*PHY</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>.73</td>
<td>.73</td>
<td>3.53</td>
<td>.06</td>
</tr>
<tr>
<td>Cognitive Stress</td>
<td>1.42</td>
<td>1.42</td>
<td>6.90</td>
<td>.009*</td>
</tr>
<tr>
<td>SE*COG</td>
<td>.45</td>
<td>.45</td>
<td>2.18</td>
<td>.14</td>
</tr>
</tbody>
</table>

*p<.05

Based on the table, no significant interaction effects were observed between self-efficacy and affective stress (.37), behavioural stress (.45), physiological stress (1.00), and cognitive stress (.14) since the values obtained went beyond the .05 alpha level. However, as individual predictors, affective stress, behavioural stress, and cognitive stress influence academic satisfaction, p values that is lower than .05 alpha level (affective = .007; behavioural = .002; cognitive = .009). Thus, emotions associated with stress, behavioural responses to stress, and thoughts accompanying stress influence one’s perception of his academic experiences, which lead to his academic satisfaction. Since no interaction effect was observed, then the fourth hypothesis is rejected; that is, academic stress does not moderate the association between college self efficacy and academic satisfaction. Thus, it is no longer necessary to perform a moderation analysis.

To determine whether college self-efficacy and academic stress predict academic satisfaction, the following table presents the multiple regression conducted for all three variables:
Table 4

Multiple Regression of Self-Efficacy, Academic Stress, and Academic Satisfaction

<table>
<thead>
<tr>
<th></th>
<th>Beta</th>
<th>B</th>
<th>t(191)</th>
<th>p-level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy</td>
<td>0.18</td>
<td>0.23</td>
<td>2.53</td>
<td>0.012*</td>
</tr>
<tr>
<td>Affective Stress</td>
<td>-0.04</td>
<td>-0.03</td>
<td>-0.41</td>
<td>0.68</td>
</tr>
<tr>
<td>Behavioral Stress</td>
<td>0.08</td>
<td>0.06</td>
<td>0.05</td>
<td>0.95</td>
</tr>
<tr>
<td>Physiological Stress</td>
<td>0.13</td>
<td>0.11</td>
<td>1.15</td>
<td>0.25</td>
</tr>
<tr>
<td>Cognitive Stress</td>
<td>-0.39</td>
<td>-0.28</td>
<td>-3.16</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

R = .401  R² = .161  Adjusted R² = .14  F(5,191)= 7.32

The results indicate that overall self-efficacy and factors of academic stress can predict academic satisfaction \( F(5,191) = 7.321, p<.000 \). Thus, the third hypothesis is accepted: that is, both college self-efficacy and academic stress affect academic satisfaction. However, as individual predictors, only self-efficacy significantly predict academic satisfaction \( (B = 0.23, p = .012) \). Similar to the results of the previous section, higher levels of self-efficacy result to higher levels of one’s academic satisfaction. Also, among the factors of academic stress only cognitive stress significantly predict academic satisfaction \( (B = -0.28, p = .001) \). Since the association is negative, higher levels of cognitive stress negate one’s academic satisfaction. Lastly, no combined effect was seen among each of all the variables tested. Thus, when self-efficacy is tested in conjunction with each domain of academic stress, no association with academic satisfaction is established.

Discussion

Based on the above results, college self-efficacy and specific forms of academic stress predict academic satisfaction. The association among these variables is not surprising, given that previous literature have established the positive correlation between self-efficacy and academic satisfaction and the negative correlation between self-efficacy and academic stress.

In the case of self-efficacy and academic satisfaction, it can be surmised that when an individual is confident of his own abilities in addressing specific tasks and situation, then he is able to overcome these, leading to his being satisfied with his academic experiences. On the other hand, when a person lacks the confidence to do such tasks, then he may perceive his overall education experience in a negative manner. Similar to the findings generated among Mexican-American students, self-efficacy lead to academic progress and positive outcome expectations, leading to academic satisfaction (Ojeda, Flores, & Navarro, 2010).

Another explanation behind the significant association is the link of self-efficacy to self-regulated learning. Indeed, high levels of efficacy have been found to be a contributory factor in self-regulated learning (Zimmerman & Martínez-Pons, 1995). Inversely, poor self-efficacy contributes to procrastination (Tan, Ang,
Klassen, Yeo, Wong, Huan, & Chong, 2008). Since academic satisfaction expresses one’s contentment in his academic experiences, being able to fulfill the academic expectations and attain academic success may be a requisite toward attaining such satisfaction.

In establishing the negative association between self-efficacy and academic stress, past literatures have already cited several reasons for this. When stress is present, an individual’s self-confidence decreases. The same negative association was observed with optimism and academic stress (Huan, Yeo, Ang, & Chong, 2006). When a person feels he is capable of doing a certain task, then he perceives problems and tasks as non-threatening. However, when a person perceives his tasks as draining and exhausting, then his belief in himself to overcome the problem can be endangered. This is observed both for students and educators as well (Vaezi & Fallah, 2011).

No significant interaction effects were observed for self-efficacy and academic stress as it relates to academic satisfaction. While self-efficacy and academic stress influences academic satisfaction independently, no combined effects for the two were generated. Academic stress, when present, negates one’s academic satisfaction. In the presence of stress, individuals may find dissatisfaction in the educational experiences he encounters. When a person experiences anxiety, tiredness, depression, then his perception toward his academic environment and the experiences attached to it is likely to be negative.

The lack of a combined effect for efficacy and specific forms of stress may be attributed to other factors that are closely related to these two factors. While an over-all effect for the two factors was achieved based on the multiple regression, there might be other factors imbedded in those variables that could explain the over-all effect. A significant number of literature has pointed to coping strategies (Struthers, Perry, & Menec, 2000) and presence of social support (Rayle & Chung, 2007; Baquitayan, 2011) as anchoring variables toward the assumed associations among efficacy, stress, and academic satisfaction. These may be anchored on cultural differences that lie between two different ethnic groups: Asians and westerns (Chan, 2009). Self-efficacy and academic stress has been popularly studied as a Western construct. Definition of these constructs may be different when cultural contexts are taken into consideration. For one, among Western respondents, stress may be anchored on pressures placed by society and significant models when they want to express their independence, while for Asian respondents, stress may be defined as the inability to meet expectations when they have imbibed the social values of their family and significant mentors. Thus, the specific and individual combined effect that is investigated in this study may not be applicable to the cultural context on which this study is based on.

Given the findings that self-efficacy is positively associated with academic satisfaction, while negatively associated with academic stress, and no combined effect when they were tested individually with each other, it is imperative that issues concerning these variables need to be addressed.
For one, programs and services should be offered that would enhance the self-efficacy of students and lessen their academic stress in order to guarantee their academic satisfaction. Previous literature has cited that educational institutions play a role in enhancing the learning and academic experiences of students (Aitken, 1982; Aldosary, 1998; Vardi, 2008). By ensuring that students perceive their academic experiences positively, learning will be enhanced and educational institutions can use these mechanisms for feedback and monitoring processes for their evaluation and subsequent improvement.

Findings of this study can be used by students in improving their academic-related behaviours, such as improving study habits, involvement in extra-curricular activities, consultation with teachers and mentors, and active participation in classroom discussions. Self-efficacy has been found to be most evidence in these academic behaviours. Thus, imbibing in these behaviours can increase self-efficacy and lessen the negative perception toward these behaviours as sources of academic stress.

Lastly, academic satisfaction is anchored on a number of factors that are not only academic in nature. The lack of a combined effect between self-efficacy and academic stress may point to other factors that serve to sustain academic satisfaction. Thus, future studies can pursue other lines of query beyond what the present study investigated. Health outcomes, family expectations, social support, coping strategies, educational programs and services are just some of the variables future studies can study.

Results of the study can be used as part of the instructional methodologies employed by educational institutions in order to enhance the academic experiences of the students at the classroom level. Self-efficacious beliefs are anchored positive perceptions of one’s academic abilities; thus, educators and administrators can incorporate strategies to enhance self-efficacy inside the classroom.

Counseling and other support services can also enhance their programs and interventions in ensuring that students’ experience of academic stress is lessened, thus guaranteeing higher self-efficacy and academic satisfaction. Lastly, cultural undertones of self-efficacy, academic stress, and academic satisfaction can be pursued. Cultural understanding of these factors can contribute to more holistic literature in educational psychology.

References


APPENDICES

COLLEGE SELF-EFFICACY INVENTORY

The following tasks are common to college students. On a scale of 1 – 4, rate your confidence in accomplishing these tasks. Please be guided by the following:

1 – Unconfident  2 – Undecided  3 – Somewhat Confident  4 – Totally Confident

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Make new friends at college.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. Talk to your professors/instructors.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. Take good class notes.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. Divide chores with others you live with.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. Research a term paper.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. Join an intramural sports team.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. Understand your textbooks.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. Get a date if you want one.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. Ask a professor or instructor a question outside of class.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10. Get along with others you live with.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11. Write a course paper.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12. Work on a group project.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13. Socialize with others you live with.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14. Do well on your exams.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15. Talk with a school academic and support (e.g., advising) staff.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16. Manage your time effectively.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17. Use the library.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18. Join a student organization.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19. Ask questions in a class.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20. Divide space in your residence.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21. Participate in class discussions.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22. Keep up to date with your school work.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Gender: (  ) Male  (  ) Female  Age: _______________
### ACADEMIC SATISFACTION SCALE

The following statements generally describe how satisfied you are with your academic experience at MIT. On a scale of 1-4, please rate your degree of satisfaction. Please be guided by the following:

1. I feel satisfied with the decision to major in my intended field.
2. I feel satisfied in choosing to study at Mapua.
3. I feel satisfied with the academic support services offered by Mapua.
4. I am comfortable with the educational atmosphere in my major field.
5. For the most part, I am enjoying my coursework.
6. I am generally satisfied with my academic life.
7. I enjoy the level of intellectual stimulation in my courses.
8. I feel enthusiastic about the subject matter in my intended major.
9. I like how much I have been learning in my classes.
10. I feel my professors are very competent.
11. I learn much from my professors.

<table>
<thead>
<tr>
<th>1 – Strongly Disagree</th>
<th>2 – Disagree</th>
<th>3 – Agree</th>
<th>4 – Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I feel satisfied with the decision to major in my intended field.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. I feel satisfied in choosing to study at Mapua.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. I feel satisfied with the academic support services offered by Mapua.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. I am comfortable with the educational atmosphere in my major field.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. For the most part, I am enjoying my coursework.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. I am generally satisfied with my academic life.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. I enjoy the level of intellectual stimulation in my courses.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. I feel enthusiastic about the subject matter in my intended major.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. I like how much I have been learning in my classes.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10. I feel my professors are very competent.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11. I learn much from my professors.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
STUDENT ACADEMIC STRESS SCALE

The following statements refer to feelings and experience of stress related to academic works. Please rate the following on a scale of 1 – 5, based on your own personal experience as a student. Please be guided by the following:

1 – None 2 – A little of the time 3 – Some of the time 4 – Most of the time 5 – All of the Time

<table>
<thead>
<tr>
<th>Statement</th>
<th>Rating 1</th>
<th>Rating 2</th>
<th>Rating 3</th>
<th>Rating 4</th>
<th>Rating 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My work built up so much that I feel like crying</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. I feel emotional</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. My emotions stop me from studying</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. I yelled at family or friends</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. I feel emotionally drained by academic institution</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. I feel I was lazy when it came to academic work.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. I procrastinated on assignments</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. I am been distracted in class</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. I am unable to study as required</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. I have trouble concentrating in class</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. I try to avoid class if possible</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. I use alcohol or drugs to enable me study well</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. I have trouble remembering my notes</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14. I couldn’t breathe.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15. I have difficulty eating</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16. My hands are sweaty</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17. I have had a lot of trouble sleeping</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18. I have headaches</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19. I feel overwhelmed by the demands of study</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20. I feel worried about coping with my studies</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21. There is so much going on that I can’t think straight</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22. I miss too many of my lectures</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23. I don’t enough time in studying</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24. I am not really sure am interested in reading</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25. At times am unable to express myself in words</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26. I am afraid to speak or discuss in the lecture room</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27. I feel the academic program is too burdensome for me</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28. I can’t keep my mind on my studies</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>29. I have trouble studying effectively</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>30. A times I don’t feel like studying</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>31. I feel am too slow in reading compared to others.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>32. I worried too much about marks to obtain in my examination</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>33. I feel am getting low marks</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>34. I would like to stop going to school</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>35. I have no stable place to study</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>36. I don't really like my course of study</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>37. I feel some textbooks are too hard for me to understand</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>38. I feel some lecturers are too hard for me to understand</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>39. I feel so much restless while receiving lectures</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>40. There are not enough good books in the library</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>41. Too much work is required in some courses</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>42. I feel am not getting along with some lecturers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>43. I feel some lecturers lack interest in their students</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>44. Some courses are too dull and boring</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>45. Some lecturers are not friendly to students</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>46. I feel lecturers are not considerate of students’ feelings</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>47. Some lecturers give unfair tests to students</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>48. I feel I have poor memory</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>49. I have trouble making up my mind about my academic work</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>50. I am too forgetful and easily discouraged about academic</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Relations between Present-hedonistic and Future Time Perspective, Achievement Goal-orientation and Regulatory Strategy Use in Technology-rich Learning Environments

Dylan Marshall
International School Manila

Abstract
This cross-sectional explanatory study examines the predictive mediational relations between time perspectives, achievement goals and regulatory strategy use in high school students in the context of technology-rich, constructivist learning environments. The study adopts Bandura's (1986) social cognitive theory as its theoretical framework for explaining the nature of predictive relations in the between the variables. Students present-hedonistic time perspective (PHTP) (α=.77), and future time perspective (FTP) (α=.79) were measured using Zimbardo and Boyd's (1999) ZTPI. The mastery-approach (MA) (α=.80), performance-approach (PA) (α=.86), achievement goals were measured with Pintrich et al.'s (1993) MSLQ and regulatory strategy use (RSU) (α=.74) with Midgley et al.'s (2000) PALS and Marshall's (2012) Tech-savy Scale. Participants were 460 international high school students of mixed gender and ethnicity aged between 15 and 18 years. Data was analyzed using path analysis SEM and the model had good fit: GFI .909, CFI .59 SRMR .029 (df=4). FTP positively predicted MA and PA (p<0.05). PHTP did not predict MA and PA (p>0.05). MA and PA positively predicted RSU (p<0.05) and achievement goal orientations mediate relations between FTP and RSU (p<0.05). Results are discussed in light of the previous research and have implications in understanding the relationship between these constructs in technology-rich learning environments.

Keywords: time perspectives, achievement goals, regulatory strategy use

Introduction
There is an increasing use of digital technology by today's high school students. Using desktop, laptop and tablet computers to locate and process information in order to construct knowledge has become central part of the learning process in the constructivist classroom. The constructivist learning theory suggests that learning is most effective when students are actively engaged in the learning process rather than receiving knowledge passively. Constructivist teaching methods often use guided discovery where the teacher avoids direct instruction and leads the student through questions and activities to create their own understandings of the material. Digital technology is a useful tool for teachers and students to create a constructivist learning environment (Jonassen, 1999).

Students use their laptops and social networking sites extensively both inside and outside of academic contexts. The technology-rich environment offers students many opportunities for constructivist learning, such as quick access to information via the internet and the ability to instantly connect and communicate with their peers and teachers. However, digital technology it can also act as a distraction from academic work, for example through instant messaging and online gaming websites. Constructivist teachers take advantage of the benefits that digital technology brings to their classrooms, but more needs to be known about how students become more successful users of these digital technologies. More research is needed on how
individual differences in the conceptions, motivations and behaviors of students in this type of learning environment impacts how effective students are in their use of digital technology in their learning.

A conception which relates student's motivations and behaviors is their notion of time, or time perspective. Zimbardo and Boyd (1999) conceptualize time perspectives as “continual flows of persona and social experiences are assigned into temporal categories, or time frames that help give order coherence and meaning to events” (p.1270). They propose that these ‘cognitive frames’ are used in the forming of expectations and goals. Zimbardo and Boyd state that “between the abstract, psychological constructions of prior, past and anticipated future events lies the concrete and empirically centered representation of the present” (p. 1272). Zimbardo and Boyd propose that a person’s conceptualization of the present (their time perspective) influences the goals they set for the future. Time perspective influences many important judgments, decisions and actions and plays a “dynamic role in life decisions, goal setting and actions” (Zimbardo & Boyd, 1999, p. 1293). Prensky (2001) described today’s students as ‘digital natives’ who have grown up in a technology-rich environment and have been interacting with digital technologies throughout their lives. Does these students conception of time influence their motivations for learning? Do their motivations influence the learning strategies they use with digital technology? This research study addresses the central question of ‘how do student’s time perspective and motivations relate to their learning behaviors in the context of technology-rich learning environments?’

**Theoretical Framework**

The research study is anchored in the social cognitive theory. Bandura’s (1986) social cognitive theory conceptualizes human behavior as a dynamic interplay between personal, behavioral and environmental influences. Bandura proposes that we are not passive responders to the environment but are self-organizing, proactive, self-reflecting and self-regulating. The capacity to regulate ones thoughts, motivation, affect and action are central to students’ academic functioning. Bandura’s theory states that we are active in the construction of our realities and what we think, believe, and feel affects how we behave. The term reciprocal determinism was proposed by Bandura to explain how cognition, emotion, biological events, behavior and environmental influences interact and result in triadic reciprocity.

In the context of this study, time perspective and achievement goal orientation are personal factors which are influenced by the learning environment. The degree of self-regulation and control shown by students when using digital technology is a behavior (regulatory strategy use). These three factors relate to each other through triadic reciprocity because time perspective affects achievement goals which affect the students’ regulatory strategy use. The student also receives feedback from their behavior, which influences their time perspective and motivation in a cyclical manner.
This study addresses this gap in the literature through the testing of a path model on predictive relations between time perspective, achievement goals and regulatory strategy use in technology-rich learning environments. The models presented in previous literature have not placed these constructs together and analyzed predictive relations between the variables within the specific context the technology-rich constructivist learning environment.

**Time Perspective**

The social cognitive theory connects time perspective to motivational and behavioral outcomes because the person’s time perspective is a *personal* factor which varies between individuals and is based on prior experiences, vicarious reinforcement and feedback. Zimbardo and Boyd (1999) developed the Zimbardo Time Perspective Inventory (ZTPI) to measure this construct and their exploratory and confirmatory factor analysis revealed it to be a multi-dimensional construct consisting of five factors.

This study addresses a gap in the literature by placing the construct in the context of the high school classroom and is particularly concerned with predictive relations between *present-hedonistic* and *future* time perspective, achievement goal orientation and students regulatory strategy use whilst using digital technology in their learning. *Present-hedonistic* time perspective reflects a hedonistic, risk-taking, devil may care attitude towards time and life. These people tend to focus on the pleasure of the moment they are living. On the other hand, *future* time perspective reflects behavior that is dominated by striving for future goals and rewards (Zimbardo & Boyd, 1999). It is predicted that students with *future* time perspective are more likely to adopt approach (mastery/task) achievement goals and are more self-regulated and controlled in their use of digital technology in their learning.

**Achievement Goals**

It is vital to understand the reasons why students engage in learning. In order to do this, this study adopts a modified version of the widely used and well-validated 2x2 achievement goal framework (Elliot and McGregor, 2001). Elliot and McGregor (2001) carried out an exploratory and confirmatory factor analysis with college students to develop their two *avoidance goals* and two *approach goals*. The *mastery-approach* goal is where the student is focused on the development of competence through task mastery. The *mastery-avoidance* goal is where the student focuses on avoiding incompetent execution of tasks, such as failing to remember material, or making small mistakes when taking notes. The *performance-approach* goal is where the student seeks to demonstrate that they are more capable than their peers and the *performance-avoidance* goal is where students seek to avoid social judgments that they are less capable than their peers (Elliot, 1999). Since *performance-approach* and *mastery-approach* achievement goal orientations have
been established as the most adaptive goals to adopt in academic environments the conceptual framework of this study will only include these two goal orientations (Lau et al. 2008; Liem et al. 2007).

**Regulatory Strategy Use**

*Regulatory strategy use* is a specific behavior which fits into the wider construct of self-regulated learning which has great bearing on students’ academic achievement. Zimmerman (2012) proposes that self-regulated learning refers to how students become masters of their own learning processes. Zimmerman does not see self-regulation as a mental ability or a performance skill but rather is the self-directed process through which abilities are transformed into task-related skills. Boekaerts, Zeidner, and Pintrich (2000) state that “self-regulation involves cognitive, affective, motivational, and behavioral components that provide the individual with the capacity to adjust his or her actions and goals to achieve the desired results in light of changing environmental conditions” (p. 751).

Bembenutty (2006) points out that when conflicts arise for students between pursuing important academic goals and yielding to tempting distractions, the self-regulated learner is able to remain task-focused despite their immediate impulses and they are able to delay gratification and students who are not as skilled at self-regulated learning are unable to delay gratification. This connects to the construct of time perspective, suggesting that students with a future time perspective are more self-regulated in their learning. Bembenutty believes that “the differences between different types of learners may be explained by their unique characteristics such as personal goals, vicarious experiences, history of reinforcement, social modeling, and highly influential environmental and social conditions” (p. 1). Bembenutty’s statement supports the placing of achievement goals as a proximal antecedent of regulatory strategy use in the conceptual framework of this study.

The term ‘self-regulated learning’ can be used in both a wide and in a narrow sense. Zimmerman points out that in the wide sense, a student is self-regulating his learning if he is able to choose what, when and where to learn. However, most of the time the term is applied to “specific situations where students have been given a learning task and it is now up to them to self-regulate the learning processes involved in doing the task, this would be called self-regulated learning in a narrow sense” (Zimmerman, 2012, p. 6). This research study examines self-regulation in a narrow sense. It focuses on the construct specifically in relation to students’ use of digital technology in their learning. In the conceptual framework of this study, students’ time perspective and achievement goal orientations are predictors of regulatory strategy use.

This study focuses on regulatory strategy use specifically related to students’ use of digital technology in their learning. The focus is on effort regulation strategies that students use when using digital technology in their learning. This demonstrates itself though students’ ability to use digital technology in a controlled manner without being distracted by other online and non-study related activities.
This study measures these variables using the items that relate to the *control* subscale on Marshall’s (2012) Tech-savvy Scale and an adapted version of the *effort-regulation* subscale of Pintrich et al.’s (1993) MSLQ which places effort regulation in the context of students’ digital technology use.

**Literature Review**

Previous research has examined relations between time perspective *regulatory strategy use*. A study by Ward, Guthrie and Butler (2009) found that *future* time perspective was related to higher levels of education and socio-economic status. Leondari (2007) also found positive relations between *future* time perspective and academic achievement. Barber et al. (2009) studied relations between self-control, time perspective and academic achievement. They concluded that self-control moderated the relationship between time perspective and academic achievement and they found that College students with *present-hedonistic* time perspective had lower GPAs and those with *future* time perspective.

Time perspective has also found to be a predictive antecedent of achievement goal orientations. Campen (2010) carried out a study of relations between time perspective and achievement goal orientation and found significant positive correlations between performance-approach and mastery-approach achievement goals and *future* time perspective. Bembenutty and Karabenick (2004) also found associations between academic delay of gratification, *future* time perspective, and self-regulated learning.

Lee et al. (2010) investigated time perspective and achievement goal orientation using structural equation modeling (SEM) and they found that *future* time perspective positively predicted mastery-approach achievement goal orientation. They found that students who have *future* time perspective are more likely to exert effort into mastering the academic tasks required of them, and are less likely to be distracted by the use of digital technology in their learning. On the other hand, *present-hedonistic* students are less likely to adopt approach goals and be regulated in their use of digital technology in their learning.

Students who adopt *performance* and mastery-approach achievement goals are more likely to engage in deep learning strategies as their achievement goal orientation leads them to be more engaged in their learning (Chiang et al., 2011; Lau et al. 2008; Liem et al. 2007). This study examines how achievement goals predict regulatory strategy use which is vital for academic achievement in technology-rich constructivist learning environments.

It is important to consider the impact of cultural differences on achievement goals. Research with predominantly western participants has identified mastery-approach goals as the most adaptive and performance-approach goals as less adaptive antecedents of adaptive learning behaviors (Wolters, 2004). However, research within the Asian context has shown that performance-approach goals also positivity predict student adaptive learning strategies (Lau et al., 2008). This study has a culturally diverse sample of high school student in an international school in
the Philippines. This will give us further insight into how time perspective and achievement goals relate and regulatory strategy use in a multi-cultural and technology-rich learning environment.

In the conceptual framework of this study achievement goals are placed as proximal antecedents of regulatory strategy use. Previous research on relations between achievement goals and regulatory strategy use has highlighted the adaptive nature of mastery-approach achievement goals. Lau et al. (2008) found that mastery-approach goals positively predicted classroom attentiveness and deep learning. Unlike research carried out on western samples, Lau et al. also found performance-approach achievement goals to be adaptive in their sample of Singaporean secondary school students. Performance-approach achievement goals positively predicted group participation and deep learning in their study.

Grant and Dweck (2003) studied relations between achievement goals and regulatory strategy use in a sample of university students from the USA. They found that mastery-approach goals predicted active coping, sustained motivation, and higher achievement in the face of challenge. On the other hand, performance-approach goals were not adaptive and predicted withdrawal and poorer performance in the face of challenge. Furthermore, Grant and Dweck’s (2003) analysis suggested that the relationship between achievement goals and course grades was mediated by the tendency to engage in deeper processing of course material. This offers justification for the placing of a narrow domain specific measure of regulatory strategy use as an antecedent of achievement goals within the conceptual framework of this study.

In summary, today’s students are operating in technology-rich environments where the ability to be regulated and controlled users of digital technology has been shown to relate to academic achievement (Marshall, 2012). Future time perspective is an antecedent of mastery-approach and performance-approach achievement goals and these achievement goals are an antecedent of regulatory strategy use (Grant & Dweck, 2003; Campen, 2010). This means that achievement goal orientations mediate relations between time perspective and regulatory strategy use. According to Baron and Kenny (1986) mediators are variables that account for relations between the predictor and the outcome variables. The conceptual framework of this study integrates these constructs into a unified model.

Research Questions

1. Do time perspectives predict achievement goals?
2. Do achievement goals mediate relations between time perspective and regulatory strategy use?
3. Do achievement goals predict regulatory strategy use?
**Method**

**Participants**

The participants were an opportunity sample of 460 high school students of with 259 females and 201 males from an international school in Metro Manila, Philippines. Participants were from varied cultural and ethnic backgrounds. All students came from high socio-economic status, all of the students use digital technology in their learning and the school had a high level of digital technology resources. The school's mission statement and curriculum is focused on the use of constructivist teaching and learning.

**Instruments**

**Time Perspective.** This was measured using the Zimbardo Time Perspective Inventory (ZTPI) subscales for *present hedonistic* and *future* time perspective (Zimbardo & Boyd, 1999). The *Present-hedonistic time perspective* subscale measures the extent to which a person adopt reflects a hedonistic, risk-taking, devil may care attitude towards time and life ($\alpha=.79$). The *future time perspective* subscale measure the extent to which a person reflects behavior that is dominated by striving for future goals and rewards ($\alpha=.77$) (Appendix A & B). It was a four-point forced choice Likert type scale and students read the statements and click their answers to corresponding statements ranging from ‘Strongly agree’ (4) to ‘Strongly disagree’ (1).
Achievement goals. In this study, two sub-scales of students’ achievement goals were measured with an adapted version of the Patterns of Adaptive Learning Survey (PALS) (Midgley et al., 2000; Lau et al., 2008) (Appendix A& B). The mastery-approach (α=.80) goal sub-scale measured the extent to which students focused on learning new, challenging and interesting things in their learning. The performance-approach (α=.86) goal sub-scale measured the extent to which students focused on demonstrating that they are more capable than others in their learning. Students clicked their answers on a Likert type scale from ‘Strongly agree’ (4) to ‘Strongly disagree’ (1).

Regulatory strategy use. The control sub-scale of Marshall’s (2012) Tech-savvy Scale was used (Appendix A) along with an adapted version of Pintrich et al.’s (1993) MSLQ sub-scale items on effort regulation were used to measure regulatory strategy use (α=.74). This sub-scale measured how controlled students are in their use of digital technology in their learning (Appendix A& B). It was a four-point forced choice Likert type scale and students read the statements and click their answers to corresponding statements ranging from ‘Strongly agree’ (4) to ‘Strongly disagree’ (1).

Procedure

Data was gathered in high school classes from during student’s homeroom periods. The high school administration was contacted by the researcher to ask if they were willing to allow students to take part in the study. After permission was obtained the researcher then created an online version of the scales outlined above using Google Docs called the Student Learning Research Survey (Appendix A). A message was sent out to by the high school administration to all homeroom teachers to administer the Student Learning Research Survey to students during homeroom period (2.30pm-3pm) as a whole class. Students were informed by their homeroom teacher that the scale was examining their beliefs, motivations and use of digital technology in learning. Students were informed that all their answers were confidential in order to adhere to the ethical guidelines for research set out by the American Psychological Association (APA, 2002). Homeroom teachers then instructed students log into their laptops and retrieve the link to the Student Learning Research Survey from their school email inbox and read the instructions at the top of the Student Learning Research Survey. Students then filled out the items by clicking in the assigned boxes (Appendix A). This was carried out in silence. After 10 minutes homeroom teacher thanked students for taking part in the research study. After the data was collected a path analysis was carried out using PASW and AMOS data analysis software.
Results

A path analysis using structural equation modeling (SEM) was used to examine predictive causal relations between the variables in the using regression equations (Byrne, 1998). Table 1 shows the descriptive statistics, Table 2 is a summary of the regression equations between the variables in the model and Figure 1 is the path diagram of the model.

Table 1.
Descriptive Statistics for all variables in the model

<table>
<thead>
<tr>
<th>Present Hedonistic TP</th>
<th>Future TP</th>
<th>Mastery Approach GO</th>
<th>Performance Approach GO</th>
<th>Regulatory Strategy Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>2.85</td>
<td>2.9</td>
<td>3.50</td>
<td>2.68</td>
</tr>
<tr>
<td>SD</td>
<td>.41</td>
<td>.49</td>
<td>.46</td>
<td>.72</td>
</tr>
</tbody>
</table>

Table 2
Regression equations for relations between time perspective goal orientations and regulatory strategy use.

<table>
<thead>
<tr>
<th>Path</th>
<th>Regression Equation</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Hedonistic TP → Mastery Approach GO</td>
<td>0.125</td>
<td>0.048</td>
<td>0.009</td>
</tr>
<tr>
<td>Present Hedonistic TP → Performance Approach GO</td>
<td>0.117</td>
<td>0.079</td>
<td>0.139</td>
</tr>
<tr>
<td>Future TP → Mastery Approach GO</td>
<td>0.416</td>
<td>0.041</td>
<td>0.001*</td>
</tr>
<tr>
<td>Future TP → Performance Approach GO</td>
<td>0.397</td>
<td>0.067</td>
<td>0.001*</td>
</tr>
<tr>
<td>Mastery Approach GO → Regulatory Strategy Use</td>
<td>0.326</td>
<td>0.051</td>
<td>0.001*</td>
</tr>
<tr>
<td>Performance Approach GO → Regulatory Strategy Use</td>
<td>0.142</td>
<td>0.033</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

*p<0.05
Three measures of goodness of fit were used, the Goodness of Fit Index (GFI) which accounts for the relative amount of variance in the model. The Comparative Fit Index (CFI) compares fit to an independent model. The Standardized Root Mean Square Residual (SRMR) is an absolute measure of fit and is defined as the standardized difference between the observed correlation and the predicted correlation. The reason why the commonly used RMSEA model fit indices was not used was because of the low degrees of freedom of the model (df=4). Kenny, Kaniskan, and McCoach (2011) argue to not even compute the RMSEA for low df models.

For GFI and CFI values greater than .09 indicate good fit (Shaufeli et al., 2002). For SRMR a value less than .08 is generally considered a good fit (Hu & Bentler, 1999). The model had good fit, with a GFI .909 and a CFI of .59 and a SRMR of .029 (df=4).

Future time perspective positively predicted mastery-approach and performance-approach achievement goals (p<0.05). Present-hedonistic time perspective did not predict mastery-approach and performance-approach achievement goals (p>0.05). Mastery-approach and performance-approach achievement goal orientation positively predicted regulatory strategy use (p<0.05).
Goal orientations mediate relations between future time perspective and regulatory strategy use ($p<0.05$).

**Discussion**

The path analysis model has good fit and conforms to the conceptual framework of this study. The model shows that approach achievement goals mediate relations between future time perspective and regulatory strategy use in the technology rich-learning constructivist learning environment. This model addresses a gap in the literature through explaining the predictive relationship between time perspective and approach goal orientations, unifying Zimbardo and Boyd’s (1999) time perspective with Elliot and McGregor (2001) achievement goal orientations. The model shows that both mastery-approach and performance-approach goal orientation positively predict regulatory strategy use. Furthermore, the model shows that future time perspective positively predicts performance-approach and mastery-approach goal orientation. In the context of Bandura’s (1986) social cognitive theory the model shows that a student’s conception of time influences their achievement goal orientation which in turn influences their regulatory strategy use.

Some students with future time perspective have a strong drive and need for personal achievement and thus pursue mastery-approach goals. These students see how important it is to study and appreciate the long term benefits of studying, so they are motivated to do well in relation to their own personal standards, and they are less likely to be distracted because they use regulatory strategies when learning. The student who pursues mastery-approach goals is the most controlled and self-regulated in their use of digital technology. This is because they are focused on the task, so they are able to avoid the distractions that digital technology offers.

Some students have future time perspective but adopt performance-approach goals and these students judge their performance in comparison to others and are competitive. In the technology-rich environment they also employ regulatory strategies, but not as effectively as the students who have mastery-approach goal orientation. The performance-approach goal oriented student is concerned by their own performance in relation to others and the technology rich-environment allows them to easy connect and also be distracted by other students who they are trying to outperform.

In the model, performance-approach and mastery-approach goal orientations both predict regulatory strategy use but there is a higher regression coefficient for mastery-approach (0.33) than for performance-approach (0.14). This finding confirms those of Lau et al. (2008) and Liem et al. (2007) in the technology-rich learning environment with a more multi-cultural sample. The results of this study also support those of Chiang et al.’s (2011) and Liem et al. (2007) who found that in the Singaporean and Taiwanese context both mastery-approach and performance-approach goals were related to adaptive behavioral outcomes.
Students who have a present-hedonistic time perspective do not pursue approach goals. These students are focused on the ‘instant gratification’ in present and because of this they are not performance-address or mastery-address goal oriented and do not employ effective regulatory strategies when using digital technology. Digital technology is a distraction for students who have a present-hedonistic time perspective as it enables them to engage socially with others and do other non-academic tasks like gaming rather than focusing on the learning the class materials.

The model shows that mastery-address goal orientation clearly mediates relations between future time orientation and achievement goals in technology-rich learning environments, and it shows that present hedonistic time orientation and to a lesser extent performance-address goal orientations are not as adaptive in the technology-rich learning environment. This has implications for the teaching in the constructivist, technology-rich learning environment because it suggests that this learning environment best suits students who have a future time perspective and mastery-address goal orientation. Teachers should encourage students to adopt a future time perspective and pursue mastery-address goals. They can do this through developing a mastery goal structure climate in their classrooms, and this will encourage students to be controlled and self-regulated in their use of digital technology.

The results of this study enhance our understanding of students learning in technology-rich environments because it gives a clearer picture of how students’ conceptions of time, motivations and learning behaviors in this context. However, it is important to recognize the methodological limitations of this quantitative cross-sectional study. Further studies are needed to gain a deeper understanding of the relations between the variables. When a clearer picture emerges of relations between these between variables, experimental research can allow us to examine the effectiveness of interventions to improve student learning in technology-rich environments.

In conclusion, this study found that future time perspective predicts both performance and mastery approach goal orientations, and that high school student’s mastery-address and performance-address goal orientation mediated relations between future time perspective and regulatory strategy use in the technology-rich constructivist learning environment.

References


Appendix A

Student Learning Research Survey

The following items relate to your learning.

The data will be used for research on student learning.

For the questions related to your classes answer these in relation to classes which you do use a laptop/PC.

All responses are confidential.

Please read each item carefully and click in the circle that relates to you.

*Required
1. Select your gender. *
   - Male
   - Female

2. Select your grade. *
   - Grade 9
   - Grade 10
   - Grade 11
   - Grade 12

3. Do you use a laptop/PC when studying? *
   - Yes
   - No

4. It’s important to me that I learn a lot of new concepts this year. *
5. I meet my obligations to friends and authorities on time. *
6. It’s important to me that I thoroughly understand my class work. *
7. I make lists of things to do. *
8. I am able to resist temptations to when I know that there is work to be done. *
9. I rarely feel lazy or bored when I study using my PC/laptop. *
10. One of my goals is to show others that I’m good at my class work. *
11. Even when course materials are dull and uninteresting, using my PC/laptop helps me to keep working until I finish. *
12. I use my laptop/PC to help me stay organized and monitor my learning. *
13. I take each day as it is rather than try to plan it out. *
14. One of my goals is to show others that class work is easy for me. *
15. It’s important to me that I improve my skills this year. *
16. If things don’t get done on time, I don’t worry about it. *
17. I believe that a person’s day should be planned ahead each morning. *
18. It’s important to me that I look smart compared to others in my class. *
19. One of my goals in all my classes is to learn as much as I can. *
20. I conduct myself in an ethical and responsible manner when using laptop/PC in my learning. *
21. One of my goals is to look smart in comparison to the other students in my class. *
22. I find myself getting swept up in the excitement of the moment. *
23. One of my goals is to master a lot of new skills this year. *
24. I keep working at difficult, uninteresting tasks if they will help me get ahead. *
25. It’s important to me that other students in my class think I am good at my class work. *
26. I do things impulsively. *
27. I am able to use my PC/laptop in my learning without being distracted. *
28. It upsets me to be late for appointments. *
29. It is more important for me to enjoy life’s journey than to focus only on the destination. *
30. I think carefully about the most efficient way to use my laptop/PC before engaging in a learning task. *
31. I complete projects on time by making steady progress. *
32. It is important to put excitement in my life. *
33. There will always be time to catch up on my work. *
34. Taking risks keeps my life from becoming boring. *
35. I feel that it’s more important to enjoy what you’re doing than to get work done on time. *
Appendix B

Scales to for time orientation, achievement goals and regulatory strategy use

**Future Time Perspective** (Adapted from Zimbardo and Boyd’s 1999 ZTPI)

- I meet my obligations to friends and authorities on time.
- I make lists of things to do.
- I am able to resist temptations to when I know that there is work to be done.
- I keep working at difficult, uninteresting tasks if they will help me get ahead.
- It upsets me to be late for appointments.
- I complete projects on time by making steady progress.

**Present Hedonistic Time Perspective** (Adapted from Zimbardo and Boyd’s 1999 ZTPI)

- I take each day as it is rather than try to plan it out.
- If things don’t get done on time, I don’t worry about it.
- I find myself getting swept up in the excitement of the moment.
- I do things impulsively.
- It is more important for me to enjoy life’s journey than to focus only on the destination.
- It is important to put excitement in my life.
- There will always be time to catch up on my work.
- Taking risks keeps my life from becoming boring.
- I feel that it’s more important to enjoy what you’re doing than to get work done on time.
**Mastery Goal Orientation** (Adapted from Pintrich et al.’s 1993 MSLQ)

- It’s important to me that I learn a lot of new concepts this year.
- One of my goals in all my classes is to learn as much as I can.
- One of my goals is to master a lot of new skills this year.
- It’s important to me that I thoroughly understand my class work.
- It’s important to me that I improve my skills this year.

**Performance-Approach Goal Orientation** (Adapted from Pintrich et al.’s 1993 MSLQ)

- It’s important to me that other students in my class think I am good at my class work.
- One of my goals is to show others that I’m good at my class work.
- One of my goals is to show others that class work is easy for me.
- One of my goals is to look smart in comparison to the other students in my class.
- It’s important to me that I look smart compared to others in my class.

**Effort Regulation & Controlled use of digital technology** (Adapted from Midgley et al. 2000 PALS & Marshall’s 2012 Tech-savvy scale)

- I rarely feel so lazy or bored when I study using my laptop/PC.
- Even when course materials are dull and uninteresting, using my laptop/PC helps me to keep working until I finish.
- I think carefully about the most efficient way to use digital technology before engaging in a learning task.
- I conduct myself in an ethical and responsible manner when using digital technology in my learning.
- I use my laptop/PC to help me stay organized and monitor my learning.
- I use digital technology to help me stay organized and monitor my learning.