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J.N. Andrews Honors Program

Andrews University

HONS 497

Honors Thesis

The Effects of Prompted Tutoring on an Emporium Model Math Course

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Abstract:

My research goal is to investigate how specific prompting of students would affect their involvement and progress in an emporium developmental math course. With the aim of increasing the students' involvement and progress I tested a method that was intended to increase students' perceived connectedness with the classroom and promote the use of the available tutors and teachers. I monitored consenting students' progress in the Spring 2015 courses and sent emails to students who met any one of three different criterion: 1) If the students time investment was below a threshold. 2) If the student's mastery pace was less than three topics per hour. 3) If the student, after taking an assessment, had regressed more than five topics. I used the average hours spent and exams passed by my subjects as measures of student involvement and success. In addition, I used a subjective questionnaire as a means of gauging students' reaction to my project. From these two methods I was able to objectively determine if there appeared to be a statistical benefit to my research and subjectively observe how students personally felt the project affected their learning. The research ultimately aided in identifying areas for further research and highlighted student perceptions of the correlation between monitoring progress and classroom connectedness.

Introduction:

Andrews University Mathematics Department employs the emporium model classroom through the use of the ALEKS system, an artificially intelligent assessment and learning program, to assist in bringing students to the college readiness level needed in order to enroll in the appropriate math courses required for their desired major. The emporium model has many positive benefits that aim to promote high student success that are balanced with certain weaknesses that could contribute to lower academic achievement. Peter Bahr highlights, in his research on a remedial math course, the vast majority of students who ultimately do not complete a college level math course [1]. Bahr conducted his study on community college students, yet there are similar concerns with a smaller percentage of the students at Andrews who need remedial math. Through the years that Dr. Weldon has taught and overseen the ALEKS courses she observed that the primary obstacle to passing the course seemed to be engagement with the material with many students not passing the ALEKS courses simply for lack of investing the time, even though this resulted in stretching out the math journey. As Bahr highlights, “regardless of the success of current or future efforts to improve the remedial math sequence, inevitably some students will begin the sequence but not complete it” [1]. As a future math educator I was disturbed by this comment and the realization that many students on Andrews campus were not able to pass the remedial courses needed for their major. Out of this concern the desire to counteract the weakness in the emporium model concerning the susceptibility for students to feel disconnected from the classroom formulated into my research project. My research goal is to investigate how specific prompting of students would affect their involvement and progress in an emporium developmental math course in an effort to find a tutoring method

that is beneficial to the mathematics department in increasing students connectedness to the classroom.

Robert Blum discusses the great impact that school connectedness has on student achievement. First he describes that, “School connectedness refers to an academic environment in which students believe that adults in the school care about their learning and about them as individuals” [2]. Although his personal research has focused on the adolescent age he notes the importance of school connectedness for all grade and age levels. In addition, Blum expresses that the various factors that contribute to the idea of connectedness result in a less clearly defined empirical base. For this reason, when developing my research I decided to focus on using the factor of progress monitoring to enhance students connectedness to the classroom. In their research, Bolt, Ysseldyke, and Patterson noted that progress monitoring has shown some aspects as having positive results but because there are various forms of progress monitoring it has also faced many challenges. One major conclusion that they discuss is that teachers that had successfully implemented progress monitoring were generally observed to be more effective teachers [3]. As an emporium model course ALEKS allows for the ability to have progress monitoring by teachers since available tutors and teachers are at each class period at students disposal [5]. For this reason if my research were successful and deemed helpful it would be a feasible option to be implemented in future classes.

Uniqueness of Research:

My research is unique and meaningful because it seeks to implement a type of progress monitoring formulated by myself and Dr. Weldon specifically geared toward the ALEKS course

in an effort to find a way to enhance student success. As an outside observer to the ALEKS course I do not have the ability that teachers or tutors would to personally tutor and instruct students. Instead the type of progress monitoring that we developed would be emails sent to the individual concerning their advancement and commitment to the ALEKS program. Students that responded specifying certain needs would then be brought to the teacher's attention so that they could provide additional support. In my review of the literature I did not find an example of a human third party monitor of student progress geared toward the specifications in the ALEKS program.

Limitations:

Although I desired for my research to produce results that spoke to the correlation between classroom connectedness and student success there were factors limiting my study that provided obstacles in achieving concrete results. The nature of my study required that I obtain consent from students before monitoring their progress. Many factors, known or unknown, contributed to the desire for students to be involved in this study. As a result, the group of students that I monitored was only a fraction of the total class size. Some consenting individuals were ultimately not included in my survey results for legitimate reasons, such as dropping the course, which resulted in an even smaller sample pool. In addition, the design of my monitoring required student feedback in a few areas in order to produce the most effectiveness. These areas included the need for students to read and reply to my emails, to accept teachers help and guidance, and to complete the closing survey. The short term of my research also limited results as I was only able to monitor student progress for a short time, and part of that time included

gaining consent, the closing questionnaire, breaks, and cancelled school (there were four snow days that semester in contrast to only two snow days in the comparison semester). Bolt, Ysseldyke, and Patterson also note that studies revolving around students are limited by the variability in students responses to different interventions [3], that is students personalities and attitudes towards math also affected the success of my research project. For these reasons, although my research may have raised questions and introduced some interesting observations, further research must be done to develop any concrete conclusions.

Methodology:

My research was implemented in the spring semester (2015) in all ALEKS courses offered on the campus of Andrews University. The professors of the program had previously approved the project and understood that as part of the project I would email them names of individuals that had requested additional help, with details as to what type of help. After allowing time for students to drop or add the course to their class schedules, I personally introduced my project to each class, handed out consent forms, and collected forms from those willing to participate. Dr. Weldon opened access to me in the ALEKS courses to monitor progress of the 31 consenting individuals and be able to email and receive emails from them. Once the list of consenting individuals and my access to their progress was complete I began to monitor student progress and send emails approximately every two weeks. Weeks that had any days with no school were generally grouped with full length weeks to give a more accurate picture of students time spent in ALEKS, topics mastered, and assessments passed. I sent students emails concerning their progress for three different reasons: 1) If they spent less than

four hours per week working in ALEKS. 2) If they were mastering less than three topics per hour. 3) If, after taking an assessment, they had regressed by five or more topics. These standards were not communicated to students so that their effort and abilities would not be altered by any factor other than the progress monitoring. The emails first identified why the student was being emailed, whether for time spent, topics mastered, or their assessment progress, and then asked the student if there was a topic they would like help mastering. If students responded to my email I forwarded the information to the teacher specifying what the student had asked for help in. Some responses simply said they would not like help, or one was satisfied with the time they had spent although I had addressed it as being low. After the information had been conveyed to the teacher I no longer had control over the intervention and it was the teacher's responsibility to further assist the student. I sent and received emails throughout the duration of the semester.

At the end of the semester I sent an email to each student with a questionnaire attached requesting their feedback. The questionnaire had five questions on it, they are: 1) Do you think that receiving these emails had an effect on your progress in ALEKS this semester? Positive, Negative, Neutral? Why? 2) Did these emails help you feel more connected and supported while doing ALEKS? 3) Did these emails prompt you to seek additional help, or to work harder at your progress in ALEKS? 4) Did you receive additional help from your teachers after responding to my email about your progress in ALEKS? 5) Do you think that this method of reviewing student progress should be continued in future ALEKS classes? The purpose of this questionnaire is to give a subjective view to the effectiveness of my research. In addition, I used the statistical T-test to have an objective view of the students success. With the statistical T-test I compared the time spent and number of assessments passed by my group of students to the spring semester 2014

ALEKS courses that met on Andrews University's campus. The information for that class was provided by Dr. Weldon as I did not have permission to view the individual student performance. I then ran the test and compiled the surveys to determine the influence of my research. Although the objective portion of my research speaks to the actual influence that my project had on student success, the goal of the subjective portion is to help clarify the objective results.

Results:

Thirty-one students agreed to participate in my research project. Over the course of the semester a total of 120 emails were sent out to the participating students. Each student received at least one email from me in regards to their progress in ALEKS. Of all the participants, nine students replied to the emails on fourteen separate occasions. In total, four students asked for additional help on seven different occasions.

The statistical T-test on the two populations was based off the data shown in Fig. 1.

Fig. 1

Group and Size	avg time spent	standard dev	avg exams passed	standard dev
Sp14-71	46.86 hrs	21.08 hrs	1.17	0.83
Sp15-31	47.91 hrs	27.81 hrs	1.06	0.93

When running the T-test on the average time spent working in ALEKS, I found a p-value of .85, which shows that there was not a statistically significant difference in the amount of time students spent in ALEKS between my research group and the classes in the spring 2014. When running the T-test on the average number of exams passed, I found a p-value of .59, which shows

that there is not a statistically significant difference in the number of exams passed between my research group and the classes in the spring 2014.

Out of the thirty-one students monitored, seven elected to participate in the subjective questionnaire. Of these seven, one responded indicating that they had not received any emails. This response is troubling because I sent emails to each student in my study. When analyzing the results of the subjective survey there are then only six responses. The results of my subjective questionnaire do not provide such straightforward results as the objective portion, yet they do provide information that leads to interesting questions. The low number subjective responses could allude to some interesting conjectures and could potentially be related to the low number of responses that I received from students seeking additional help. As found in my literature review, project monitoring is impacted by the variables of students interaction with the monitoring [3]. The first question on my survey asks students if they felt the emails I had sent had a positive, negative, or neutral effect on their progress and why. Two students noted a positive effect, four students responded that it had a neutral effect, none responded that it had a negative effect. Students that responded concerning the neutral effect of my emails mentioned that they did not help or hurt them because they felt no obligation to respond. Those who said it had a positive effect noted that they felt that someone was interested in their success, it gave them another alternative to seek help, and they felt supported.

The second question on my survey asked if the emails helped students feel more connected and supported while doing ALEKS. The responses for this were split down the middle, with three answering yes and three answering no. Here I observed that one person that responded with neutral influence to the first question notes a positive aspect to my emails. Next I

sought information regarding whether students felt prompted to seek additional help or work harder at their progress. Again the answers were split, with three answering yes and three answering with a no. One of the students that responded with a no expounded on their answer explaining that after receiving an email she would remember how badly she was doing and would go work. So, although she responded with a no, her explanation calls for the question to actually have been answered with a yes.

The fourth question asked if students had received additional help from teachers after responding to my email. In this part two responded with a yes, two with a no, and two were neutral. In reviewing the responses from those who claimed to have not received additional help, I noticed that one student had never responded to my emails asking for additional help, and the other explained that the teacher could not help them any more than they already were without doing the work for them.

Lastly, I desired to know if the students felt that this form of monitoring should be continued in future ALEKS courses. Five of the students encouraged the use of monitoring in future courses with only one student responding with a no.

Conclusions:

Within the limitations of this study, additional monitoring and prompts were not the hoped-for catalyst for improving progress and time invested. Although this study did not detect any difference in the time students spent in ALEKS or the number of exams passed, the subjective responses supported the idea that prompting may promote connectedness to the

classroom. This raises questions on the correlation between classroom connectedness and student progress in an emporium model math course.

The contradictions in the subjective responses highlight the need to use multiple assessments to evaluate the effects of interventions. In particular, the mixed results concerning the effect on student progress and connectedness contrasted with all but one response to continue using prompts. This raises questions concerning the true effect on the students which blurs the relationship between the prompts and feelings of connectedness. Ultimately, my research has shown that there could be an increase in classroom connectedness due to targeted monitoring of students in the ALEKS courses but further study (involving more time and more students) is needed to establish any link to student time investment or progress. The low response rates to my email prompts could be an indicator of low classroom connectedness, so other interventions that increase connectedness may have a significant effect on student success. In addition, removing the third party so that the instructor sends prompts directly could increase feeling of connectedness. Other recommended improvements include incorporating a follow up plan for non-responders coupled with more intentional methods of gathering feedback from students. Designing an expanded survey and interviewing selected students may provide valuable insight into perceptions of classroom connectedness and the key motivators for changes in behavior.

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