

Effects of Teaching and Practice of Time Management Skills on Academic Performance in Computer Information Systems Courses

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Abstract

This study proposes a time management intervention for college students that includes 1) identifying academic deliverables with due dates, 2) preplanning specific study times each week in advance, 3) and sharing the plan with the instructor. Results show a decrease in missing assignments and an increase in course grades even when controlling for graduate/undergraduate status. Both undergraduate and graduate students perceive the intervention as positive. Students practice time management skills which are critical to their academic success and success as professional developers.

Keywords: time management, academic performance, procrastination

1. INTRODUCTION

Trait procrastinators are slower to act than non-procrastinators and demonstrate a propensity for being behind schedule on personal projects (Lay, 1990), studying fewer hours for exams (Lay & Burns, 1991), and turning in assignments later than others (Ferrari, 1993). Students frequently struggle to manage and balance their study time and their workload (Van der Meer et al., 2010). These behaviors can have deleterious impacts on a student's learning and academic performance. In contrast, students who perceive control of time report greater evaluation of their performance, greater work and life satisfaction, less overload, and fewer job-induced tensions (Macan et al., 1990).

Time management can be defined as setting goals and priorities, the use of mechanics to manage time, and perception regarding the ability to control time (Lay & Schouwenburg, 1993). As applied to academics, this definition prescribes

that students should learn to define goals for their academic success, identifying academic tasks, and prioritizing them.

2. LITERATURE REVIEW

Time management training in the workforce can have positive impacts on time management behaviors. Hall and Hursch (1982) evaluated the effect of a training manual and weekly consultation on workplace effectiveness. They observed that time spent on high-priority tasks increased as did self-rated productivity and satisfaction. Employees who attended a 3-day training program improved how they manage time at work demonstrating that interventions can improve behavior (Orpen, 1994). Van Eerde (2003a) observed a 1.5-day time management training seminar significantly reduced avoidance behavior, reduced worry, and increased employees ability to manage time at work. Time management intervention helps employees avoid procrastination (Lay & Schouwenburg, 1993; Van

Eerde, 2003b). Lang (1992) demonstrated that time management techniques significantly lowered anxiety.

García-Ros, Pérez-González, and Hinojosa (2004) call for instructional proposals aimed at improving college student's time management behaviors. They identified three subcomponents of time management for students: short-range planning, long-range planning, and time attitudes. Short-range planning is concerned with the management of tasks and time ranging from one day to one week. Long-range planning is focused on their goals over the academic year. Time attitudes are regarding their perceptions of control over time and self-efficacy.

Seven Habits of Highly Effective People (7HHEP) provides a useful framework for teaching time management skills to students. According to Covey (1989), Habit 1 is "Be Proactive," which means taking responsibility for one academic performance and that a student can influence their academic outcomes. Habit 2 is "Begin with the End in Mind" or goal setting. This habit relates to García-Ros et al.'s long-range planning. For students, long-range planning can include setting goals for the academic semester or academic year and setting milestones to meet academic deadlines. The activity of identifying what is due in a semester and the due dates can be considered short-range and mid-range planning.

Habit 3 is "Putting First Things First," which is a behavior of prioritizing activities that are in alignment with the student's academic goals. The activity of preplanning when to study and executing the plan can be considered a Habit 3 activity. Time management has mechanics like lists and schedules and perceived control of time (Macan et al., 1990). Bacon, Fulton, and Mallot (1983) used a checklist system to improve employee performance. Their system included a checklist of tasks and periodic supervisor review. The percentage of completed tasks increased by 29%. For our research purposes, we propose a time management intervention for college students which includes learning about 7HHEP, identifying what academic deliverables are due and when (short-range to mid-range planning), and to specifically preplan study time for the coming week (prioritizing). It is anticipated that the success in developing these habits in academics will also prepare them for the workforce where large software development projects often include setting short-range milestones and prioritizing tasks.

In this study we aim to experimentally test if learning about and practicing time management skills will have a positive impact on students' academic performance. The rationale for how a time management intervention may positively affect academic performance is as follows. Some researchers consider time management as one of the factors that influence students' study efforts and teaching students how to monitor their time and study environment will enhance their ability to make wise decisions about their study times (Risko et al., 1991). Higher scores on the scales of setting goals and establishing study priorities were correlated with greater percentage of planned academic work actually accomplished (Lay & Schouwenburg, 1993). Some components of time management could be used to predict college grade point average and time-management practices may influence college performance (Britton & Tesser, 1991).

Students who regularly identify what assignments are due and when may be more aware of their academic demands and may be less likely to forget to submit an assignment. Turning in more assignments will result in fewer zero grades and consequently a higher course grade. Students who regularly preplan their study time are more likely to follow through with their plan and actually study, which should increase their knowledge attainment and their assessment grade. Identifying their academic demands may influence students to purposefully load balance their study plans with work and life demands, potentially minimizing time conflicts, and avoid procrastination. The following hypothesis is testable.

H1. Students who learn about and practice time management skills will have fewer missing assignments and higher course grades.

Perceived control over time leads to reduced overload and greater work and life satisfaction (Macan et al., 1990). Time management interventions have the potential to increase a person's feeling of satisfaction (Hall & Hursch, 1982) and to decrease anxiety and stress (Macan et al., 1990; Van Eerde, 2003a). Studies also showed that procrastination is usually associated with anxiety and low grades (Häfner et al., 2014). We predict that as students receive training and implement the time management training, they will express positive sentiments towards the intervention.

H2. Students who learn about and practice time management skills will express

positive sentiments towards the intervention.

3. METHODOLOGY

Students at a southern, regional college of business participated (N = 331). Undergraduate students (n = 174) were from six sections of a digital collaboration course and three sections of an intermediate programming course. Graduate students (n = 157) participated in seven sections of an IT in healthcare course. All the source sections except two were delivered online. Demographic data were not collected as there is no theoretical reason to do so and because the treatment was to be applied to all students equally in a course regardless of their demographics. IRB approved the research protocol.

In the treatment group (n = 210), the professor taught aspects of time management in a 15-minute lecture. The topics are loosely based on 7HHEP habits 1-3: Be Proactive, Begin with the End in Mind, and First Things First. Students were asked to identify the deliverables for their class(es) (quizzes, exam, homework, anything that needed to be turned in for a grade). Analogy was drawn to a professional developer tracking deliverables for clients. Students were also asked to preplan their study time for each week. Students were taught that effective preplanning includes specific day and time, e.g., "study Tuesday 4:00pm-5:30pm, Saturday 11:00am-2:00pm" as opposed to ineffective planning, e.g., "study on Tuesday and Saturday." Analogy was drawn to successful athletes who arrive at the gym each day at 6am or at a team practice at a specific time not a general time. Each week of the course the students delivered to the professor the two, time management tasks (identify deliverables and preplan study time) through a simple quiz with a short-answer text box. The questions were as follows.

Quiz Question 1: What are the deliverables due next week? Just write or list them in this text box. In business, knowing what deliverables are due to the client and by when helps you plan the tasks and insure you produce quality deliverables by the due date. Many studies and experiences have demonstrated that when you preplan a goal, it gets accomplished. When you don't preplan, you lose your way. So, answer this question to demonstrate and practice time management and project management skills.

Quiz Question 2: When will you study next week? Specifically, what days and what times? This is a

promise you make to yourself, not to the professor. Poor Answer: "I'll study on Tuesday and Thursday"---Poor because it is not specific enough and distractions will stop you from succeeding. Poor Answer: "I don't know because my schedule changes each week." ---That's the exact reason to preplan! You can change it as needed but preplan. Great Answer: "I will study on Monday at 9pm-10pm; Wed from 8am-10am; Thu from 8am-10am; Sat from 8pm-10pm. "

In one section of intermediate programming course, the professor administered the same time management treatment and added that the students were to identify the deliverables for all their academic classes and preplan study time on an electronic or paper calendar. Students delivered a screenshot of their calendar instead of taking the short-answer quiz, but the learning objectives were the same as the other sections: identify deliverables and preplan study time.

The variable *treatment* (yes, no) identifies who received the time management treatment. Two students were removed from the treatment group for failure to accomplish more than 50% of the treatment quizzes. The control group included students from the same courses but different sections and did not receive the treatment.

Missing assignment percentage is the count of assignments not turned-in by the student divided by the total count of assignments. The time management quizzes were not included. *Final grade percentage* is the overall grade each student received in the course. *Is_Undergraduate_Student* (yes, no) identifies the student as an undergraduate student or graduate students. This value was identified by the course the student was enrolled in. This variable is used as a control with the assumption that graduate students will have more experience with time management and naturally have fewer missed assignments despite the treatment. Estimates of the mean missed assignment percentage should be more accurate when accounting for undergraduate or graduate status.

The *sentiment* variable (positive, neutral, or negative) was derived from a reflective exercise at the end of the course for the treatment group. The question was "Each week you were asked to preplan your study schedule and identify your deliverable. Did this activity help you improve your time management skills? Why or why not? You get points for participation not for any predefined answer." Three raters independently read the student's reflection and judged the sentiment as positive, neutral, or negative.

Instructions and examples were provided to the raters. Positive means the student expressed improvement in time management, positive results, or valuable learning experience. Neutral means the student expressed no improvement in time management or indifference to the learning experience. Negative means the student expressed a decrease in time management, negative results, or dissatisfaction with the learning experience.

4. RESULTS

Prior to the analysis, data were screened for missing data and outliers. Eleven participants were removed as multivariate outliers using Mahalanobis distance. Data was found to be multivariate normal and linear but homogeneity was not met (Levene's $p < .001$). A MANOVA was analyzed with treatment (yes, no), Is_Undergraduate_Student (yes, no), and their interaction predicting missing assignment percentage and final grade percentage. Alpha was 0.05 and Wilks' lambda was chosen as the test statistic. Because of the non-homogeneity and unequal group sizes, a non-parametric equivalent of the MANOVA was also conducted and results compared.

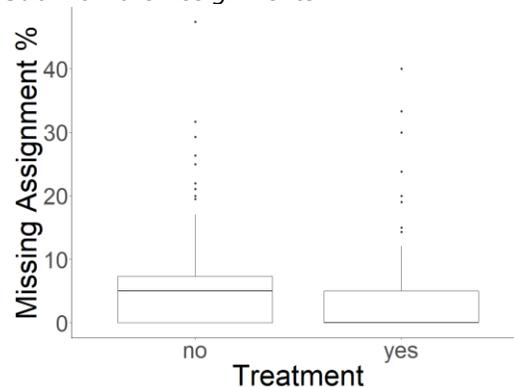
Significant multivariate main effects were found for treatment ($F(2, 315) = 4.81, p = .009, \eta_p^2 = .03$) and for Is_Undergraduate_Student ($F(2, 315) = 36.42, p < .001, \eta_p^2 = .19$), but not for the interaction ($F(2, 315) = 1.82, p = .16, \eta_p^2 = .01$). Univariate ANOVAs examined individual dependent variables. Treatment scores showed a significant difference on missing assignment percentage ($F(1, 316) = 9.49, p = .002, \eta_p^2 = .03$) and on final grade ($F(1, 316) = 4.56, p = .033, \eta_p^2 = .01$). Students who received the treatment had lower missing assignment percentages ($M = 2.5, SD = 5.1$) than the control group ($M = 5.5, SD = 6.7$). Students who received the treatment had higher final grade percentages ($M = 94.9, SD = 6.1$) than the control group ($M = 92.1, SD = 7.5$).

Is_Undergrate_Student scores showed a significant difference on missing assignment percentage ($F(1, 316) = 57.47, p < .001, \eta_p^2 = .15$) and on final grade ($F(1, 316) = 58.77, p < .001, \eta_p^2 = .15$). Undergraduate students had higher missing assignment percentages ($M = 6.0, SD = 7.2$) than graduate students ($M = 1.1, SD = 2.5$). Undergraduate students had lower final grade percentages ($M = 91.1, SD = 7.5$) than graduate students ($M = 96.7, SD = 4.5$). Figure 1 and Figure 2 show the mean difference for

missing assignment percentage and final grade grouped by treatment.

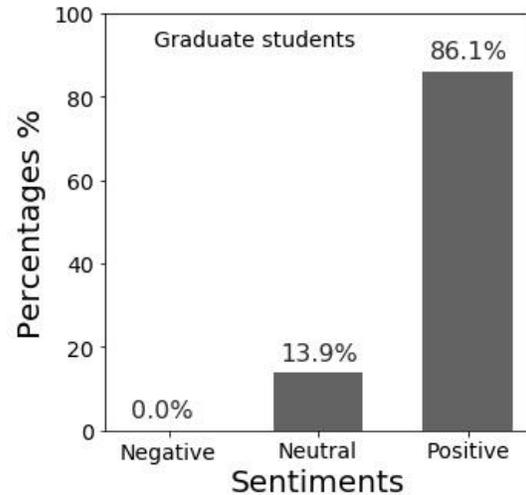
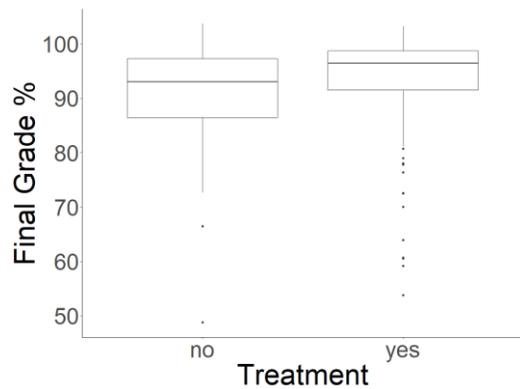
A non-parametric equivalent of the MANOVA was conducted. The R-version of the non-parametric test used (nonpartest() in the nrmv package) only allows for one independent variable but does not require the same assumptions as the parametric tests (Burchett et al., 2017). Since treatment is the phenomena of interest, treatment was used as the independent variable predicting missing assignment percentage and final grade. The test confirmed the results from the parametric MANOVA. A significant multivariate main effect was observed for treatment ($F(2, 317) = 17.2, p < .001$). The function ssnonpartest (nrmv package) is equivalent to the follow-up ANOVA tests to determine which dependent variable is significantly different. The analysis confirmed that both missing assignment percentage and final grade are statistically significant and the hypotheses of equality are rejected for both. Because of the internal algorithm, a t-statistic is not reported. Instead the function returns a "reject" or "failure to reject" message at an alpha of 0.05.

Figure 1. *Students Receiving the Treatment Submit More Assignments*



Note. The treatment has students regularly identify academic assignments with due dates and preplan weekly study time.

Figure 2. *Students' Final Grade is Higher When Taught Time Management.*



The percentage of students' sentiments are calculated based on the resulted rating by each of the three raters. The final sentiment is calculated using majority rule. For example, two positive ratings lead to a positive sentiment, and if the three ratings are different (i.e. one positive, one negative, and one neutral) the final sentiment will be neutral. The percentages shown in Figures 3 and 4 were obtained using undergraduate and graduate students' sentiments. The results show that the majority (85% or more) of students find the activity very helpful and improved their time management skills.

Figure 3. Majority of undergraduate students expressed improvement in time management and valuable learning experience.

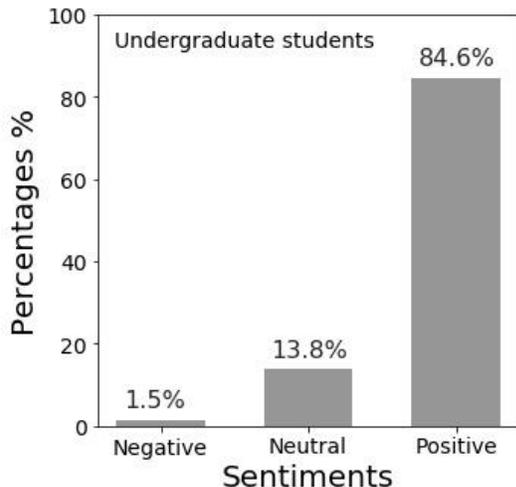


Figure 4. Majority of graduate students expressed improvement in time management and valuable learning experience.

An interrater reliability analysis using Fleiss (multi-Kappa) metric was performed to determine consistency among raters. The interrater reliability for the raters was found to be 0.68 which means a substantial agreement between the three raters.

5. DISCUSSION AND CONCLUSION

García-Ros et al. (2004) call for more instructional proposals designed for teaching time management to college students. This request is increasingly important for Information System students as their professional skills often require working on large, lengthy development projects where goals and milestones need to be identified and prioritization of time is critical to success.

This study proposes a time management intervention for college students that includes 1) identifying academic deliverables preferably for a month at a time and for all the courses that a student is enrolled in, 2) preplanning specific study times a week in advance, 3) and sharing the plan with the instructor through a checklist or calendar system. We recommend that the first three habits of 7HHEP provide a good framework for learning about time management. Useful videos are available at <https://www.franklincovey.com/the-7-habits.html>.

Results indicate that students who participated in the time management intervention missed fewer assignments and scored higher on the final course grade (H1), although the effect is smaller than that of being a graduate student with more life experience. On average, undergraduate students fail to submit more assignments than graduate students. Yet, both undergraduate students and

the vast majority of graduate students self-reported that the time management intervention had a positive impact on their performance (H2). Many students report that this intervention was a worthwhile activity even at the graduate level. Graduate students appreciate the intervention because they reported greater conflicts with full-time work, family, and academic demands. Some students reported that the time management skills had an overflow effect that positively impacted their work and life time management. Some students self-reported decreased stress consistent with past studies on time management.

Study time duration is not the only consideration when teaching college students about time management. How to study and the activities in effective studying are important qualitative factors that impact academic success (García-Ros et al., 2004). Some students reflected that their preplanned study time was not successful because work or life demands made following the plan difficult. Instructors should emphasize that adjustments and flexibility are successful management behaviors.

Some instructors may opine that the responsibility to teach time management lies with the academic counselor or solely with the student. To this position we have two responses.

First, each instructor has the opportunity to evaluate why students do not perform well in their course. Making adjustments is an instructional responsibility. Helping students succeed is an instructional opportunity. One factor motivating this research was a problem observed in our Computer Information Systems program's ABET and AACSB accreditation process. Through annual faculty assessments and reflections, we discovered that the number one reason for our failure to obtain student outcomes was the fact that students failed to turn in assignments. Note that the reason was not poor learning or poor performance on an assessment but the failure to submit the assignment. This behavior is a classic failure of time management and procrastination, which had negative effects on a student's academic success and potentially on our program's accreditation. This study demonstrates that with a simple intervention the number of missed assignments decreased because of student's awareness of academic deliverables, identification of due dates, and preplanning of their study time. This study may also suggest that training alone is not enough to effect change. Being accountable to the professor

and receiving a small grade for participation in the weekly or monthly exercises also helps motivate students to implement time management practices. Van de Meer and Torenbeek (2010) argue that universities and instructors should play a more active role in helping students learn and practice time management.

Secondly, professional success relies on similar time management skills as described in this paper. By practicing these skills in our courses, students have the opportunity to mature the skills and attitudes needed to be successful developers, network administrators, and data scientists. Benefits of workplace time management include increased performance and decreased stress, overload, work-family conflicts, and family-work conflicts (Jex & Elacqua, 1999). We encourage instructors to teach about time management from an academic perspective and professional perspective. We also encourage instructors to use simple assessment tools to motivate students to implement time management skills.

6. REFERENCES

- Bacon, D. L., Fulton, B. J., & Malott, R. W. (1983). Improving Staff Performance through the Use of Task Checklists. *Journal of Organizational Behavior Management*, 4(3-4), 17-25. https://doi.org/10.1300/J075v04n03_03
- Britton, B. K., & Tesser, A. (1991). Effects of time-management practices on college grades. *Journal of Educational Psychology*, 83(3), 405-410. <https://doi.org/10.1037/0022-0663.83.3.405>
- Burchett, W. W., Ellis, A. R., Harrar, S. W., & Bathke, A. C. (2017). Nonparametric Inference for Multivariate Data: The R Package nrmv. *Journal of Statistical Software*, 76(1), 1-18. <https://doi.org/10.18637/jss.v076.i04>
- Covey, S. R. (1989). *The 7 Habits of Highly Effective People*. Free Press. <https://www.franklincovey.com/the-7-habits.html>
- Ferrari, J. R. (1993). Christmas and procrastination: Explaining lack of diligence at a "real-world" task deadline. *Personality and Individual Differences*, 14(1), 25-33. [https://doi.org/10.1016/0191-8869\(93\)90171-X](https://doi.org/10.1016/0191-8869(93)90171-X)

- García-Ros, R., Pérez-González, F., & Hinojosa, E. (2004). Assessing Time Management Skills as an Important Aspect of Student Learning: The Construction and Evaluation of a Time Management Scale with Spanish High School Students. *School Psychology International, 25*(2), 167–183. <https://doi.org/10.1177/0143034304043684>
- Häfner, A., Oberst, V., & Stock, A. (2014). Avoiding procrastination through time management: An experimental intervention study. *Educational Studies, 40*(3), 352–360. <https://doi.org/10.1080/03055698.2014.899487>
- Hall, B. L., & Hursch, D. E. (1982). An Evaluation of the Effects of a Time Management Training Program on Work Efficiency. *Journal of Organizational Behavior Management, 3*(4), 73–96. https://doi.org/10.1300/J075v03n04_08
- Jex, S. M., & Elacqua, T. C. (1999). Time management as a moderator of relations between stressors and employee strain. *Work & Stress, 13*(2), 182–191. <https://doi.org/10.1080/026783799296138>
- Lang, D. (1992). Preventing short-term strain through time-management coping. *Work & Stress, 6*(2), 169–176. <https://doi.org/10.1080/02678379208260351>
- Lay, C. H. (1990). Working to Schedule on Personal Projects: An Assessment of Person-Project Characteristics and Trait Procrastination - ProQuest. *Journal of Social Behavior and Personality, 5*(3), 91.
- Lay, C. H., & Burns, P. (1991). Intentions and Behavior in Studying for an Examination: The Role of Trait Procrastination and its Interaction with Optimism - ProQuest. *Journal of Social Behavior and Personality, 6*(3), 605.
- Lay, C. H., & Schouwenburg, H. C. (1993). Trait procrastination, time management, and academic behavior. *Journal of Social Behavior & Personality, 8*(4), 647–662.
- Macan, T. H., Shahani, C., Dipboye, R. L., & Phillips, A. P. (1990). College students' time management: Correlations with academic performance and stress. *Journal of Educational Psychology, 82*(4), 760–768. <https://doi.org/10.1037/0022-0663.82.4.760>
- Orpen, C. (1994). The Effect of Time-Management Training on Employee Attitudes and Behavior: A Field Experiment. *The Journal of Psychology, 128*(4), 393–396. <https://doi.org/10.1080/00223980.1994.9712743>
- Risko, V. J., Alvarez, M. C., & Fairbanks, M. M. (1991). External factors that influence study. *Teaching, Reading, and Study Strategies at College Level, 195–236*.
- Van der Meer, J., Jansen, E., & Torenbeek, M. (2010). 'It's almost a mindset that teachers need to change': First-year students' need to be inducted into time management. *Studies in Higher Education, 35*(7), 777–791. <https://doi.org/10.1080/03075070903383211>
- Van Eerde, W. (2003a). Procrastination at Work and Time Management Training. *The Journal of Psychology, 137*(5), 421–434. <https://doi.org/10.1080/00223980309600625>
- Van Eerde, W. (2003b). A meta-analytically derived nomological network of procrastination. *Personality and Individual Differences, 35*(6), 1401–1418. [https://doi.org/10.1016/S0191-8869\(02\)00358-6](https://doi.org/10.1016/S0191-8869(02)00358-6)