UNIV 101
UNIVERSITY OF NORTHERN COLORADO

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Setting, Elaborating, and Reflecting on Personal Goals Improves Academic Performance

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Of students who enroll in 4-year universities, 25% never finish. Precipitating causes of early departure include poor academic progress and lack of clear goals and motivation. In the present study, we investigated whether an intensive, online, written, goal-setting program for struggling students would have positive effects on academic achievement. Students ($N = 85$) experiencing academic difficulty were recruited to participate in a randomized, controlled intervention. Participants were randomly assigned to 1 of 2 intervention groups: Half completed the goal-setting program, and half completed a control task with intervention-quality face validity. After a 4-month period, students who completed the goal-setting intervention displayed significant improvements in academic performance compared with the control group. The goal-setting program thus appears to be a quick, effective, and inexpensive intervention for struggling undergraduate students.

Keywords: goal setting, university, academic achievement, student retention, intervention

A surge in university enrolments across North America and Western Europe over the last 2 decades has increased the discrepancy between the number of students who enter the system and the number who graduate (Montmarquette, Mahseredjiana, & Houle, 2001). Only 35% of full-time university students in the United States earn their degree in the expected 4 years; this figure rises to just 57% after 6 years (Knapp, Kelly-Reid, Whitmore, & Miller, 2007). Twenty-five percent never finish at all. These substantial rates of school departure negatively affect university budgets and opinions about university quality (Braxton, Hirschy, & McClendon, 2004; Perry, 2003). Publicly funded institutions face growing political pressure to improve completion rates (Charlton, Barrow, & Hornby-Atkinson, 2006). Furthermore, many organizations consider retention rates when ranking institutions of higher education (Tinto, 2006–2007). Such statistics affect the ability of schools to attract higher caliber students (Meredith, 2004; Standifird, 2005).

The consequences of failing to complete a university degree are even greater for students. A longitudinal U.K. pilot study found that noncompleters of university earned less and experienced longer durations of unemployment than graduates (Johnes & Taylor, 1991). Pennington (2004) reported that, on average, individuals with bachelor's degrees earn 70% more than high school graduates. Individuals with a bachelor's degree also have lower unemployment rates (2.6% in 2008) than those with a high school diploma (5.7% in 2008; U.S. Bureau of Labor Statistics, 2009). This earning-and-employment gap appears to be widening (Carey, 2004).

Potential Causes of the Problem of Academic Failure and Departure

Many general factors—including lack of goal clarity, decreased motivation, disorganized thinking, mood dysregulation, financial stress, and relationship problems—can hinder academic performance and increase the probability of course dropout (Braxton et al., 2004; Dale & Sharpe, 2001; Kuh, Kinzie, Buckley, Bridges, & Hayek, 2007). Adjusting to the university environment itself can augment the effect of or independently produce risk factors that undermine academic achievement and degree completion (Fisher, 1988; Pennebaker, Colder, & Sharp, 1990). Perry (1991) suggested, for example, that many of the changes attendant on the transition from secondary to postsecondary school life can negatively influence students' perceptions of control. Such changes

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include (a) increased emphasis on success versus failure, (b) heightened level of academic competition, (c) pressure to excel, (d) frequency of academic failure, (e) decreased familiarity level with academic assignments, (f) more specific association of decisions with impact on career, and (g) transformation and disruption of social networks. Decreased perception of academic control constitutes an emotional stressor that has been linked with decrements in university performance (i.e., grades, course dropout) in several field studies of college classrooms (Perry, Hladkyj, Pekrun, Clifton, & Chipperfield, 2005; Perry, Hladkyj, Pekrun, & Pelletier, 2001; Ruthig, Perry, Hall, & Hladkyj, 2004).

Difficulty in adjusting to a university can lead to academic underachievement—a condition characterized by a discrepancy between a student's current achievement and his or her academic potential, as previously manifested or hypothetically possible (Peters, Grager-Loidl, & Supplee, 2000; Reis & McCoach, 2000; Richert, 1991; Rimm, 1997; Whitmore, 1980). In a broad sense, underachievement might be reflected in low grades (Pendarvis, Howley, & Howley, 1990), reduced number of credit hours accumulated in consecutive university terms (Kuh et al., 2007), low levels of effort on extracurricular tasks, decreased involvement in social relationships, lack of life goals, avoidance of challenging and creative projects in and out of school, and subsequent loss of motivation (Baum, Renzulli, & Hébert, 1995; Butler-Por, 1993; Gallagher & Gallagher, 1994). Without proper intervention, a cycle can form between subpar school performance and decreased motivation, ultimately leading to lower grades and school departure or expulsion.

Previously Attempted Interventions

Many universities already offer mentoring programs, freshman interest groups, seminars or learning communities, and service-learning programs to help ease the transition to university life. These programs might broadly improve the student experience (Bean & Eaton, 2001–2002). However, very few of the studies analyzing their success used rigorous, randomized, and controlled experimental designs. Even fewer studies evaluating student retention or academic-success programs examined before-and-after overall grade-point average (GPA), which is among the most important predictors of ultimate degree completion (Adelman, 1999, 2006; Pascarella & Terenzini, 2005). A number of researchers have additionally focused on students with several elements of risk, such as specific subgroups of minority students (e.g., Cohen, Garcia, Apfel, & Master, 2006; Walton & Cohen, 2007). These studies have reported some success with targeted interventions, but their results cannot be easily generalized to other student populations.

The Proposed Solution

The ideal intervention would be broadly implemented, straightforward, inexpensive, and available to a large number of students. In the present longitudinal study, we explored the possibility that participation in a formalized, intensive, online, personal goal-setting program might serve as an effective intervention for struggling university students. Personal goals reflect consciously articulated and personally meaningful objectives that guide perception, emotion, thought, and action (Elliot, Chirkov, Kim, & Sheldon, 2001; Wiese & Freund, 2005). In the current study, we tested the possibility that clearly articulating such goals would lead to improved academic performance.

Benefits of Goal Setting

Goal-setting theory emerged within the field of industrial–organizational psychology over the course of the last 35 years. More than 400 correlational and experimental studies provide evidence for the validity of the goal-setting approach (Latham & Locke, 2007; Locke & Latham, 1990). The basic premise is simple: Explicitly setting goals can markedly improve performance at any given task. Individuals with clear goals appear more able to direct attention and effort toward goal-relevant activities and away from goal-irrelevant activities, demonstrating a greater capacity for self-regulation. The establishment of clear goals also appears to increase enthusiasm, with more important goals leading to the production of greater energy than less important goals. Goal clarity increases persistence, making individuals less susceptible to the undermining effects of anxiety, disappointment, and frustration. Finally, well-defined goals appear to help individuals discover and use ever more efficient strategies and modes of thought and perception (Locke & Latham, 2002; Locke, Shaw, Saari, & Latham, 1981; Smith, Locke, & Barry, 1990).

Many studies demonstrate the broad impact of goal setting. Emmons and Diener (1986), for example, found that goal attainment was strongly correlated with positive affect among undergraduates (and that the lack of goal attainment was correlated with negative affect, although somewhat less strongly). They also discovered that the mere presence of self-rated important goals was as strongly correlated with positive affect as actually attaining those goals. Brunstein (1993) demonstrated, similarly, that perceived goal progress could act as a catalyst for increased feelings of well-being. Levels of perceived self-efficacy are also likely to increase as progress is made and the sense of well-being rises (cf. Latham & Seijts, 1999). If participating in goal setting improves self-efficacy, then individuals are not only encouraged to set further goals but are also likely to develop higher expectations of success (Karakowsky & Mann, 2008).

Goal Setting in Academic Contexts

Goal setting plays a prominent role in social-cognitive learning models of academic achievement. According to such frameworks, successful achievement involves positive feedback loops between self-efficacy and goal commitment (Schunk, 1990; Zimmerman, Bandura, & Martinez-Pons, 1992). As a student experiences successful goal attainment, self-efficacy increases; this in turn enhances goal commitment and mobilizes the self-regulation of cognitive and motivational resources to facilitate subsequent achievement (Pintrich, 2000). A personal goal-setting intervention should "kick-start" this feedback loop by strengthening both sides of the expectancy–value equation (Wigfield & Eccles, 2000): (a) clarifying the desired outcome, thereby making the value of the goal more salient, and (b) specifying the path to goal completion, thus increasing the perceived attainability of success and establishing the benchmarks by which goal progress can be evaluated. Whereas most previous research on academic goal setting has focused on younger children within a specific task or classroom

context (Covington, 2000), in the current study we extend this work into an undergraduate population across the entire academic year.

Objectives and Hypotheses

In the current study, we assessed the effectiveness of a computerized goal-setting program for students experiencing academic difficulty (a fuller description and theoretical rationale for the program is provided in the Appendix) compared with an assessment of vocational interest, used as an intervention-like control. It was hypothesized that this one-time, intensive, goal-setting intervention would lead to improvements in GPA and student-retention rates.

Method

Participants

Recruitment. Recruitment procedures were aimed at self-nominated academically struggling students from McGill University (Montreal, Quebec, Canada) with GPAs below 3.0 (3.0 = B). Participants were recruited via numerous posters and flyers around campus; oral presentations to introductory classes; e-advertisements on the university classifieds website; and official letters sent from the Associate Deans of Science, Arts, and Education to all students with probationary standing. All advertisements indicated that the study was designed to investigate the effects of two brief interventions for improving students' academic performance.

Students interested in participating underwent a brief (10-min) phone interview, designed to screen potential participants for inclusion and to assess feelings of academic difficulty. Inclusion criteria comprised three components: Students must (a) have planned to take a full-time course load (nine credits) each semester while in the study, (b) have been on official academic probation or had a cumulative GPA under 3.00, and (c) have stated that they were experiencing academic difficulty. If students met such criteria and expressed interest, they were informed that two interventions were being tested for their effects on academic achievement. Participants were advised that they would be randomly assigned to one of the two intervention groups. They were also advised that it was not known whether either intervention would improve grades but that no negative effects were expected. Financial remuneration was offered for time spent in the study. A total of 85 students met the study criteria and were included.

Demographics. Students ranged in age from 18 to 23 years (M = 20.49 years, SD = 1.34). Of the participants, 60 were women (70.6%). The participants were primarily European Canadian (56.5%) and East Asian (16.5%), although 27.1% came from African, First Nations, Hispanic, and South Asian backgrounds. Participants were characterized by the following distribution of estimated parent or guardian total incomes: less than $50,000 (22.5%); $50,000–$100,000 (40.0%); $100,000–$200,000 (27.1%); and more than $200,000 (10.6%).

Materials

Academic achievement.

Grades. Official university transcripts were collected for all participants for the semester immediately prior to (GPA1; winter term of the previous year) and immediately following (GPA2; winter term of the subsequent year) the intervention. The goal-setting and control interventions occurred during the fall term between these two academic periods.

Retention rates. The goal group and the control group were compared for the number of students whose course load dropped below that of full-time status (nine credits or more) in the postintervention semester.

Concluding Questionnaire. At the end of the study, all participants were required to complete a final feedback questionnaire. This questionnaire, completed in the laboratory, included 15 brief, scaled, feedback items querying participants about their motivation for completing the study, the seriousness with which they took the study, and how they felt as a result of the intervention. Students were told that their answers should be as honest as possible and that negative feedback was perfectly acceptable.

Procedure

Study procedures were described to participants during the initial phone interview. Students were told that they were free to complete the study from any computer with Internet access, preferably in a quiet room with minimal distractions. They were e-mailed instructions, the link to a group-specific website containing questionnaires and the intervention, and login information for accessing tasks online. All study components aside from the Concluding Questionnaire were completed over the Internet via online survey software (SelectSurveyASP Advanced; ClassApps, 2004). Students were told that the study would occur in two stages: Stage 1 would consist of informed consent and demographics, as well as the intervention itself; Stage 2 would include the Concluding Questionnaire and permission forms for releasing official transcripts.

Stage 1. Students signed an online consent form before completing the demographics questionnaire and intervention. Each of the two group-specific websites for the study presented participants with links to their particular intervention. Group 1 (goal group) participated in a web-based, intensive, goal-setting program. This program, originally developed by Peterson and Mar (2004), was adapted for use with university students. The program led participants through a series of eight steps that facilitated the setting of specific personal goals along with detailed strategies for achievement (see the Appendix for a more detailed description).

Students were asked to allow themselves at least 2.5 uninterrupted hours to complete the program (the survey software timed the program, allowing the researchers to confirm that all individuals approximated the suggested time frame). One or two short breaks of 5–10 min were allowed. Students were informed (a) that they should complete the intervention when they were feeling alert and unrushed; (b) that they would be sometimes asked to write down their private thoughts and feelings, without concern for grammar or spelling, and that other times they would be asked to carefully revise what they had written; (c) that the writing program was meant to benefit them personally; (d) that everything they wrote would be strictly confidential; and (e) that they would receive a copy of what they had written shortly after completing the program. They were advised to have a clock nearby to stay on task when asked to write freely for specified amounts of time. The writing program then began.

Group 2 (control group) participated in three different web-based tasks in lieu of the goal-setting intervention. The first task involved a series of questionnaires measuring positive psychology traits, including the Personal Growth Initiative Scale (Robitschek, 1998), the Mindful Attention Awareness Scale (Brown & Ryan, 2003), the Meaning in Life Questionnaire (Steger, Frazier, Oishi, & Kaler, 2006), the Gratitude Questionnaire (McCullough, Emmons, & Tsang, 2002), the Inspiration Scale (Thrash & Elliot, 2003), and the Curiosity and Exploration Inventory (Kashdan, Rose, & Fincham, 2004). These questionnaires were not scored, and no feedback was provided. They were included to get control participants thinking about different personal characteristics (though without a specific focus or resolution) and were intended to increase the face validity of the intervention.

In the second task, control group students wrote about some positive past experiences. They were instructed to write down their thoughts and feelings about these experiences and to write nonstop without regard for grammar or spelling. They were specifically asked to answer three out of six questions focusing on neutral topics (e.g., a favorite extracurricular activity), and were told to spend 10–15 min on each response. They were instructed to answer each question in an objective way, writing seriously and thoughtfully, with minimum emotional expression. This second task was included to match the free-writing aspect of the goal group intervention. Students were sent a copy of their responses after completion.

Finally, for the third task, control group students completed a widely used career-interest measure: the Newly Revised Strong Interest Inventory Assessment (Strong Interest Inventory, 2004). After completion, each student was sent a computer-generated report of his or her results.[1]

Stage 2. Approximately 16 weeks after completion of the Stage 1 intervention, all participants completed the Concluding Questionnaire and signed the transcript-release form. Participants were then remunerated for their time over the previous 4 months.

Results

Baseline Similarities Between Groups

When comparing participants in the goal group ($n = 45$) and the control group ($n = 40$), no significant differences were found in the following categories: age, sex, ethnicity, parents' income, self-reported average of high school grades, English as a first language (EFL; all students were fluent in English, but 35.3% of the sample's first language was not English), whether students were studying in English for the first time, whether they were on official academic probation (31.8% of the sample), whether they were receiving tutoring (10.6% of the sample), or whether they were enrolled in any other kind of intervention at the beginning of the study (4.8% had enrolled in short-term procrastination or test-anxiety workshops offered by the university).

GPA

No baseline differences were found between control group GPA1 ($M = 2.26$, $SD = 0.72$) and goal group GPA1 ($M = 2.25$, $SD = 0.93$), $t(83) = 0.08$, $p = .93$. GPA was normally distributed in each group, within acceptable limits for skewness and kurtosis. A repeated measures analysis of variance (ANOVA) was conducted to test for differences between groups on GPA (pre- and postintervention). There was a significant main effect of time, $F(1, 83) = 13.66$, $p < .01$, $\eta^2 = .14$, as well as a significant Group × Time interaction, $F(1, 83) = 4.01$, $p < .05$, $\eta^2 = .05$.

As a follow-up to the ANOVA, post hoc tests were used to explore the nature of the significant interaction. In the goal group, the postintervention GPA2 ($M = 2.91$, $SD = 0.65$) was significantly higher than the baseline GPA1 ($M = 2.25$, $SD = 0.93$), $t(44) = 4.17$, $p < .01$, $d = 0.65$. In the control group, by contrast, no significant difference emerged between GPA2 ($M = 2.46$, $SD = 1.06$) and GPA1 ($M = 2.26$, $SD = 0.72$), $t(39) = 1.19$, $p = .28$, $d = 0.17$. A planned comparison of GPA2 between groups was also conducted. GPA2 for the goal group ($M = 2.91$, $SD = 0.65$) was significantly greater than GPA2 for the control group ($M = 2.46$, $SD = 1.06$), $t(83) = 2.76$, $p = .03$, $d = 0.50$ (see Figure 1 for a comparison of group changes in mean GPA over time).

Retention Rates

No significant baseline difference was observed between the number of credits in the preintervention semester taken by participants in the control group ($M = 13.21$, $SD = 1.68$) versus the goal group ($M = 13.88$, $SD = 1.91$), $t(83) = 1.69$, $p = .09$, $d = 0.36$. A Fisher's exact test was conducted to determine whether the proportion of students maintaining a full course load in the postintervention semester differed by group. No students in the goal group dropped below nine credits in the semester postintervention, but eight students in the control group (20%) dropped below nine credits (with two withdrawing from school completely). The retention-rate difference between groups was significant at $p < .005$.

Goal Setting and Self-Reported Outcomes

In the next set of analyses, we explored group-outcome differences in self-reported change as a result of the intervention, using the Concluding Questionnaire measure described above. The 15 items on this questionnaire were designed to elicit information about general emotional status, concentration, motivation, and the seriousness with which participants took their involvement in the study. Because the items overlapped considerably, an exploratory factor analysis using maximum likelihood estimation and varimax rotation was used to group the questions.

Two factors emerged from the analysis, based on examination of the scree plot and goodness-of-fit statistics. Taken together, these two factors accounted for 50.3% of the total variance. Table 1 contains the rotated factor matrix. Because factor analyses require

[1] It is worth noting that the feedback provided by this assessment can be construed as providing information about an individual's character strengths, which has previously been used in positive psychology interventions to improve affective experience (Seligman, Steen, Park, & Peterson, 2005). However, these interventions were not successful when character feedback was provided on its own; it was only when participants were explicitly told to use these strengths in a new and different way every day for 1 week that lasting improvements were observed. Accordingly, the control intervention should not be considered equivalent to previous positive psychology interventions.

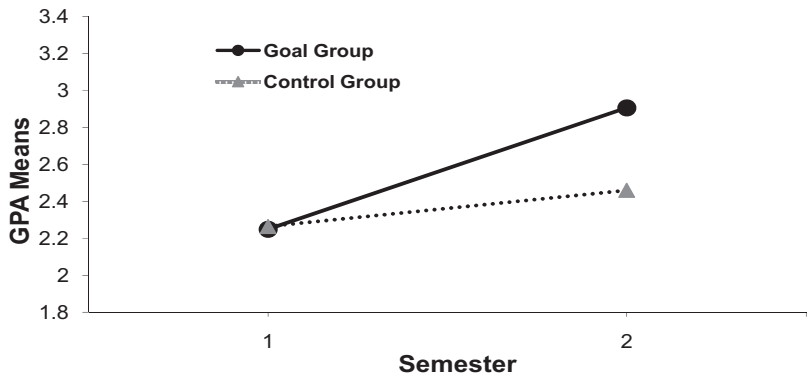

Figure 1. Group differences in grade-point average (GPA) change postintervention.

large sample sizes to obtain reliable factor loadings, the obtained solution was used only as a guide for combining the items into scales. The items loading on each factor were averaged together to create scale scores. Two items were removed from analysis because they loaded similarly on both factors. On the basis of the item content, Factor 1 was interpreted as reflecting reduced negative affect, whereas Factor 2 was interpreted as reflecting enthusiasm for the study. The reduced negative affect scores were significantly higher for the goal group ($M = 42.96$, $SD = 16.48$) than for the control group ($M = 34.44$, $SD = 20.66$), $t(83) = 2.11$, $p < .05$, $d = 0.46$. No significant differences were observed, however, for the enthusiasm scores, $t(83) = 0.73$, $p = .47$, $d = 0.16$.

Table 1
Rotated Factor Matrix for Self-Reported Change on the Concluding Questionnaire

Condensed items	Component 1	Component 2
As a result of the intervention:		
Do you feel less anxious?	.91	
Do you feel less stressed?	.86	
Do you feel less sad?	.74	
Are you more generally satisfied with life?	.66	
Have you been more generally conscientious?	.52	.37
Is it easier to concentrate?[a]	.40	.44
To what extent would you recommend it?		.78
How helpful did you find it?		.75
Would you recommend the intervention?		.70
Rate the value of taking part.		.69
How seriously did you take the intervention?		.51
Is it easier to study?[a]	.36	.40
How seriously did you take the associated tasks?		.31
To what extent did you do it for potential academic or cognitive gains?		.31
To what extent did you do it for the money?		

Note. The extraction method used was maximum likelihood. The rotation method used was varimax with Kaiser normalization. Rotation converged in three iterations.
[a] These items were removed from the resulting scales because of their near-equivalent dual loadings.

Reduced negative affect scores also correlated with grade improvement over the course of the study ($r = .19$, $p < .05$). Statistically controlling for this variable rendered the main Group × Time interaction in the prediction of GPA nonsignificant, $F(1, 82) = 2.77$, $p = .10$, $\eta^2 = .03$. GPA improvements over the course of the study thus appear related to general reductions in self-reported negative affect as a result of the intervention. It is unclear, however, whether the reduced negative affect was a cause or a consequence of improved academic performance in the goal group, as both models produced significant mediation tests when using the recommended product of coefficients method described by MacKinnon, Lockwood, Hoffman, West, and Sheets (2002): $z' = 1.03$, $p < .05$, for the former; and $z' = 1.01$, $p < .05$, for the latter.

Content Analysis

The specific mechanisms promoting improvements in academic performance were examined via exploratory analyses of the written responses to the goal-setting exercise. Content variables included the prevalence of academic versus nonacademic goals (as coded by three trained judges); the number of specific behavioral plans, obstacles, and performance markers delineated for each goal; and the number of words used in describing the goal and its ramifications for the respondent's life. The average word count for the intervention was 2,811 ($SD = 1{,}033$), with intercorrelations between most of the content variables (e.g., people who listed more potential obstacles also listed more benchmarks and specific plans). Of all the content variables that were examined, the only significant predictor of academic improvement was the number of words used in describing the ideal future ($M = 347$, $SD = 140$); those who wrote more about the ideal future also demonstrated greater improvements in their grades ($r = .30$, $p = .05$). Although most participants (86%) in the goal group had at least one academic goal, the total number of academic goals set ($M = 1.49$, $SD = 1.06$) did not correlate with academic improvement. Because the majority of students set at least one academic goal, it was not possible to examine whether performance benefits would have been observed if only nonacademic goals had been set.

Familiarity With English Language

Given the multicultural nature of our sample, an examination of the potential moderating influence of participants' familiarity with

the English language was conducted. The initial repeated measures ANOVA predicting academic performance on the basis of the experimental condition was repeated with EFL entered as an additional between-subjects variable. A trend toward significance was observed for the Group × Time × EFL three-way interaction, $F(1, 81) = 3.77$, $p = .056$, $\eta^2 = .044$. Follow-up analyses confirmed that the main Group × Time interaction effect was stronger for native English speakers, $F(1, 53) = 6.29$, $p = .015$, $\eta^2 = .106$, than for nonnative English speakers, $F(1, 28) = 0.23$, $p = .63$, $\eta^2 = .008$. The intervention thus appeared to be most effective with native English speakers. The word-count variable described above was, however, unrelated to familiarity with the English language. No other demographic variable moderated the effectiveness of the intervention.

Discussion

In the present study, we tested the effects of a single-session, intensive goal-setting program for undergraduate students experiencing academic difficulty. Compared with the control group, students who completed the goal-setting exercise experienced three benefits in the postintervention semester: (a) increased GPA, (b) higher probability of maintaining a full course load, and (c) reductions in self-reported negative affect. Given the paucity of successful interventions for improving academic performance in university students, the current study indicates that personal goal setting deserves greater attention as an effective technique for improving academic success.

The most important finding of the current study is that the goal-setting exercise was able to successfully improve GPA among undergraduate students. Despite the baseline equivalence of the two groups, postintervention grades for the goal group were significantly higher than postintervention grades for the control group. Maintaining a good GPA is the single most important factor in predicting successful degree completion (Adelman, 1999; Kuh et al., 2007), suggesting that personal goal setting might be a useful intervention for helping undergraduates to optimize their educational experience. It should be noted, however, that the postintervention grade improvements appear to be specific to native English speakers. This may not come as a surprise, given that the intervention is entirely language based, and nonnative English speakers might thus have had more difficulty working through the intervention process in their nonprimary language. It would likely be necessary to develop a variety of native-language interventions to generalize the results across language groups. An alternative interpretation of this finding is that the academic performance deficits of nonnative English speakers are more closely related to linguistic challenges rather than to motivational problems, limiting the extent to which the current intervention was able to improve academic outcomes (cf. Grayson & Stowe, 2005).

The second most important benefit of the goal-setting program was increased likelihood of maintaining a full course load. Each participant had stated their intent to maintain at least nine course credits per semester for the duration of the study. When grade data were collected, it was discovered that eight students had fallen below nine credits in the postintervention semester and that all of these students were in the control group. Previous research suggests that maintaining a full-time course load is also highly related to ultimate degree attainment (Adelman, 1999).

The third benefit of the goal-setting program was that students in the goal group reported significant decreases in negative affect, which they attributed to the intervention. These subjective improvements were in turn correlated with improvements in academic performance, although it is unclear whether these changes contributed to or resulted from improved grades.

In the exploratory content analysis of the goal-setting responses, the number of words used to describe the ideal future was the only predictor of academic improvement. This suggests that developing a detailed specification of the desired outcome was central to the current effects. A well-differentiated representation of the goal is an important component of effective goal setting and self-regulation, serving as a prerequisite for the full mobilization of psychological resources (Carver & Scheier, 1998; Locke & Latham, 2002). Although mere specification of the desired future is unlikely to be as effective without detailed planning, this step appears to have been a rate-limiting factor in moderating the intervention's benefits. Undergraduate students, in particular, might be especially responsive to this step, in that most are in a transitional state and have not fully articulated their desired futures. For these students, specifying their vision for an ideal future by reflecting and elaborating on their personal goals might be one of the intervention's most valuable components. Improvements in goal clarity and the increased motivation that results from effective goal setting are two likely mechanisms of the current intervention, as they are both related to academic achievement outcomes (Braxton et al., 2004; Kuh et al., 2007). On a related note, although goal-setting theory states that adopting specific and challenging goals leads to performance improvements (Locke & Latham, 2002), in the current intervention we focused more on establishing goal specificity rather than difficulty.

Finally, although the intervention used in this study was broader than those commonly employed in goal-setting research, the results do not necessarily conflict with goal-setting theory. In particular, goal-setting interventions usually involve the setting of specific goals in a single domain, leading to domain-specific improvements (Locke & Latham, 2002). Our goal-setting program, in contrast, required participants to set multiple goals in self-selected domains. One question raised by this approach is whether the benefits of goal setting in one area can generalize to other domains. Although we observed academic performance benefits following the current intervention, this might have depended on the fact that the majority of students in the goal group set at least one academic goal. As a result, we could not directly examine whether goal setting in nonacademic domains contributed to improvements in academic performance. However, if effective goal setting in one domain can bolster generalized self-efficacy (Bandura, 1977, 1986; Schunk, 1990), there might be concomitant performance improvements in other domains. By a similar token, the very process of setting personal goals might induce a learning or mastery orientation (Seijts, Latham, Tasa, & Latham, 2004), the benefits of which might generalize to other domains. This remains an open question and is of particular interest for organizational contexts requiring the pursuit of multiple goals. Indeed, a broad and multifaceted goal-setting intervention might be useful for optimizing the concurrent pursuit of multiple, complex goal structures (a topic that has received less attention in the industrial–organizational psychology literature; Wood, 2005).

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Appendix

Description of the Goal-Setting Instrument

The goal-setting intervention (adapted from Peterson & Mar, 2004) involved eight steps that were derived from the goal-theory literature as contributors to a successful goal-setting experience. The result is a "package" intervention, which was designed to simultaneously influence a number of factors related to effective goal pursuit. Such interventions are thought to be more effective than those that involve only a single construct, although the contribution of each specific mechanism can be difficult to ascertain (Vancouver & Day, 2005). This package-intervention approach was implemented to maximize real-world benefits. Each of the program's eight steps, along with the theoretical rationale, is described below.

Step 1 included a series of exercises that required students to free-write for specified amounts of time (e.g., 1–2 min, 10 min) about (a) their ideal future, (b) qualities they admired in others, (c) things they could do better, (d) their school and career futures, (e) things they would like to learn more about, and (f) habits they would like to improve (i.e., related to school, work, relationships, health). This initial "fantasy" step was intended to allow participants the chance to consider a number of possible futures and to identify the ones that were most desirable (cf. Markus & Nurius, 1986). Contemplating the desired state of an imagined future can be an important motivator in goal pursuit, especially when it is compared with current reality (Oettingen, Pak, & Schnetter, 2001). The program's first step was thus included to get participants thinking about what their desired futures might look like.

Step 2 asked students to examine the result of their fantasizing about the future and to extract seven or eight specific goals that could be pursued to realize the desired state. For each goal, students were required to provide an identifying label as well as a brief description of the goal itself. Each of these goals would then be elaborated on in the rest of the program. It was emphasized that the identified goals had to be clear and specific, as these tend to be more effective than poorly defined targets or do-your-best goals (Austin & Vancouver, 1996; Locke, Chah, Harrison, & Lustgarten, 1989; Locke & Latham, 2002; Locke et al., 1981).

Step 3 required students to evaluate their goals by ranking them in order of importance, detailing specific reasons for pursuit and evaluating the attainability of each goal within a self-specified time frame. This step was included to ensure that goal prioritization was handled effectively, in order to avoid potential goal conflicts and their associated performance costs (Locke, Smith, Erez, Chah, & Schaffer, 1994). It was also important for students to consider the attainability of their goals, because positive outcome expectations are important motivators of goal-relevant behavior, and unrealistic goals tend to be less motivating (Bandura, 1977; Brunstein, 1993; Perrone, Civiletto, Webb, & Fitch, 2004; Schunk, 1991).

Step 4 asked students to write about the impact that achieving each goal would have on specific aspects of their lives and the lives of others. It has been suggested that the very process of representing the future consequences of a goal might provide a cognitive source of motivation (Bandura, 1977; Schunk, 1991). This step was thus included to help students form a more detailed understanding of the importance of the goal and the consequences of its attainment.

Steps 5, 6, and 7 helped students to elaborate on their specific plans for goal pursuit. Research suggests that complex goals require the setting and completion of subgoals, which provide clear benchmarks of progress (i.e., feedback; Bandura & Simon, 1977; Latham & Seijts, 1999; Locke & Latham, 2006; Morgan, 1985; Stock & Cervone, 1990). Goal progress is further bolstered by detailed implementation plans (Gollwitzer, 1999; Koestner, Lekes, Powers, & Chicoine, 2002; Locke et al., 1981) that describe how the path to a goal will be physically instantiated

(*Appendix continues*)

and that are instrumental in overcoming challenges (Gollwitzer & Brandstätter, 1997). Step 5 led students through a process of determining subgoals and concrete strategies for achieving each goal. Step 6 required them to identify potential obstacles to the achievement of each goal as well as strategies for overcoming these obstacles. Step 7 guided them through the process of setting concrete benchmarks for goal attainment to help them to monitor their own progress and gain feedback. Detailing the path to goal attainment should also serve to increase the perceived attainability of the goal, thereby increasing motivation.

Finally, Step 8 asked students to evaluate the degree to which they were committed to achieving each goal. Goal commitment is an important component of goal success (Koestner et al., 2002; Ryan, Sheldon, Kasser, & Deci, 1996), and this step was added to represent a personal contract of maintaining commitment to the pursuit of the goals outlined throughout the intervention. After students completed the program, they were e-mailed a copy of everything that they had written to print out and review as desired.

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Call for Nominations:
Emotion

The Publications and Communications (P&C) Board of the American Psychological Association has opened nominations for the editorship of the journal **Emotion** for the years 2012–2017. Elizabeth A. Phelps is the incumbent editor.

Candidates should be members of APA and should be available to start receiving manuscripts in early 2011 to prepare for issues published in 2012. Please note that the P&C Board encourages participation by members of underrepresented groups in the publication process and would particularly welcome such nominees. Self-nominations are also encouraged. The search is being chaired by Norman Abeles, PhD.

Candidates should be nominated by accessing APA's EditorQuest site on the Web. Using your Web browser, go to http://editorquest.apa.org. On the Home menu on the left, find "Guests." Next, click on the link "Submit a Nomination," enter your nominee's information, and click "Submit."

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Effects of Time-Management Practices on College Grades

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A prospective study tested the hypothesis that college grade point average would be predicted by time-management practices. Ninety college students completed a time-management questionnaire in 1983; their high school Scholastic Aptitude Test (SAT) scores were obtained from college records. Principal-components analysis of the 35-item time-management instrument revealed 3 components. In 1987, 4 years later, each student's cumulative grade point average was obtained from college records. Regression analyses showed that 2 time-management components were significant predictors of cumulative grade point average (R^2 = .21) and accounted for more variance than did SAT scores (increment in R^2 = .05). It is concluded that time-management practices may influence college achievement.

Students' time is a limited resource. Like other limited resources, time can be more or less effectively managed. We propose that differences among individuals in time-management practices account for some of the differences in how much people achieve during their college years. Time-management practices have been the subject of an extensive popular literature (e.g., Bliss, 1976; Greene, 1969; Lakein, 1973), but this literature presents only anecdotal evidence for the efficacy of time-management practices.

In the scholarly literature, researchers generally agree that intellectual achievement takes time (Barron, 1988; Csikszentmihalyi, 1988; Gruber & Davis, 1988; Johnson-Laird, 1988; Tardif & Sternberg, 1988; Torrance, 1988) and perseverance (Gardner, 1988; Gruber & Davis, 1988; Simonton, 1988; Sternberg, 1988; Tardif & Sternberg, 1988; Torrance, 1988). If educational achievement, like intellectual achievement in general, takes time, then time-management practices should play a role in educational achievement. In empirical studies of self-regulated learning, researchers have often measured time-management variables in the context of other variables such as self-monitoring, self-judgment, and alertness (Corno & Mandinach, 1983; McCombs, 1986; Zimmerman, 1990; Zimmerman & Schunk, 1989). In some cases the group of variables has been found to influence empirical measures of school achievement (McCombs, 1986; Zimmerman, 1990).

As we sought clear empirical evidence that time-management practices influence educational achievement, we found that there have been relatively few empirical studies in which time-management practices were measured separately or in which time-management abilities were related to quantitative measures of achievement. Hall and Hursch (1982) measured time-management practices in the course of successfully using behavior-management techniques to increase the time that four faculty and staff allocated to self-selected, high-priority tasks over several weeks. Tulga (1979) and Tulga and Sheridan (1980) measured short-term time-management practices by testing graduate students and faculty on a time-management computer game. In the game, several blocks on a computer screen—each block representing one job—moved toward a deadline. The subject could "work on" only one block at a time. The subject's goal was to earn points by completing blocks. Each block was marked with several graphical features indicating, for example, the number of points to be accrued if work on the block was completed before it reached its deadline and the amount of work each increment of time devoted to the block would accomplish. Subjects chose which block to work on by moving a cursor to it. As each block was worked on, it decreased in size until it disappeared on completion. The results showed that individuals differed substantially in the optimality with which they allocated their time in this gamelike task within single experimental sessions. Tulga's and Tulga and Sheridan's studies confirm that there are individual differences in time-management practices within an experimental session, and Hall and Hursch's study showed that time-management practices can be experimentally manipulated over several weeks. The goal of the present study was to look for effects of time-management practices over a much longer period—the length of a college education—and to look for effects on more usual empirical measures of achievement.

Britton and Glynn (1989) described a simple theoretical model of time-management practices intended to maximize intellectual productivity. The present investigation was based loosely on that model. The model specifies several time-management components: choosing goals and subgoals, prioritizing the goals, generating tasks and subtasks from the goals, prioritizing the tasks, listing the tasks on a "to-do" list, scheduling the tasks, and then carrying out the tasks. We constructed a time-management questionnaire with which to measure these components. Our prediction was that students with well-developed time-management practices would accomplish more intellectually and therefore would have higher college grades.

Why would time-management practices influence intellectual accomplishment? Our theory is derived from research in

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computer-operating systems (Calingaert, 1982). A computer's operating system manages the computer's information-processing resources, which are limited. We think that the information-processing resources of college students, which are also limited, can also be managed and that this management can profitably be considered as being carried out by some mental system analogous to the time-management component of a computer's operating system.

The computer programs that computer-operating systems use to manage their central processing unit's (cpu's) time have several characteristics; our time-management questionnaire asks about the human counterparts of some of these. For example, a computer-operating system's time-management programs specify goals, make lists of jobs, and use priorities. Our questionnaire asks about goals ("Do you have a clear idea of what you want to accomplish during the next week?," "Do you write a set of goals for yourself each day?," "Do you have a set of goals for the entire quarter?"); making lists ("Do you make a list of the things you have to do each day?," "Do you make a schedule of activities you have to do on work days?"); and priorities ("Do you set and honor priorities?," "Do you stop unprofitable routines or activities?," "On an average day do you spend less time with personal grooming than doing school work?").

From time to time, cpu time-management programs take over their cpu to run themselves in order to carry out list making, goal specification, and setting of priorities; likewise, we asked our subjects about the amount of time they spend planning their allocation of time ("Do you spend time each day planning?," "Do you plan your day before you start it?"). The very existence of cpu time-management programs is evidence that those who designed them believed them to be important and useful; likewise, we asked our subjects about their attitudes toward time management ("Do you make constructive use of your time?," "Do you feel you are in charge of your own time, by and large?," "Do you believe there is room for improvement in the way you manage your time?").

We have observed that college students and other intellectual workers, like large institutional mainframe computers, often have a large number of information-processing tasks to do and that the tasks are of differing lengths, complexity, priority, deadlines, and proneness to interruptions: In short, college students' cpus are overloaded. In such circumstances it would be natural for students to consider how they might manage their mind's time more effectively. Indeed, a survey showed that 67% of the undergraduates at our university reported that their greatest personal need (of 40 needs on a checklist) was "to manage my time more effectively" (Weissberg, Berentsen, Cote, Cravey, & Heath, 1982).

Informally we have observed that people with modest abilities can accrue substantial lifetime achievements if they focus their abilities effectively on achievable goals in a limited domain over a lengthy period of time. It is as if such persons' abilities, when focused over and over again within a limited domain, tend to compound so that they can eventually conquer that domain. That is, even if each single application of such persons' ability is very small (because their ability is modest), the cumulative buildup in a specific domain can be very large if their abilities are applied in a focused way to well-selected and limited goals and to well-chosen subgoals over a large number of iterations. In contrast, we have observed some persons of high ability who do not select, prioritize, and monitor their goals, subgoals, and tasks, and who therefore seem disorganized and accomplish relatively little. This informal description applies to the selection of goals, prioritizing goals to focus effort, and monitoring task and goal accomplishment. These are all elements of time-management practices that are measured in this study.

Grades in college courses, particularly undergraduate courses, often depend on managing the completion of a complex mix of jobs, including jobs with various priorities, deadlines, lengths, and other characteristics (e.g., getting papers and lengthy assignments with various grade weightings in on time and studying for tests at the appropriate time) rather than on a single challenging assignment such as deriving a brilliant and original proof 3 weeks after the course grades have been assigned. Similar to computers, which have multiple tasks and multiple users to satisfy, students have multiple tasks and multiple instructors to satisfy, and grades are determined by the quality of service provided to the various tasks and instructors. Thus, grade point average would be expected to be influenced by time-management skills. To rule out the possibility that such skills are merely another side of the traditional view of aptitude, we also assess aptitude using the Scholastic Aptitude Test (SAT) and compare the independent contributions of time-management skills and aptitude to grade point average using a prospective design.

Method

Subjects

Ninety male and female freshmen and sophomore undergraduates enrolled in an introductory psychology class at the University of Georgia volunteered for course credit to complete a set of questionnaires, labeled collectively as "Group Testing." One of the questionnaires was the time-management questionnaire. This testing session was conducted in October 1983. Students enrolled in introductory psychology at the University of Georgia are from a variety of academic majors and socioeconomic status categories; about 90% are White and about 10% are ethnic minorities.

Materials

The time-management questionnaire included 35 items, each answered on a 5-point scale consisting of the responses *always, frequently, sometimes, infrequently,* and *never*). In scoring, 5 points were assigned to the response at the end of the scale that we defined a priori as the "good" practice and 1 point was assigned to the response at the other end of the scale, with intermediate values given for the other responses. Higher values on the scale correspond to better time-management practices.

Results

Grade Point Average

The cumulative grade point average from October 1983 to September 1987 ranged from 1.63 to 3.77, on a conventional scale ranging from F (0) to A (4). The mean was 2.73, and the standard deviation was 0.52.

Scholastic Aptitude Test Scores

The total SAT scores ranged from 700 to 1,430, with a mean of 993 and a standard deviation of 125. These tests were administered before the students entered college.

Time-Management Questionnaire Scores

The total score on the time-management questionnaire ranged from 52 to 123, with a mean of 91 and a standard deviation of 14. To analyze the factors associated with this instrument, we subjected the items to a principal-components analysis. Although there were 12 components with an eigenvalue greater than 1, an application of the Scree test indicated a clear "elbow" at three components. Therefore, three components were retained and rotated with a varimax solution. These three components accounted for 36% of the variance. Inspection of the factor loadings indicated that each of the factors is interpretable. The items loading .40 or more on a factor are listed in Table 1.

We named the first factor Short-Range Planning because it appears to encompass a variety of items that require planning in the short run, either within the day or within the week. Students who score high on this factor report organizing their day. The second component, which we call Time Attitudes, is more attitudinal in nature. Students who score high on this factor indicate that their time is used constructively and that they feel in charge of the way their time is spent. The third component was more difficult to name, but we tentatively call it Long-Range Planning. Students who score high on this component seem to think of things in terms of a relatively wide time window. They set goals for the entire quarter, keep track of important dates on a single calendar, review material even when tests are not imminent, and do not wait until the last minute to finish working on major assignments.

Each of these components of time management appears to have obvious and straightforward meaning for effective performance. For example, students who implement Short-Range Planning activities will have a clear idea in advance of what they intend to accomplish during the next week and will spend time at the beginning of each day writing a list of goals, a to-do list, and a schedule; these planning lists will be informed by setting priorities, with the priorities honored in the implementation of the plan.

Students who score high on the Time Attitudes factor report that they find more time to spend on their schoolwork by stopping unprofitable activities, saying "No" when people ask them to do things that would interfere with work, and giving schoolwork a higher priority than grooming. Also, they have a strong sense of control over the valued commodity of time;

Table 1
Time-Management Questionnaire Factor Structure and Loadings

Factor/item	Short-Range Planning (Factor 1)	Time Attitudes (Factor 2)	Long-Range Planning (Factor 3)
Short-Range Planning			
1. Do you make a list of the things you have to do each day?	.79	−.10	.00
2. Do you plan your day before you start it?	.72	.15	.10
3. Do you make a schedule of the activities you have to do on work days?	.71	.00	.32
4. Do you write a set of goals for yourself for each day?	.67	−.13	−.05
5. Do you spend time each day planning?	.66	.13	.31
6. Do you have a clear idea of what you want to accomplish during the next week?	.54	.21	.37
7. Do you set and honor priorities?	.50	.43	.18
Time Attitudes			
1. Do you often find yourself doing things which interfere with your schoolwork simply because you hate to say "No" to people? [a]	−.04	.63	.20
2. Do you feel you are in charge of your own time, by and large?	.12	.60	.10
3. On an average class day do you spend more time with personal grooming than doing schoolwork? [a]	.22	.58	−.20
4. Do you believe that there is room for improvement in the way you manage your time? [a]	.19	.55	.28
5. Do you make constructive use of your time?	.21	.55	.35
6. Do you continue unprofitable routines or activities? [a]	.05	.52	.17
Long-Range Planning			
1. Do you usually keep you desk clear of everything other than what you are currently working on?	.05	−.03	.61
2. Do you have a set of goals for the entire quarter?	.33	.01	.49
3. The night before a major assignment is due, are you usually still working on it? [a]	−.07	.42	.47
4. When you have several things to do, do you think it is best to do a little bit of work on each one?	.00	.13	.47
5. Do you regularly review your class notes, even when a test is not imminent?	.39	.31	.42

Note. Factor 1 accounts for 16% of total variance, Factor 2 for 11%, and Factor 3 for 9%.
[a]These items were reverse scored, for example, responses of "never" were given a score of 5.

this feeling may be a counterpart in the time realm of the sense of self-efficacy, which Bandura (e.g., Bandura, 1989) has argued is generally associated with better performance. That is, if one is able to say no and to refrain from unprofitable activities, then one is likely to develop a sense of efficacy with respect to time control and should more confidently be able to plan and carry out one's plan for time distribution. Students who score high on the Long-Range Planning factor report having a set of goals for the entire quarter and being well organized in their work habits.

Regression Analyses

Our first attempt at analyzing the effects of time management was to regress grade point average on each of the time-management components and on SAT score in a data-determined stepwise procedure. Time-management components were based on least-squares factor scores ($M = 0$, $SD = 1$). As can be seen in Table 2, the intercorrelations among these variables in this sample are relatively low; therefore, concern about multicollinearity was less important. This stepwise procedure resulted in the Time Attitudes component of time management entering first ($R^2 = .15$, $p < .001$), followed by the Short-Range Planning component (increment in $R^2 = .06$, $p < .02$). SAT score entered third (increment in $R^2 = .05$, $p < .03$). Long-Range Planning did not seem to make much difference and did not enter, $p > .05$.

Because the relationship between scholastic aptitude (as measured by the SAT) and grade point average is already well established, we decided to take a more conservative approach to evaluating the independence of the contribution of time management. In this analysis we forced SAT score into the equation first. Under these conditions SAT score still accounted for only 4% of the variance and was nonsignificant. In addition, both Time Attitudes and Short-Term Planning again entered and made significant ($p < .05$) contributions together, adding 21% of predictable variance to the equation.

Discussion

These data suggest that self-reports of time management are related to academic achievement. Furthermore, the effects of time management are independent of SAT score and, in this particular study, even stronger than the effects of SAT score. We attempt to put these results into perspective: First, we must note that there is normally a range restriction with respect to SAT score. Those students in the lower portion of the distribution, of course, do not get into college. However, as noted above, in our sample the standard deviation was 125 rather than the national norm of 100. Thus, whereas the relationship between SAT score and grade point average would usually be underestimated in college populations, in our sample this may be less of a problem. It is interesting to note that although there is a substantial body of data from the Educational Testing Service indicating that the correlation between SAT score and freshman grade point average is about .42 (Donlon, 1984), we have been unable to find any reports of correlations between SAT score and grade point average beyond the freshman year. Also, our data are based on psychology-course enrollees. We therefore do not have a figure to compare directly with our correlation between SAT score and grade point average of psychology course enrollees of .20. On the other hand, even if the relationship between SAT score and grade point average has been underestimated, our analysis procedures ensure that SAT score cannot serve as a plausible explanation for the relationship between time management and grade point average.

One can take several stances about responses to the time-management instrument. Our point of view is that students are describing with some accuracy their actual behaviors and feelings about time. Another possibility, however, is that responses to the time-management questionnaire represent various response biases and that the results can be explained on the basis of such biases. For example, a plausible case can be made that people who score high on the time-management questionnaire are simply presenting themselves in a favorable light. Being able to present oneself in a favorable light is a very useful skill. It may not only result in a high score on the time-management questionnaire but also help one to get good grades in college, particularly in small classes or in classes with less-objective scoring criteria. With regard to this explanation, the relation between time-management questionnaire responses and college grades is spurious rather than causal.

Although such an explanation is possible, there are some problems with it. First, if social desirability were the only determinant of responses to the time-management questionnaire, then that questionnaire ought to have been found to have a single factor, that is, social desirability. It did not. Second, even if social desirability does not pervade the entire questionnaire but explains only part of the relationship between the time-management questionnaire score and grade point average, then only a single factor, that is, a factor correlated with social desirability, ought to have predicted grade point average. In fact, two of the independent factors within the time-management questionnaire made a significant contribution to grade point average: Short-Range Planning and Time Attitudes. Finally, if one analyzes the three factors that emerged from the principal-components analysis, it is unclear which of these factors is most highly saturated with social-desirability response bias. Indeed, the Long-Range Planning factor appears as desirable or perhaps more so than any of the other factors, and yet it was not associated with grade point average. We believe that a similar response would

Table 2
Correlations Among the Variables

Variable	GPA	SAT	TM1	TM2	TM3
GPA	—	.20	.25*	.39*	−.10
SAT		—	.06	.01	−.28*
TM1			—	.01	−.01
TM2				—	−.01
TM3					—

Note. GPA = grade point average; SAT = Scholastic Aptitude Test; TM1 = time-management component 1, Short-Range Planning; TM2 = time-management component 2, Time Attitudes; TM3 = time-management component 3, Long-Range Planning.
*$p < .05$.

follow for any explanation focusing on a single bias as an explanation for the relationship between time-management factors and grade point average. Therefore, we are inclined to discount this class of explanations.

Another interpretation of the relationship between time management and grade point average is that students who happen to do well in school somehow come to develop short-range planning skills and positive attitudes toward time. Although it is not clear what the mechanism(s) are by which such transformations would take place, this interpretation is not plausible on design grounds. Although high school success could have fostered time management, in this prospective study measures of time-management attitudes and skills were taken prior to the unfolding of grade point average. This sequence of events makes less plausible an interpretation in which grade point average produces time-management responses.

From our perspective the more interesting aspects of these results emerged through considering the factors as descriptions of behavior. The Time Attitudes factor seems very much like self-efficacy. Subjects report feelings of being in charge of their own time. They are able to say "No" to people. They are able to stop unprofitable routines or activities. According to Bandura (1989), such feelings of efficacy allow, and indeed support, more efficient cognitive processing, more positive affective responses, and more persevering behavior. The present data seem to be consistent with that position.

Short-Range Planning also seems to predict grade point average, whereas Long-Range Planning does not. Why is this the case? There are several possibilities. In some environments, for some goals, long-term trends may be more important than short-term fluctuations. On the other hand, a short-term window may be optimal in other environments for other goals. The college environment is one in which changes in expectations, demands, and so forth, are relatively rapid and frequent. Different parts of the same course may unpredictably differ in difficulty; the overlapping of demand from different courses is often unpredictable; nonacademic life events may cause unpredictable changes in demands, available time, or priorities; instructors may even change their mind about the due data on papers or the date an exam will be scheduled; on occasion, there is no syllabus and even in courses in which there is a syllabus, there are often consequential deviations from it. Perhaps in this type of environment if the goal is to maximize grades, a short-term planning window is more optimal than a long-term planning window. If this interpretation is correct, then the Long-Range Planning factor might become more important in a less volatile, more stable environment.

The interpretation of Long-Range Planning described above does not account for its negative correlation with SAT score. Perhaps this factor should be interpreted differently. Several of the items loading on Long-Range Planning may indicate an inability to tolerate complexity, for example, keeping a clean desk. To the extent that these items indicate a low tolerance for ambiguity, those persons who score high on this factor might be unable to cope with other kinds of complexity, such as the complexity involved in taking the SAT. These are questions for future research.

In sum, the present results show an encouraging relationship between time-management attitudes and skills and grade point average. This relationship may have applied implications because time-management skills can be taught (Hall & Hursch, 1982). College students are useful subjects for this research, partly because a suitable measure of achievement is readily available for them. The relationship between time management and achievement may also hold in other fields. More research is needed to document this relationship and to determine with greater precision the circumstances under which it does and does not hold.

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How and when do students use flashcards?

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Previous survey research has documented students' use of self-regulated study strategies, with a particular interest in self-testing. These surveys indicate that students frequently use flashcards to self-test and that self-testing is primarily used as a way to monitor learning. Whereas previous surveys provide information about whether and why students self-test, they provide minimal information about how and when students choose to self-test. Accordingly, the primary purpose of the current survey was to explore how and when students engage in self-testing. We surveyed 374 undergraduates about the amount of practice and the timing of practice, two factors that strongly affect the efficacy of self-testing. Results indicate that students understand the benefits of practising to higher criterion levels (amount of practice) but do not typically implement or understand the benefits of practising with longer lags (timing of practice). We discuss practical implications for supporting more successful student learning.

Keywords: Self-testing; Criterion learning; Lag effects; Survey.

A wealth of previous research has shown that testing is beneficial for learning and memory (for recent reviews, see Rawson & Dunlosky, 2011; Roediger & Butler, 2011). However, the effectiveness of self-testing depends on several factors, including the amount and timing of practice. Although the majority of research on testing effects has been conducted in laboratory settings in which practice tests are under experimental control, in real-world contexts decisions of how and when to self-test are left up to students. Thus, the actual benefits of self-testing in most learning environments will depend on the extent to which students' choices reflect those conditions that facilitate learning. Given the sizeable amount of laboratory research exploring conditions under which self-testing is most effective, it is perhaps surprising that little is known about how students implement self-testing on their own. Accordingly the main focus of the current survey was to explore how and when students self-test, with a particular interest in students' self-reported use of flashcards (given that students often report using flashcards during self-regulated learning).

HOW SHOULD STUDENTS IMPLEMENT SELF-TESTING?

Two critical factors that affect the efficacy of self-testing are the amount of practice and the timing of practice. Concerning the amount of practice, increasing the number of times an item is correctly recalled during practice benefits later retention (e.g., Karpicke, 2009; Karpicke & Roediger, 2008; Pyc & Rawson 2009; Vaughn &

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Rawson, 2011). For example, Vaughn and Rawson (2011) presented learners with Lithuanian–English word pairs for test–restudy practice until items were correctly recalled one to five times. Correctly recalling an item more than once during encoding significantly improved final cued recall two days later (e.g., 31% versus 71% for items correctly recalled once versus four to five times). In addition to effects of the amount of practice within a given learning session, increasing the number of learning sessions benefits long-term retention. For example, Rawson and Dunlosky (2011) presented students with key concept definitions for test–restudy practice until items were correctly recalled during initial learning, followed by anywhere from one to five relearning sessions on subsequent days. Final cued recall 1 month later improved substantially as the number of relearning sessions increased (e.g., 35% versus 62% after one versus four to five relearning sessions).

Concerning the timing of practice, self-testing is most effective when using longer versus shorter lags between practice trials for a given item, both within and between sessions (e.g., Bahrick & Hall, 2005; Cepeda, Vul, Rohrer, Wixted, & Pashler, 2008; Karpicke & Bauernschmidt, 2011; Kornell, 2009; Pashler, Zarow, & Triplett, 2003; Pyc & Dunlosky, 2010; Pyc & Rawson, 2007, 2009, 2012). Pyc and Rawson (2009) presented learners with Swahili–English word pairs for test–restudy practice trials that were separated by either 6 or 34 other items. Items practised with a longer versus shorter lag were more likely to be recalled on a final test 25 minutes later (76% versus 55%) or one week later (30% versus 5%). In sum, self-testing is most effective when implemented with higher criterion levels within and across sessions and longer lags between practice trials.

HOW DO STUDENTS IMPLEMENT SELF-TESTING?

In contrast to the sizeable amount of laboratory research in which practice tests are under experimenter control, minimal research has explored how students implement self-testing on their own. A few studies have used experimenter-controlled environments to examine students' decisions about the amount or timing of self-testing (Karpicke, 2009; Kornell & Bjork, 2008a; Kornell & Metcalfe, 2006). Kornell and Bjork (2008a, Experiment 3) gave learners 10 minutes to learn 20 Swahili–English word pairs (in anticipation of a final cued recall test after a 5-minute delay). After initial study, items were presented for test–restudy trials. After each trial learners were given the option to remove a word pair or keep it in the list for further practice. Learners dropped 63% of word pairs after one correct recall rather than practising to a higher criterion. These results appear to suggest that students do not understand the benefits of higher criterion levels. However, a time limit of 10 minutes might have compelled students to drop items after only one correct recall to ensure enough time was left to practise unlearned items. More generally, all previous experimental studies have only given students control over limited aspects of self-testing in which much of the implementation of testing is still under experimenter control.

Survey methods provide a complementary approach to investigating students' use of self-testing (Carrier, 2003; Hartwig & Dunlosky, 2012; Karpicke, Butler, & Roediger, 2009; Kornell & Bjork, 2007; Kornell & Son, 2009; McCabe, 2010). Surveys avoid the disadvantage of limited control in experimental studies by providing students with opportunities to report decisions used in real-world contexts. Several recent survey studies have established that students use self-testing and frequently report using flashcards in particular. Hartwig and Dunlosky (2012) had students report which study strategies they use on a regular basis, and 62% of learners reported using flashcards. Likewise Karpicke et al. (2009) had students freely list strategies used during study; 40% of learners reported using flashcards. Prior surveys also provide information about why students self-test. Kornell and Son (2009) asked learners why they choose to self-test during study; 66% of learners reported self-testing to determine how well they knew the information, whereas only 20% said because they learn more than with restudy. Similarly, in surveys by Hartwig and Dunlosky (2012) and Kornell and Bjork (2007) 54% and 68% of learners reported self-testing to figure out how well they had learned information, and only 27% and 18% said because they learned more that way than rereading. These findings suggest that students primarily self-test to monitor how well target information has been learned rather than as a learning strategy.

Although prior survey research is informative about whether and why students choose to self-test, prior survey studies provide minimal

information about *how* and *when* students engage in self-testing. Given that the efficacy of self-testing is highly dependent on how and when it is used, the present survey focuses on the details of these factors in students' flashcard use.

METHOD

Surveys were administered via computer as part of six larger studies. Across all six studies, 374 undergraduates from Kent State University completed the survey in return for course credit. Each participant was given 20 minutes to complete the survey. Due to the time limit some participants did not respond to every question. Furthermore the particular set and sequence of questions varied somewhat across studies. Accordingly the number of respondents varies across questions; sample size for each question is indicated in the tables below.

For the majority of the survey questions, response format was open-ended. The few questions involving an alternate response format are denoted in the tables below. For scoring purposes, all open-ended responses were coded by one of two raters. Data were initially coded by frequency of response exemplars. The tally for each response exemplar included verbatim or close paraphrases of a particular idea. For example, Question 1A asked learners why they use flashcards to study for classes; responses of "easy for me to learn", "learning is easier this way", and "easiest way to learn" were all coded under "easy to learn". Two authors then reviewed the list of response exemplars and decided which exemplars could be collapsed into response categories. Response categories were developed for exemplars that indicated a similar kind of information (e.g., for Question 2C, we collapsed responses of "quickly recalled" and "easily recalled" into one response category) or to combine infrequent responses (e.g., for Question 2G, we created the category "6+ times"). Overall, response categories were used infrequently; all responses presented in the tables are exemplars unless otherwise denoted as a response category.

RESULTS AND DISCUSSION

Before reporting the primary outcomes of interest concerning how and when students self-test, we briefly discuss relevant background information about respondents and replications of findings from prior survey studies.

Background information

Appendix A of the online supplement reports background information about the survey respondents. Most students were freshmen, and a majority of the sample maintained above a 3.00 grade point average. A significant number of students reported that teachers and/or professors taught them study strategies (A1–3). Interestingly, although a large majority of students reported having received instruction from teachers about how to study, students reported that only 23% of instructors recommended flashcards, and only 25% recommended completing practice problems or quizzes.

Whether and why students use flashcards

Replicating prior survey research, Table 1 shows that a large number of students report using flashcards to study (Question 1A). In contrast to previous findings, our results differ somewhat in regard to reasons students gave for why they use flashcards. Whereas the most common reason students reported self-testing in prior studies was to evaluate how well target information has been learned, the most common reason reported in the current study was to help memorise information (although see Question 2J for some evidence that students revisit dropped flashcards for purposes of checking memory). These divergent outcomes may be due to methodological differences between studies. For example, whereas we asked students why they use flashcards in particular, prior surveys asked students why they choose to quiz themselves more generally (which might or might not involve the use of flashcards). Additionally, the three prior survey studies all used a multiple choice format in which possible reasons were provided but that only permitted selection of one response option. In contrast we used an open-ended question. Given the open-ended nature of the responses it is unclear whether students meant the act of testing in and of itself helps memorisation or if testing helps determine what information still needs to be memorised. Further clarification on this distinction awaits future research.

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TABLE 1
Whether and why students use flashcards

1A. Do you use flashcards to study for your classes? ($n = 247$)		
Yes		67.6%
No		32.4
Why or why not? ($n = 154$)*		
	Why ($n = 114$)	Why Not ($n = 40$)
Helps to memorise	60.5%	
Easy way to learn	22.8	
Lots of vocabulary	14.9	
Convenient to carry	8.8	
Isolates information	6.1	
Helps organisation	2.6	
Breaks up information	1.7	
Forces rereading	1.7	
Helps/forces rewriting	0.9	
Not helpful		60.0%
Not useful		35.0
Didn't need to study		5.0
1B. Explain what type of information you put on them ($n = 216$)*		
Vocabulary		82.9%
Factual information from notes (people/places/dates)		29.2
Key concepts		28.2
Formulas		7.4
Difficult information		3.7
Information from study guide		3.7
1C. In reference to the classes you took last semester, how often did you use flashcards to study? ($n = 264$) +		
0 classes		35.6%
1 class		11.4
2 classes		12.1
3 classes		22.3
4+ classes		18.6

*For these questions the sum of response percentages exceeds 100% because participants could report more than one response.
+For this question participants were given five corresponding response buttons.

Extending beyond prior research, Table 1 provides information about what kinds of materials students use with flashcards—an overwhelming 80% of students report using flashcards to learn vocabulary (Question 1B)—and also shows that a majority of students (53%) use flashcards in more than one class (Question 1C).

How students use flashcards: Amount of practice

Learning to criterion. Table 2 includes questions about how students use flashcards, focusing

TABLE 2
How student use flashcards: Amount of practice

2A. Imagine that you are studying with a stack of flashcards. How do you decide when you have studied a given flashcard enough? ($n = 327$)*	
I recall it correctly	39.4%
I recall it correctly more than once	25.7
I don't have to look at the other side	17.4
I don't have to think about it	15.6
I recall it quickly	12.5
I understand the information	8.6
Mix-up and still recall	5.5
Other	3.1
2B. Imagine you are studying a stack of flashcards. Which of the following would influence how many times you studied an item? ($n = 272$)*+	
How easily you can remember the item	80.0%
How many times you can correctly recall item	68.7
Importance of the particular item	58.9
How long you planned to study that day	40.1
Other	4.0
2C. Do you ever remove cards from the stack of flashcards when you are studying? ($n = 327$)	
Yes	73.7%
No	26.3
If yes, please explain when and why you would drop out cards ($n = 296$)*	
Need to focus on unknown	40.0%
Remembered multiple times	33.8
Don't need to study what is known	29.8
Quickly/easily recalled †	12.0
Ones I need to study more	8.4
Helps divide concepts	3.1
Helps organise	2.7
Other	1.8
If no, please explain why you would not drop out cards ($n = 72$)*	
Need to know all the material	55.6%
Will remember better more times studied	36.1
Messes up the order	8.3
Don't see the point	8.3
2D. When you take a card out, how often is it because you tested yourself and were able to remember it correctly? ($n = 133$) ^	
0.0–19.9%	8.3%
20.0–39.9%	3.8
40.0–59.9%	13.5
60.0–79.9%	21.8
80.0–100.0%	52.6
2E. When you take a card out, how often is it because it's too hard and you don't feel that you can learn it? ($n = 135$) ^	
0.0–19.9%	65.0%
20.0–39.9%	16.3
40.0–59.9%	5.9
60.0–79.9%	8.9
80.0–100.0%	3.0
2F. When you take a card out, how often is it because it's too easy and you don't feel you need to practice it? ($n = 135$) ^	
0.0–19.9%	20.7%

TABLE 2 (*Continued*)

20.0–39.9%	11.1
40.0–59.9%	8.1
60.0–79.9%	25.2
80.0–100.0%	34.8

2G. When using flashcards to self-test your memory, how many times do you think you should be able to correctly recall an item during flashcard practice so that you will be able to remember it later for an exam? ($n = 243$)

1 time	0.8%
2 times	4.5
3 times	22.2
4 times	8.2
5 times	22.0
6+ times †	29.6
Non-numeric response †	12.7

2H. Imagine that you are self-testing using flashcards and you correctly recall an item once. How much more likely would you be to remember that item later if you continued practising until you correctly recall that item again a second time? ($n = 143$) ^

0.0–19.9%	2.1%
20.0–39.9%	7.7
40.0–59.9%	9.1
60.0–79.9%	32.3
80.0–100.0%	49.0

2I. Do you think there is a point at which correctly recalling an item more times during practice would no longer benefit your ability to remember that item later? If so, what do you think that point is? ($n = 143$)

No, there is not a point	44.8%
Yes, there is a point	55.2

If so, what is the point? ($n = 78$)*

I recall it X number of times	52.6%
I know answer without thinking about it	30.8
I remember the item the next day	12.8
I start to become unfocused	11.5
Other	2.6

2J. If you were to drop out cards from your stack of flashcards when you are studying, once an item is dropped from practice, does it ever get put back in the stack of flashcards within that same session? ($n = 315$)

Yes	84.1%
No	15.9

Why or why not?*

	Why ($n = 257$)	Why Not ($n = 37$)
To check memory	41.0%	
Always useful to restudy	37.7	
Need to keep all to learn all	14.4	
Helps to understand completely	7.0	
Forget otherwise	7.0	
I know it		64.9%
Use it in different session		37.9
Need to focus on unknown		13.5
Confuses if re-added		8.1

TABLE 2 (*Continued*)

2K. Suppose you were using flashcards to prepare for an upcoming exam, and you wanted to get an Ā on the exam. On how many different days would you study with your stack of flashcards? ($n = 126$)

1 day	4.0%
2 days	13.5
3 days	15.1
4 days	13.5
5 days	15.1
6 days	4.8
7 days	14.3
8–10 days †	12.7
Other/non-numeric †	7.2

2L. When using flashcards to self-test, how do you decide if you have correctly recalled an item? ($n = 274$)*

Self check by looking at external information	48.9%
Self check in mind	27.4
Continuously recall correctly	16.4
Answer correctly without hesitation	12.0
Partner check	3.6
Write down correctly	2.5

*For these questions the sum of response percentages exceeds 100% because participants could report more than one response.

+For this question participants were provided with the list of options.

^For Questions 3D–3F participants were given were given a sliding scale with endpoints marked as "0% of the time" and "100% of the time". For Question 3H participants were given a sliding scale with endpoints marked as "100% more likely" to "0% more likely".

†Response category: see text for details.

specifically on students' self-reported use and beliefs about amount of practice. Question 2A demonstrates that a large majority of students (65%) report practising until items are correctly recalled (collapsing across "I recall it correctly" and "I recall it correctly more than once"; these two response exemplars were treated as mutually exclusive for coding purposes). Although the number of correct recalls was not always specified, this finding suggests that many students learn to a criterion of at least one correct recall when using flashcards. With that said, a disconcerting number of students report making decisions without checking to make sure they are correct ("I don't have to look at the other side", 17%) or based on cue familiarity ("I don't have to think about it", 16%) and/or fluency of retrieval ("I recall it quickly", 13%). Although fluency of retrieval can accurately predict subsequent

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performance in some situations, fluency can be misleading in other cases (e.g., if the fluently retrieved information is incorrect, or if fluency is due to retrieval from working memory rather than long-term memory). Relying only on the fluency with which information comes to mind without evaluating the correctness of the fluently retrieved information may be particularly problematic if it leads students to incorrectly believe they know more than they do, which is particularly likely for more complex material (e.g., Dunlosky, Hartwig, Rawson, & Lipko, 2011; Rawson, O'Neil, & Dunlosky, 2011).

Nonetheless most students seem to understand the importance of correctly recalling target information during study, which is one key component of maximising the benefits of self-testing. Converging evidence for this conclusion comes from Question 2B, with a majority of students (69%) reporting that they practice to criterion when studying with flashcards. Additionally, Question 2D shows that students commonly report dropping flashcards in their stack because they reached criterion. Along the same lines Question 2E indicates that students are not likely to drop cards prior to reaching criterion. Students also reported removing items from practice when the item was easy (Question 2F), but these results are somewhat harder to interpret given that students might have interpreted "too easy" to mean they were able to recall target material correctly, quickly, or based on some other source (e.g., cue familiarity).

Higher criterion is better. Results thus far indicate that students typically choose to reach criterion before dropping flashcards from study. The next question of interest concerns the extent to which students practise beyond a single correct recall. In Question 2A, 26% of students spontaneously reported that they practise until information is correctly recalled more than once. Question 2C indicates that of the 74% of students who report dropping flashcards from their stack during study, 34% of these students explicitly stated that they practised recalling information multiple times before dropping it. However, these outcomes may underestimate the prevalence of practising to higher criterion levels, in that some students might simply not have thought to specify a particular criterion level. Indeed, when asked directly, almost every single student indicated belief that practising beyond one correct recall will help later memory of target material for an exam (Question 2G). With that said, by asking "how many times", the phrasing of Question 2G might have biased some students to report more than one correct recall versus only one (although students' preferences for more versus fewer correct recalls are harder to explain as due to biasing from the prompt).

Question 2H shows that a majority of students expect to benefit substantially from correctly recalling information for a second time. Question 2I suggests that some students do not anticipate diminishing returns from continuing to correctly recall target material (although a majority of students do correctly believe that once information has been recalled a certain number of times, there is no need to continue to practise it). Finally, Question 2J indicates almost all students (84%) report putting dropped flashcards back into their stack during a practice session. Moreover, when students report not putting a flashcard back into their stack, it is interesting to note that a common reason is because they intend to practise it at a later time (38%). Lastly, Question 2K indicates that students believe it is important to restudy flashcards on more than one day in order to obtain an A on an exam, suggesting that students understand the benefit of engaging in multiple learning sessions.

Concerning criterion learning and amount of practice, one related aspect is important to consider. Students report learning to criterion and that a higher criterion is beneficial, but how do students know when they have correctly recalled information? Question 2L shows that fewer than half of students report checking answers against external information (e.g., turning the flashcard over or checking against notes). Importantly, even when students check their answers against external information, they often still overestimate the correctness of their own answer (e.g., Dunlosky et al., 2011; Lipko et al., 2009; Rawson et al., 2011). Even more disconcerting is the fact that 27% of students reported checking answers "in their mind", given that research has shown that evaluating the correctness of a response without comparison to external information produces even higher levels of overconfidence (Dunlosky & Rawson, in press; Lipko et al., 2009). In either case, overconfidence can produce detrimental effects on learning because students do not effectively regulate practice (Dunlosky & Rawson, in press; Rawson et al., 2011). For present purposes this outcome suggests that students may not actually achieve their intended criterion level if they prematurely terminate practice due to overconfidence in the accuracy of their responses.

TABLE 3
How students use flashcards: Timing of practice

3A. Imagine that you have a total of 60 flashcards for a class. You need to know all 60 items for the next exam. When studying the flashcards, how many cards would you practise at a time? In other words, would you practise all 60 in one big stack, or would you divide them up into smaller stacks and then study one stack at a time? Below indicate how many flashcards you would practise at a time ($n = 279$)+

60	28.7%
30	9.0
20	21.0
15	14.0
10	18.3
Other	9.0

Why? ($n = 253$)*

	10–15 ($n = 87$)	20–30 ($n = 72$)	60 ($n = 74$)
Need to know them all	4.6%	11.1%	63.5%
Easier to remember a smaller stack	67.8	44.4	2.7
Less overwhelming	34.5	40.3	–
Divides into ones I know/don't know	–	15.3	20.3
Influences how information is encoded/learned	4.6	4.2	8.1
Needs to be somewhat difficult	1.1	6.9	6.8
Confusing to divide	1.1	1.4	2.7
Split into categories/chapters †	5.7	2.8	1.3
See card more times	4.6	4.2	–

3B. Do you think having a larger or small stack of flashcards is better for studying? ($n = 263$)*

Small	72.2%
Medium	1.9
Large	16.3
Doesn't matter	6.8
Depends	4.2

Why? ($n = 229$)*	Small ($n = 176$)	Medium/Large ($n = 42$)
Less to remember	53.7%	9.5%
Learn quicker	23.9	4.8
Narrows focus	19.1	11.9
See card more times	8.5	2.4
Gets confusing	8.0	–
Helps to feel accomplished	6.4	4.8
Brain only holds so much	6.4	–
Need to know all the information	3.2	64.3
Time between cards better	1.1	4.8

3C. If you were going to study a stack of flashcards, what do you think would work best and why? Study them one at a time repeatedly (for example, 1, 1, 1, 2, 2, 2, 3, 3, 3, 4, 4, 4). Study them mixed together (for example, 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3, 4). ($n = 140$)*

Mixed	80.9
Repeated	17.1
Other	3.9

*For these questions the sum of response percentages exceeds 100% because participants could report more than one response.
+For this question participants were given six corresponding response buttons.
†Response category: see text for details.

When students use flashcards: Timing of practice

Table 3 includes questions about when students use flashcards with specific respect to the timing of practice. Most strikingly, several outcomes indicate that students do not understand the benefits of longer lags during study. For example, Question 3A indicates that a majority of students prefer to use a smaller versus larger stack of flashcards when studying. Of those students who reported a preference for using a smaller stack, a

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substantial percentage (68%) said the reason was because it is easier. In addition, even when students said they would use a larger stack, none of them reported doing so because it would improve learning. Question 3B provides converging evidence showing that when students are specifically asked whether using a smaller versus larger stack of flashcards is better for studying, an overwhelming 72% believe smaller is superior, whereas research has shown that retention is better after practising with a larger versus smaller stack (e.g., Kornell, 2009). Furthermore, not a single student indicated that the reason for their preference on stack size was because it is better for retention. However, although students do not appear to understand the advantage of long versus short spacing, Question 3C shows that at least most students (81%) believe that spaced study is better than massed study.

Although students' understanding of lag effects was of primary interest, Appendix A of the online supplement provides results for questions that are relevant to another aspect of timing. Of interest, a recently emerging issue in the testing effect literature focuses on interleaving versus blocking of practice for items from different categories (e.g., Kornell & Bjork, 2008b; Taylor & Rohrer, 2010). Despite frequent reports of using flashcards for more than one class (Question 1C and A1–4), Question A1–5 indicates that almost no one said they would mix flashcards of different topics when studying.

Putting the pieces together: Calendar question

Tables 2 and 3 report outcomes from fine-grain questions that prompted students to report either on amount of practice or on timing of practice. Table 4 reports outcomes from a more global survey question that was designed to explore how students would make decisions about both the amount and timing of practice and how flashcard use might be combined with the use of other strategies. For this question students were shown a visual calendar display for the month of February along with the informational prompt and questions shown in Table 4.

Not surprisingly almost all students said that they would study the night before an exam (93%) and a fair number reported studying the morning of an exam (38%). Although prior research has shown that massed study can enhance performance on immediate tests, cramming before an exam is not sufficient for longer-term retention (e.g., Balota, Duchek, & Paullin, 1989; Karpicke & Roediger, 2007; Rawson & Kintsch, 2005). Responses to Question 4A are consistent with outcomes described above, in that almost all students reported that they would study on more than one day. However, results also extend the finding that students do not understand lag effects. For students who reported they would study in two or more sessions, the majority reported that they would only separate their study sessions by about one day.

Responses to Question 4B indicate that a majority of students (65%) said they would use two or three different strategies when studying for the exam. However, students also reported that they would rely more heavily on restudying than on self-testing. Restudying notes had the highest reported percentage for strategies used the morning of an exam, the night before an exam, or any other day, and 52% of students said they would restudy notes during every study session. In contrast only 34% said they would use flashcards the morning of an exam and 38% said they would use flashcards the night before the exam. Likewise only 34% said they would use flashcards on other days, and only a minority (24%) said they would use flashcards on every other day they studied. Although the percentage of students who said they would use flashcards is lower than in other survey questions described above (e.g., 68% in Question 1A), note that Question 4B asked students specifically about preparing for an exam in General Psychology. To revisit Question 1B, a majority of students reported using flashcards for vocabulary (83%) versus information from notes or key concepts (29% and 28%, respectively). Given that General Psychology typically involves learning key concepts and related material rather than vocabulary (as in foreign language classes), the lower percentage of students who reported they would use flashcards in Question 4B is consistent with the percentage who reported using flashcards for key concepts in Question 1B.

DISCUSSION

The current survey extends beyond previous survey research by exploring how and when students self-test, with an emphasis on flashcard use. Of primary interest, two key patterns emerged: First, most students report engaging in criterion learning and

TABLE 4
Responses to calendar question

Here is a calendar for the month of February. Imagine that today is Feb 1st and you have an exam in General Psychology on Feb 27th. Suppose you wanted to get an A on this exam. In the field to the right, answer these questions in as much detail as possible:

4A. Which day or days would you study for the exam (write exact dates)? ($n = 286$)

Participants reporting they would study the morning of the exam	38.5%
Participants reporting they would study the night before the exam	93.0

Not counting the morning of the exam or the night before the exam, number of other days participants reported they would study:

0 days	6.3%
1 day	13.0
2 days	9.1
3 days	13.3
4 days	8.7
5 days	7.3
6 days	9.8
7–8 days	10.8
9+ days	21.7

For participants who reported studying on two or more sessions ($n = 273$), the mean lag between sessions:

1 day (1.0–1.5)	66.3%
2 days (1.6–2.5)	21.2
3 days (2.6–3.5)	7.0
4 days (3.6–4.7)	3.3
7 days (6.5–7.5)	2.2

4B. What exactly would you be doing in each of these study sessions to prepare for the exam? Next to each date you wrote down, write what you would be doing during that session to prepare for the exam ($n = 269$)
Number of strategies participants reported using to study across sessions:

1 strategy	20.0%
2 strategies	32.6
3 strategies	31.9
4 strategies	11.8
5 strategies	3.3
6 strategies	0.4

For participants who indicated they would study the morning of the exam ($n = 108$), how did they say they would study? For participants who indicated they would study the night before the exam ($n = 247$), how did say they would study? For participants who indicated they would study on at least one other day ($n = 252$), how did they say they would study?*

	Morning	Night before	Other day(s)
Restudy notes	70.4%	68.8%	65.6%
Restudy textbook	30.6	36.4	40.0
Flashcards	34.3	38.4	34.0
Practice test/ problems	15.7	14.6	10.2
Other	21.3	25.5	21.2

TABLE 4 (*Continued*)

How many sessions on other day(s) participants reported they would use flashcards, restudy the textbook, and restudy notes to prepare for exam ($n = 252$)

	Flashcards	Restudy textbook	Restudy notes
Every session	24.2%	30.6%	51.6%
No session	55.6	48.8	23.0
Some but not all sessions	20.2	20.6	25.4

*This question only includes participants who provided responses for both how and when they would study. The sum of response percentages exceeds 100% because participants could report more than one response

understand the benefits of practising to higher criterion levels. Second, students do not appear to implement or understand the benefits of longer lags when self-testing with flashcards. Concerning learning to criterion, a majority of students choose to reach at least one correct recall during practice before dropping a given flashcard (Questions 2A, 2B, and 2D), although it is interesting to note that students do not always check their answer against external information (Question 2L). Concerning criterion level, some students spontaneously reported going beyond one correct recall during practice (Questions 2A and 2C) and almost all students believe that going beyond one correct recall is important (Questions 2G and 2H). In addition a majority of students report using more than one practice session (Question 2K). Concerning lag, responses indicate a majority of students opt to use smaller versus larger stack sizes when self-testing (Questions 3A and 3B). Of critical importance is that not one student (regardless of preferred stack size) indicated awareness of the relationship between lag and learning (Questions 3A and 3B). Overall the results suggest that when students self-test with flashcards they make advantageous decisions regarding the amount of practice but detrimental decisions regarding the timing of practice.

Note that some questions in the current survey tapped students' beliefs whereas others tapped students' behaviours. We used this multi-faceted approach because what students believe about effective study strategies and what they actually do when studying likely do not completely align (e.g., due to time pressure). For example, nearly all students believe that correctly recalling an item more than once has a substantial benefit on later retrieval (Question 2H), whereas only 34% of students spontaneously reported practising to a

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higher criterion when studying (Question 2C). Additionally, if students do not report engaging in a particular behaviour, questions about beliefs help to diagnose whether suboptimal behaviour is due to a metacognitive knowledge deficit or an implementation deficit. For example, 71% of students report dividing up information into smaller stacks (Question 3A); the finding that 72% of students believe using a smaller versus larger stack of flashcards is better (Question 3B) suggests that the suboptimal behaviour is primarily due to a metacognitive knowledge deficit. More generally, we would advocate for the inclusion of both belief and behaviour questions in future survey research.

Our findings concerning how and when students use flashcards have several important implications for educational practice. Perhaps most importantly the results showing a general lack of understanding about how lag affects learning, and that relatively few students effectively implement lag either within or between practice sessions, indicate that students should be educated about the benefits of lag and how to effectively implement lag when self-testing. Another unanticipated but important outcome concerns the extent to which students reported using flashcards for a relatively restricted range of materials (in Question 1B, 83% of students report using flashcards for vocabulary whereas only 29% report using flashcards for key concepts). Thus students would also likely benefit from education about the utility of flashcards for learning a wider range of material. In addition, responses concerning how students evaluate the correctness of their answers (Question 2A) suggest that students should also be educated about the importance of explicitly checking their answers, particularly when using flashcards to learn complex material.

Beyond implications for more effective flashcard use in particular, the current survey results have practical implications for supporting successful student learning with the use of self-testing more generally. Although a majority of students choose to self-test during study, the current results suggest that students would benefit from more information or training about how to effectively implement self-testing. One straightforward approach would be for instructors to teach students about the importance of the amount and timing of self-testing. Unfortunately the current results suggest that relatively few instructors advise students to use self-testing as a learning strategy (Question A1–3), much less how to self-test effectively. Given that few instructors recommend self-testing to students, educators themselves may be unaware of the robust effects of self-testing and the factors that influence the efficacy of self-testing. Ideally teacher training programmes could educate instructors on the benefits of self-testing, factors that influence the effectiveness of self-testing, and ways to incorporate self-testing methods into curricula. Another approach to enhance the effective use of self-testing is through study skills classes or workshops increasingly offered by universities to support student achievement. Ideally these programmes would target first-semester freshmen, who may have never been taught about the use of self-testing. The goal would be to educate students on how and when to self-test in ways that facilitate learning (e.g., higher criterion levels and longer lags). More generally, promoting students' awareness of the benefits of self-testing and providing knowledge of how to effectively self-test in real-world contexts will support more successful student learning.

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UNIV 101
UNIVERSITY OF NORTHERN COLORADO

Research Project Instructions

Purpose: The purpose of this project is to give students an introduction to the research process at the university level. This includes students presenting their findings both in written and verbal formats.

Evaluation: Evaluation consists of a Process Grade (completing all required tasks within the deadlines) and a Product Grade (product quality).

***Process Requirements* (60%)**	***Due Dates***
• Draft Outline and Introduction (40 pts)	_____
• Formal First Draft (40 pts)	_____
• Instructor Feedback Meeting (20 pts)	_____
***Product Requirements* (40%)**	
• Final Paper (70 pts)	_____
• Research Presentation (30 pts)	_____
o Poster Presentation & Participation	
Library Requirements	
• Attend Library Research Session (+5% or -50%)	(see sign-up and schedule on Canvas)
• Attend Library APA Session (+5%)	(see schedule on Canvas)

Project Description

1. Paper is a minimum of five full pages of written text, plus a cover and reference page:

a. Cover page includes name, date, UNIV section, and title of paper.

b. Paper includes in-text citations and a reference page. All citations/references must be listed in APA style (6th ed.). Include *at least* **6** peer-reviewed sources published in the last 10 years (since 2008).

c. No more than **3** direct quotes can be included in your final paper.

d. Format is 1-in margins, double-spaced, and Times 12-pt font.

2. Choose a topic of personal or professional interest from the provided list (or topic of your own), decide whether to write using an analytical or argumentative research approach, and conduct library research to find peer-reviewed sources.

3. Paper begins with an introduction that provides an effective overview of the topic, and includes a research question or problem and statement of your position (i.e., thesis). Remainder of paper should include your arguments and/or findings, supporting and/or opposing literature, and a conclusion.

4. You will submit several drafts before your final paper is formally due:

a. Submit a **draft outline and introduction** online by 8am on the due date. The draft outline should be completed using the given template form (see online) and include at least one peer-reviewed source per major point and brief explanations for each section (see example and template). Sources should be listed in rough APA style.
The introduction should include at least one peer-reviewed source, create interest, explain your topic, and provide a clear statement of purpose or thesis. The length should be at least half a page. A reference page listing the reference(s) should be included. Attempts at APA style should be clear.

b. Submit a **complete first draft** online by 8am on the due date, including cover and reference pages.

c. Submit your **final paper** online by 8am on the due date.

5. At some point during the project, you must schedule a time and meet one-on-one with your instructor to discuss your paper or poster. This can include a meeting early in the project to get help finding sources and narrowing your topic, to meeting later in the project to get help incorporating feedback into your final paper. Your instructor will tell you the process for scheduling a meeting.

6. Participate in Research Night by formally presenting the findings of your research project and viewing other projects.

Research Topics	**UNIV 101 Sections**						
Business & Media Communication • Cybersecurity • Online Retail/E-business • Children's Programming and Advertising • Media Bias	102	103	104	105	106	107	108
	109	110	111	112	113	114	115
Crime, Law, & Politics • Assisted Suicide • Campus Violence • Mandatory Minimum Sentencing • Election Reform	102	103	104	105	106	107	108
	109	110	111	112	113	114	115
Education, Arts, & Music • Charter Schools • Hazing • Postmodernism • Music Therapy	102	103	104	105	106	107	108
	109	110	111	112	113	114	115
Environmental • Alternative Energy • Marine Pollution • Population Control • Wildlife Conservation	001	002	003	004	005	006	007
	008	009	010	011	014	101	116
Sociology & Psychology • Sleep • Genetic Screening • Feminism • Queer and Gender Issues	001	002	003	004	005	006	007
	008	009	010	011	014	101	116
Religion & Spirituality • Addiction and Spirituality • Cults/Occultism • Indigenous Healers • Separation of Church and State	001	002	003	004	005	006	007
	008	009	010	011	014	101	116

Example Articles in APA Style:

BUSINESS & MEDIA COMMUNICATION

CYBERSECURITY:

Roesener, A. G., Bottolfson, C., & Fernandez, G. (2014). Policy for US cybersecurity. *Air & Space Power Journal, 28*(6), 38-54.

ONLINE RETAIL/E-BUSINESS:

Insley, V., & Nunan, D. (2014). Gamification and the online retail experience. *International Journal of Retail & Distribution Management, 42*(5), 340-351.

CHILDREN'S PROGRAMMING AND ADVERTISING:

Shin, W., Huh, J., & Faber, R. J. (2012). Developmental antecedents to children's responses to online advertising. *International Journal of Advertising, 31*(4), 719-740.

MEDIA BIAS:

Dunham, W. R. (2013). Framing the right suspects: Measuring media bias. *Journal of Media Economics, 26*(3), 122-147.

CRIME, LAW, & POLITICS

PHYSICIAN-ASSISTED SUICIDE:

Hosseini, H. M. (2012). Ethics, the illegality of physician assisted suicide in the United States, and the role and ordeal of Dr. Jack Kevorkian before his death. *Review of European Studies, 4*(5), 203-209.

CAMPUS VIOLENCE:

Seo, D., Torabi, M. R., Sa, J., & Blair, E. H. (2012). Campus violence preparedness of U.S. college campuses. *Security Journal, 25*(3), 199-211.

MANDATORY MINIMUM SENTENCING:

Cano, M. V., & Spohn, C. (2012). Circumventing the penalty for offenders facing mandatory minimums: Revisiting the dynamics of “sympathetic” and “salvageable” offenders. *Criminal Justice and Behavior, 39*(3), 308-332

ELECTION REFORM:

Larocca, R., & Klemanski, J. S. (2011). U.S. state election reform and turnout in presidential elections. *State Politics & Policy Quarterly, 11*(1), 76-101.

EDUCATION, ARTS, & MUSIC

CHARTER SCHOOLS:

Halqachmi, A. (2013). Charter schools in the USA. *International Journal of Productivity and Performance Management, 62*(4), 420-435.

HAZING:

Tokar, K., & Stewart, C. (2010). Defining high school hazing: Control through clarity. *Physical Educator, 67*(4), 204.

POSTMODERNISM:

Brînzeu, P., & Szönyi, G. (2011). The esoteric in postmodernism. *European Journal of English Studies, 15*(3), 183-188.

MUSIC THERAPY:

Mika, A. M. (2014). Is mindfulness a useful practice for music therapists? A research project report. *Approaches: Music Therapy & Special Music Education, 6*(2), 78-87.

ENVIRONMENTALISM

ALTERNATIVE ENERGY:

Azad, A. K., & Saha, M. (2012). Wind power: A renewable alternative source of green energy. *International Journal of Basics and Applied Science, 1*(2), 193-199.

MARINE POLLUTION:

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POPULATION CONTROL:

Pillai, V. K., & Gupta, R. (2011). Reproductive rights approach to reproductive health in developing countries. *Global Health Action, 4*, 1-11.

WILDLIFE CONSERVATION:

Meretsky, V. J., & Fischman, R. L. (2014). Learning from conservation planning for the U.S. national wildlife refuges. *Conservation Biology, 28*(5), 1415-1427.

SOCIOLOGY & PSYCHOLOGY

SLEEP:

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GENETIC SCREENING:

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QUEER AND GENDER ISSUES:

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RELIGION & SPIRITUALITY

ADDICTION AND SPIRITUALITY:

Room, R. (2013). Spirituality, intoxication and addiction: Six forms of relationship. *Substance Use & Misuse, 48*(12), 1109-1113.

CULTS/OCCULTISM:

Salande, J. D., & Perkins, D. R. (2011). An object relations approach to cult membership. *American Journal of Psychotherapy, 65*(4), 381.

INDIGENOUS HEALERS:

Day, D., Silva, D. K., & Monroe, A. O. (2014). The wisdom of indigenous healers. *Creative Nursing, 20*(1), 37-46.

SEPARATION OF CHURCH AND STATE:

Butz, D. A., & Carvalho, J. D. (2015). Examining the psychological separation of church and state: The American–Christian effect. *Psychology of Religion and Spirituality, 7*(2), 109-119.

One and Two Authors:

- (Smith, 2003)
- (Smith, 2003, p. 14)
- Smith and Jones (2004) stated in their research that…
- Smith (2003) stated, "Oh my goodness" (p. 14).
- Goals promote academic achievement (Smith & Jones, 2004).

Three, Four, and Five Authors:

- (Smith, Jones, & Wilson, 2005)
- (Smith, Jones, & Wilson, 2005, p. 14)
- Smith, Jones, and Wilson (2005) stated in their research that…
- Smith, Jones, and Wilson (2005) stated, "Oh my goodness" (p. 14).
- Goals promote academic achievement (Smith, Jones, & Wilson, 2005).
- Subsequent citations:
  - (Smith et al., 2005)
  - Smith et al. (2005) stated in their research that…

Journal Article:

Author, A., Author, B., & Author, C. (year). Title of the article. *Title of the Journal, Volume*(Issue), page number – page number.

Smith, T. (2013). Elementary students and reading. *Journal of Reading, 12*(1), 213-222.

Smith, T., Wilson, A., & Jones, B. (2013). Student motivation in school. *Journal of Educational Psychology, 3*(2), 42-45.

Book:

Smith, T., & Wilson, B. (2008). *The motivation book.* New York, NY: Pearson.

Online:
These can be used ***in addition*** to your minimum of 6 peer-reviewed articles.

- ***Article from a Web page:***
  Ostro, A. (2009, Oct. 8). Twitter is frozen in time. *Mashable*. Retrieved from http://mashable.com/2009/10/08/twitter-is-frozen-in-time/
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  Globalization and clothes. (2006). Retrieved from http://unpac.ca/economy/g_clothes.html
- ***Article from a Web page, no date:***
  Dvoretsky, D.P. (n.d.). *History: Pavlov Institute of Physiology of the Russian Academy of Sciences.* Retrieved from http://www.infran.ru/history_eng.html
- ***Online newspaper article:***
  Zernike, K. (2009, April 1). Paying in full as the ticket into colleges. *The New York Times*. Retrieved from http://www.nytimes.com

If you have an author, you cite the same way (Lastname, year). If there is not an author then you use part of the title ("Title of the Piece," year) or the entire title if it is short. Notice there are quotation marks and all words are capitalized except for the a, an, the, etc.

Sample Outline: The following outline is for a five-page argumentative paper discussing the important link between music education and child development.

I. Introduction

A. Current Problem: Educational budgets for arts and music are decreasing in the United States while standardized test funds are increasing.

B. Population/Area of Focus: Children and adolescents/public school system.

C. Key Terms: music education, government funding

Thesis Statement: *The importance of arts education is very clear; it is a field that should be encouraged and funded with excitement rather than one which is placed on the backburner of American society.*

II. Major Point 1: Music in Early Development.

A. Minor Point 1: Fun musical activities stimulate general learning abilities of toddlers.
B. Minor Point 2: Active musical environments enhance social learning of young children.

Source: Morehouse, P. G. (2013). The importance of music making in child development. *YC Young Children, 68*(4), 82 – 89.

III. Major Point 2: Music in Adolescence.

A. Minor Point 1: Arts involvement tied to better high school grades, as well as lower dropout rates among students with a low socioeconomic status.
B. Minor Point 2: Motivation and focus required of musicians improves cognitive abilities.

Source: Catterall, J. S., Chapleau, R., & Iwanaga, J. (2008). Involvement in the arts and human development: General involvement and intensive involvement in music and theatre arts. *Champions of Change, 1*, 1-18.

IV. Major Point 3: Music and the Mind.

A. Minor Point 1: Learning music in childhood enhances the basic structure of the brain.
B. Minor Point 2: Learning music in childhood improves the plasticity of the brain.

Source: Johansson, B. B. (2009). Music and brain plasticity. *European Review, 14*(1), 49.

V. Major Point 4: Music and Public Education.

A. Minor Point 1: Federal and economic pressures have harmed fine arts education.
B. Minor Point 2: School administrators and superintendents largely support arts education.

Source: Abril, C. R., & Gault, B. B. (2008). The state of music in secondary schools: The principal's perspective. *Journal of Research in Music Education, 56*(1), 68-81.

VI. Conclusion

A. Restatement of Thesis: The current ideological and financial atmosphere has created a situation in which the arts have fallen by the wayside in schools.
B. Next Steps: Scientific information continues to support the value of music education; music is tied to social and cognitive benefits for children and adolescents; administrators can no longer discount the incredible value of music education.

Adapted from: http://writingcenter.walden.edu/318.htm

In recent years, America has witnessed deep cuts in educational budgets for arts and music. An emphasis in funding based on standardized test scores drives many schools to reallocate resources toward those classes which are tested and away from subjects which are not (Abril & Gault, 2008). This trend was exacerbated by economic downturn at the end of the decade which gave educational institutions even fewer resources to work with. The result thus far has been downsizing or even complete shutdown of fine arts facilities in many public schools. The administrators in charge of these cuts are certainly faced with difficult decisions and it is hard to assign blame for removing services declared non-essential.

However, the degree of truth in this declaration must be brought into question. Significant studies have determined that youth involved in the arts are far more successful in general than students who do not or cannot participate in fine arts programs (Catterall, Chapleau, & Iwanaga, 2008). As the economic situation in the United States becomes more stable again, an evaluation-based educational ideology must not be allowed to suffocate the arts from public schools. Ironically, the defunding and elimination of music education for children actually closes an opportunity for growth, which was shown by Catterall and company (2008) to increase student ability in tested subjects overall. Furthermore, the experience of music is fundamentally important in early child development. The importance of arts education is very clear; it is a field that should be encouraged and funded with excitement rather than one which is placed on the backburner of American society.

Commented [GA1]: Statement of position or thesis.

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Abril, C. R., & Gault, B. M. (2008). The state of music in secondary schools: The principal's perspective. *Journal of Research in Music Education, 56*(1), 68-81.

Catterall, J. S., Chapleau, R., & Iwanaga, J. (2008). Involvement in the arts and human development: General involvement and intensive involvement in music and theatre arts. *Champions of Change, 1*, 1-18.

John A. Student

November 17, 2014

University 101-002

Dr. Angela Vaughan

The Essentiality of Music in Child Development

The Essentiality of Music in Child Development

In recent years, America has witnessed deep cuts in educational budgets for arts and music. An emphasis in funding based on standardized test scores drives many schools to reallocate resources toward those classes which are tested and away from subjects which are not (Abril & Gault, 2008). This trend was exacerbated by economic downturn at the end of the decade which gave educational institutions even fewer resources to work with. The result thus far has been downsizing or even complete shutdown of fine arts facilities in many public schools. The administrators in charge of these cuts are certainly faced with difficult decisions and it is hard to assign blame for removing services declared non-essential.

However, the degree of truth in this declaration must be brought into question. Significant studies have determined that youth involved in the arts are far more successful in general than students who do not or cannot participate in fine arts programs (Catterall, Chapleau, & Iwanaga, 2008). As the economic situation in the United States becomes more stable again, an evaluation-based educational ideology must not be allowed to suffocate the arts from public schools. Ironically, the defunding and elimination of music education for children actually closes an opportunity for growth which was shown by Catterall and company (2008) to increase student ability in tested subjects overall. Furthermore, the experience of music is fundamentally important in early child development. The importance of arts education is very clear; it is a field that should be encouraged and funded with excitement rather than one which is placed on the backburner of American society.

Music in Early Development

The incredible role music plays in the social and mental growth of children is evident even at very young ages. Music educator Paul Morehouse (2013) described the experience of

working with toddler-aged children in what he calls the game of music. During these years of development, it is important to allow children to enjoy music and learn freely rather than placing unfit expectations of aptitude on them. Participating in creative adult-led music making develops an understanding of language, music's structure, and how to interact with both. These fun music lessons connect with and strengthen other curricular objectives that rely on an understanding of structure and language such as literacy, speaking, and mathematics (Morehouse, 2013). The more a child's brain is enabled to develop structural understanding in a fun, captivating environment, the stronger they are in grasping the basic structure of early-level language and math.

The benefits of early music education go beyond early academic success, however. The Western world is full of music; so much that it sometimes goes without notice! In a culture that places such value on music, understanding the common structure of Western music has become a subtle cultural norm. When infants are placed in an active music environment, they become aware of the music system far more quickly than those who are not in active arts education (Trainor, Marie, Gerry, Whiskin, & Unrau, 2012). Trainor and his colleagues go even further to attribute these musical experiences with an improved level of social success; the children who actively participate in music learn to be part of a group, have fun, and develop many pro-social characteristics. Even before children can truly grasp that they are making music, the effect that it has on their lives is significant, measurable, and multi-faceted.

Music in Adolescence

The positive effects of music education can be observed not only in very early childhood, but also in later years of a student's formal education (Catterall et al., 2008). Arts involvement is tied to levels of success far above those of non-involved students. Students with high levels of

involvement in music and performing arts were found to have 15 to 20% more A's and B's in English classes, and were also nearly 18 percent more likely to perform in the top two quartiles of standardized testing. These statistics held true in check-in points throughout the higher educational process, namely the eighth, tenth, and twelfth grades. These results are highly significant, and are a large enough differentiation to theorize potential causation between participation in the arts and academic success. However, not all who support music education believe there is enough scientific proof to tie music and other academics together, nor do they believe music should be forced to justify itself by these other subjects (Kuzmich, 2010). Kuzmich also points out that often, the children in music classes are those who would be getting good grades anyway. However, further data by Catterall et al. (2008) seems to prove that even in negative circumstances, music helps students to perform better in class.

One of the most interesting elements of Catterall et al.'s (2008) study is the breakdown of statistics from students with a low socioeconomic status. These students are faced with less opportunity and more difficulties in daily life, but when given opportunities to participate in music education, their scores are significantly higher as well. While not as large of a gap as in the congregated data, low socioeconomic status students were about 8% more likely to be in higher quartiles than non-music students of the same status on standardized tests. Also, there were 3% fewer dropouts by tenth grade, a substantial increase in retention rates (Catterall et al., 2008). These results are very encouraging for those who participate in music and advocate for arts education in schools, but they do not explain the "why" behind the improvements.

The success of musicians can be attributed largely to the nature of the work that musicianship requires. Arts studies require personal motivation and effort, learned skills that naturally apply themselves to other curricular studies. Performers who "practice a tricky passage

in the solo they are working on, they are not merely improving their solo, [but] developing a high level of concentration that will aid them when they are working on the next algebra problem" (Cole, 2011, p. 27). Cole also described the simultaneous cognitive and spatial processes involved in playing an instrument that enables students of music to also more easily grasp subjects such as geometry. In addition to the outward effects of music, which are tied to the adjustment of a musician's attitude and being able to connect performing music to other school subjects, arts involvement greatly affects the physical structure and development of the mind.

Music and the Mind

One of the most intriguing areas in the study of the importance of music in human development, and especially in the development of successful students, is the study of physical changes in the brain due to the art. The mind of a studious, dedicated musician is far different structurally than a non-musician's (Johansson, 2009). This ability for the brain to change its structure – referred to as brain plasticity – is strongest in early childhood, but continues long into adulthood. Therefore, the auditory, motor, sensory functional, and cortical functional parts of a lifelong musician are organized in far different ways from those who never played an instrument, and are significantly more reorganized than those who begin practicing music as an adult (Johansson, 2009). Music participation, even begun at an adult age, changes the way the brain processes information, redirects and reorganizes neural connections, and increases the physical size of involved mental areas.

When considering a musician's unique skills, "including reading a complex symbolic system (musical notation) and translating it into sequential, bimanual motor activity dependent on multisensory feedback; developing fine motor skills coupled with metric precision; memorizing long musical passages; and improvising within given musical parameter" (Schlaug,

2008), it is hard to not assume that there is a substantial effect on the mind's structure. These assumptions have been wholly backed up by medical research. The same study found the areas of the brain involved with the skills of a musician to have far more gray matter than those of non-musicians, indicating a simple increase in ability of that area of the brain. Both Johansson and Schlaug conducted studies in which the results bolster the evidence of brain plasticity tied to musicianship; it is clear that the human mind benefits greatly from musical training.

Music and Public Education

Public education is a complex system, balancing curriculum, politics, federal regulation, and finance. In the last decade or so, the opinions on how to balance these factors have created a negative atmosphere toward the arts in the far-off land of high-level school administration, where 51% of fine arts curriculum decisions are made (Abril & Gault, 2008). The effect of policies such as No Child Left Behind has been to completely shift the emphasis of education systems away from a truly liberal education, and place emphasis only on those tested subjects. Though opinions may vary on the success and value of No Child Left Behind, it is undeniable that there has been significant impact in the fine arts due to the law. Government funding for public schools is directly tied to math, reading, and writing; creating a system which nearly incentivizes the reallocation of funds from extracurricular activities such as music to the tested core subjects. The situation only became worse as the economy began to go into a downturn in 2008, and school budgets were cut nationwide. Funding for non-tested subjects came under fire first due to the lack of financial accountability placed outside of testing (Beveridge, 2009). From the perspective of school administrators, government funding must be first priority due to NCLB assessments; however, at the lower levels, the importance of the fine arts has not been forgotten.

Contrary to the previous portrayal of administration, there is very strong support for the arts from local administrators in schools. An Illinois study showed that 94% of principals and 92% of superintendents believe arts to be incredibly vital to the educational process (Abril & Gault, 2008). There are many various groups and a majority who support the continued music education of American students. Even the number of recent studies supporting a connection between arts and student success shows a broad cultural involvement in the issue of cut music programs. The aforementioned benefits of music education are being brought to the forefront of more study and more discussion, and it is only a matter of time before there is a revival of pride in the arts as a key supplement to conventional subjects, and further yet as a standalone subject worth funding.

Conclusion

The current ideological and financial atmosphere has created a situation in which the arts have fallen by the wayside in schools (Abril & Gault, 2008). Even for those who do not believe there is substantive evidence connecting music and other subjects, it is very sad to see music education be cut from curricula (Kuzmich, 2010). However, the vast amount of scientific information tying the arts to educational success overall is bringing support for a renaissance. The art of music, from a very young age, is essential to the development of a healthy human mind. Music ties people together, creating social wellness. Music exercises the brain, creating mental wellness. Music creates better human beings, resulting in societal wellness. As studies bolster public opinion favoring music education, it is only a matter of time before administrators can no longer discount the incredible value of music education, both in their standardized goals and in-and-of itself; music education will come back full-force, even if it does require an investment before school boards see the returns.

References

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Purpose: To provide individual support and feedback to aid in successful completion of the research project. The ultimate goal is to aid in developing your research skills (e.g. finding sources, writing, presenting) to be effective in future research endeavors.

Do's:

- Come on time and prepared with specific questions for your instructor.
    - Bring these in writing to your meeting.
- Read all prior instructor feedback before coming to your meeting.
- Bring your most current draft/feedback with you to the meeting via hard copy or laptop.
- Use the time to get support in an area that you are having or anticipate having difficulty.
- Tell the instructor what you are planning to address in your meeting beforehand in person or via email so that he/she can be best prepared assist you.

Don'ts:

- Do not skip your meeting.
- Do not come unprepared or expect the instructor to create the agenda for your meeting.
- Do not wait until the last minute to prepare.

Examples of Areas for Support:

- Assistance in narrowing your topic and creating a clear, effective thesis statement.
- Finding peer-reviewed sources.
- Assistance in organizing and structuring your paper.
- Getting more in-depth feedback on your introduction/outline/draft.
- Help with developing or delivering your presentation.

Grading: This meeting is graded as complete or incomplete. If you attend your meeting and are prepared, you will receive full credit (100%). If you come to the meeting unprepared, you will lose 50%. If you miss your meeting and do not reschedule beforehand, you will receive no credit (Note: rescheduling depends on instructor availability). The instructor also reserves the right to refuse to reschedule after 2 cancellations/no shows.

Creating Your Poster for Research Night

What is the purpose of the poster?

- Your poster is meant to be a visually engaging summary of your entire research paper, designed for others to briefly learn about your research.
  - You want to prepare the poster as a supplement to your 'elevator pitch' – about a 3-minute speech detailing the main points of your research. Simultaneously, you want the poster to give enough information that if you were absent, someone could still read the poster and understand your research.

You MUST include:

- The title of your research
- An introduction to your research question (the purpose of your research)
- The main points of your paper which contribute to your question/purpose (including in-text citations)
- A reference page

Organization and Visual Appeal

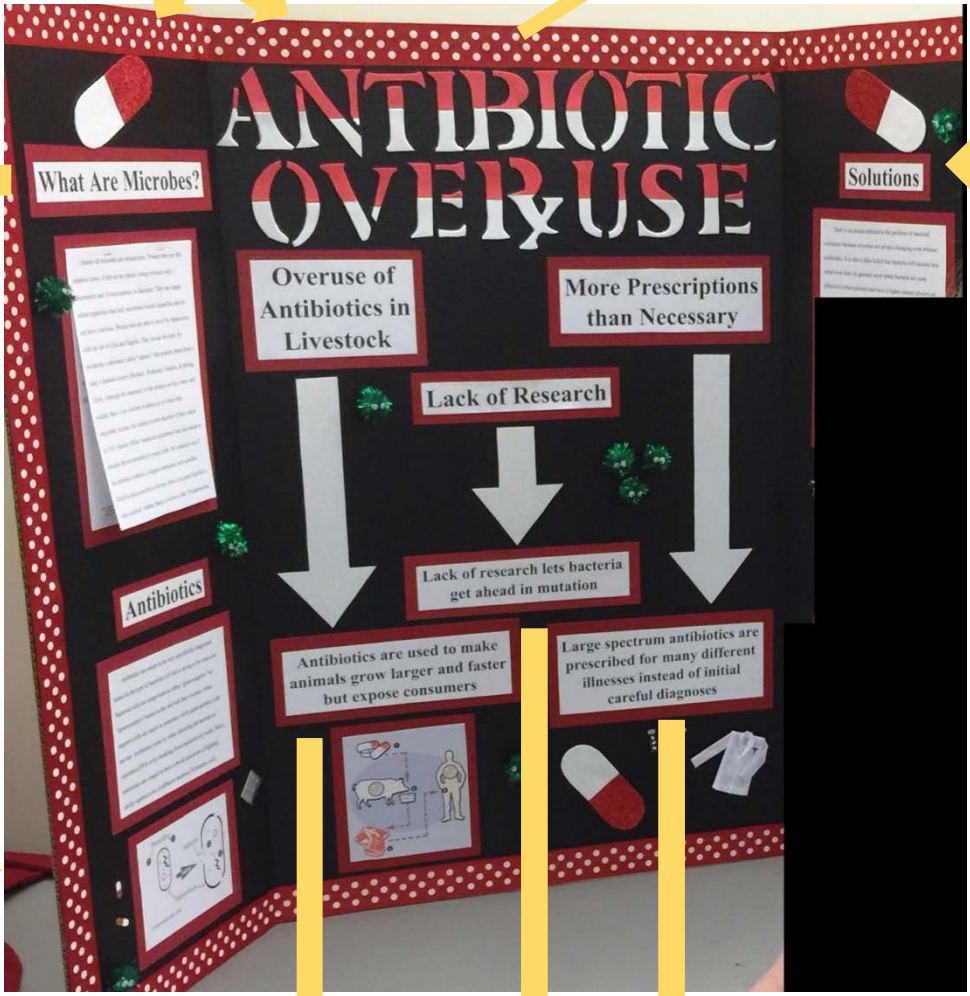
- You want your poster to be well organized and eye-catching.
  - Print and paste/glue/tape your sections to the board. Handwriting can look sloppy on a poster and may be difficult to read. Be thoughtful of the font and sizing you use to draw attention to important concepts while avoiding unnecessary distraction.
  - Utilize color and borders. Using a colored poster board or backing different sections with a colorful border draws the eye to different areas of the board and contributes to visual organization.
  - Use pictures, diagrams, and other visuals to aid audience interest and understanding. Make sure all visuals connect to the poster content!
  - Add decorations where appropriate. Don't be afraid to add personal flair to your board, just be sure to limit the amount to maintain a professional look!

FINALLY: Refer to the Research Night Rubric in your Research Project supplement for all requirements pertaining to the grading of your poster. This document is meant to be a starting point, and does not specifically list all poster requirements and grading criteria.

Example 1:

Visual appeal: Eye-catching color and decorations

Title



Your proposed solution/conclusion

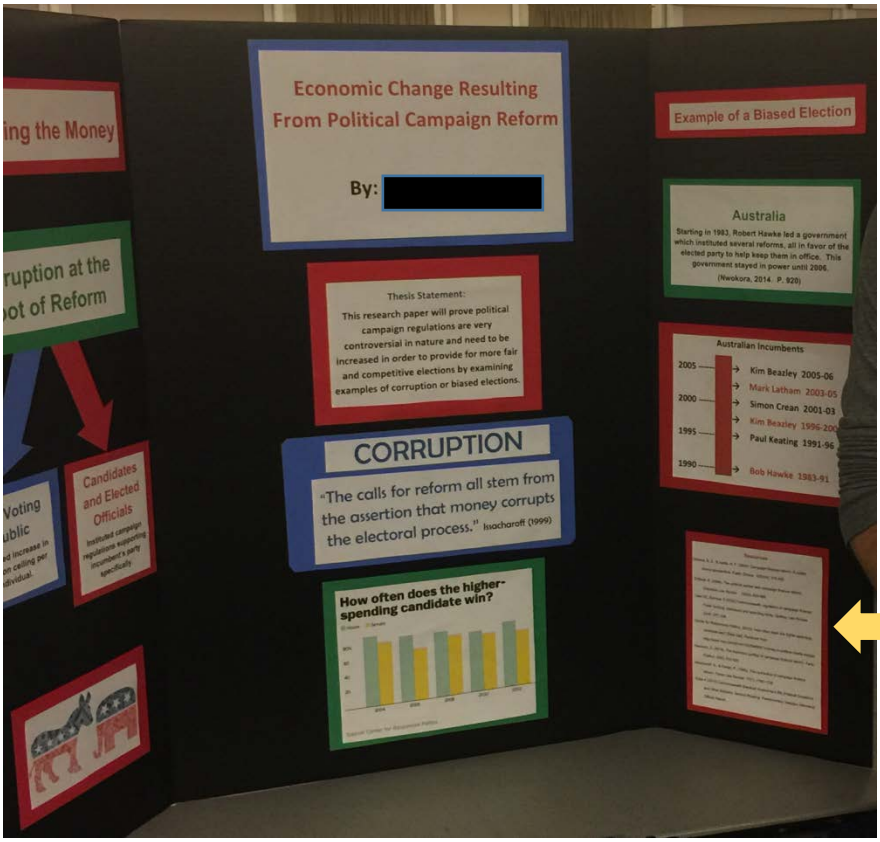
Introduce content

Visual diagram/ pictures

Supporting argument and main point(s)

Example 2:

In the example below, the presenter has utilized bold colors, print, and visuals to create a poster that draws the audience in. The text chosen is sparing and supports the main points of the research.



Reference page

Example 3: Notice how this poster utilizes a powerful quote citing statistics on the research content, with the presenter making specific statistics bold and larger to draw the audience's attention.

Research Night:
What to Expect and How to Participate

Preparing and Checking In:

- Dress business casual for the evening – this is a professional development experience and you want to present yourself as a professional.
- DON'T FORGET YOUR POSTER!
- Make sure to sign in at the front table when you arrive to confirm your attendance at research night.

Your Poster Presentation:

- Arrive early and have your poster ready to present prior to session time. When the session starts, be prepared to engage with other students, instructors, and judges who may approach your poster. To engage with these individuals:
  - Introduce yourself! Shake hands and tell the individual(s) your name and your poster topic.
  - Tell them about your research. Give a brief introduction of what you researched and why, what you found, what solutions you believe are available (if any), and any other information you find interesting. You want this to be a **3-minute** 'elevator pitch' (planning what you will say as if you only have a minute or two to give this person an overview of the most important details).
  - Ask the audience if they have any questions or thoughts. Your learning and others' can be enriched when ideas and understanding are shared.

Viewing Other Posters:

- When you are not presenting your own research, you will be required to look at your peers' research posters. To ensure a successful experience for your peers who will be presenting their posters, follow these guidelines:
  - Be kind and friendly! This is likely a new experience for most students, and your encouragement goes a long way.
  - Allow students to tell you about their poster before bombarding them with questions. Many of your questions may be answered in the process of the

presentation, and interrupting your peers throughout their presentation may make it more difficult for them to tell you everything they hope to relay!

— Ask any remaining questions. As part of your project grade, you will be required to share what you learned as a participant.

- Don't wander aimlessly or avoid participating. Everyone has worked hard to prepare their research for this night, and it is a waste of effort for a student who has no audience! You may feel avoidant and shy, but remember, the presenter will be doing most of the talking. Your job is to listen and provide engaged feedback.

How are you Graded?

- For your own poster presentation, a University 101 instructor will come to your poster and grade your presentation to him/her using a grading rubric. The rubric is included with your research project supplement.

- For your participation in viewing other research posters, you will be required to fill out a form detailing some of the information you learned from several different posters. This form will be given to you at research night. You will turn it in at the end of the evening for participation points.

Draft Outline

	4	3	2	1	0	Total Pts
Introduction	Includes an overview of the current problem or issue, the area of focus or population, key terms and a clear thesis statement	One of the required items is missing or is not clear	Two of the required items are missing or are not clear	Three of the required items are missing or are not clear	Overview is not included	
Main Points	Provides 3 or more major points that support the thesis/purpose and are relevant to the broader project	Provides 3 or more major points, but they are not consistent OR are not relevant to the broader project	Provides only 2 major points	Provides only 1 major point	Major points are not included	
Minor Points	Provides 2-3 minor points for each major point that are relevant to the broader project	Provides 2-3 minor points for each major point, but they are not all relevant to the broader project	Minor points are not provided for all major points, but those that are included are relevant to the broader project	Minor points are not provided for all major points, and those that are included appear irrelevant to the broader project	No minor points are included	
Conclusion	Provides brief review of next steps and a clear restatement of thesis	Provides both items but one is not clear	Provides both items but both are not clear	One item is missing	Conclusion is not included	
Citations	Provides 3 or more citations from peer-reviewed journals, and clearly tried attempting APA style	Provides 3 or more citations, but not all are from peer-reviewed journals, OR APA style is not attempted	Provides only 2 citations	Provides only 1 citation	Citations are not included	
					Total Points	

Draft Introduction

Strongly Agree 5	4	3	2	**Strongly Disagree** 1	
Interest: Introduction generates interest and explains the importance of the topic. Comments:					
Statement of Purpose or Thesis: Statement of purpose or thesis is included. Clearly provides direction for the paper. Comments:					
Source: At least one peer-reviewed source is cited within the introduction. A reference page is included. APA style is attempted. Comments:					
Paper Mechanics, Format and Length: Contains very few or no errors in conventions and demonstrates an excellent command of the language. Paper follows the required format: typed, 12- point font with 1-inch margins. The introduction is at least half a page. Comments:					
				TOTAL SCORE	

Draft Paper

Strongly Agree 5	4	3	2	**Strongly Disagree** 1	**WT**	**Pts**
Cover Page: A cover page is included and is the same as the given example. Comments:					X1	
Sources: At least six peer-reviewed sources are cited throughout the paper. Citing in APA style is attempted. Comments:					X2	
Reference Page: A reference page is included listing all of the sources used in the paper and APA style is clearly attempted. Comments:					X2	
Length: The paper is 5 complete pages of text. Comments:					X3	
					TOTAL SCORE	

Final Paper

Category	4 - 3.1 points	3 - 2.1 points	2 - 1.1 points	1 - 0 points	Weight	Points
Statement of Purpose	There is a clear and direct statement of purpose in the introduction which matches the information in the body of the paper.	There is a statement of purpose in the introduction that lacks some clarity AND/OR the statement of purpose does not fully match the information in the body of the paper.	There is a statement of purpose in the introduction that is vague and unclear AND/OR there is little match between the statement of purpose and the information in the body of the paper.	There is no clear statement of purpose in the introduction of the paper AND/OR there is very little to no match between a statement of purpose and the information in the body of the paper.	X3	
Content	The body of the paper effectively utilizes research findings to support the thesis statement.	The body of the paper utilizes some research to support the thesis statement.	The body of the paper utilizes little research to support the thesis statement.	The body of the paper does not utilize research to support the thesis statement.	X4.5	
Organization	Well-developed paper with a strong introduction and conclusion and effective transitions.	Generally well organized with an adequate introduction and conclusion. Transitions are well managed.	Includes an introduction, conclusion, and transitions; however, they are weak or too brief.	Any or all of introduction, conclusion, and transitions are missing.	X3	
Length Requirement	Paper is at least 5 pages of double-spaced written text.	Paper is 3 to 4 pages of double-spaced written text.	Paper is 1 to 2 pages of double-spaced written text.	Paper is less than 1 page of double-spaced written text.	X2	
APA Style: Reference Page Accuracy	All references are listed correctly in APA style.	1 – 2 errors or only 1 – 2 type of errors repeated.	3 – 4 errors or 3 – 4 types of errors repeated.	5+ errors or 5+ types of errors repeated.	X1	
APA Style: In-Text Citations Accuracy	All in-text citations are in APA style.	About three-quarters of in-text citations are in APA style.	About one-half of in-text citations are in APA style.	Paper does not include in-text citations or less than half are in APA style.	X1	
Writing Conventions: Grammar/ Spelling/ Punctuation	Paper is essentially error free.	The mechanical and usage errors do not interfere with meaning.	There are repeated weaknesses in mechanics and usage, a pattern of flaws that begins to interfere with meaning.	Mechanical and usage errors are so severe that writer's ideas are hidden.	X1	
References	Paper includes at least 6 peer-reviewed references published within the last 10 years.	Paper includes at least 4 to 5 peer-reviewed references published within the last 10 years.	Paper includes at least 2 to 3 peer-reviewed references published within the last 10 years.	Paper includes at least 0 to 1 peer-reviewed references published within the last 10 years.	X1	
Format & Cover Page	Paper follows all format requirements.	Paper does not follow at least 1 format requirement.	Paper does not follow at least 2 format requirements.	Paper is typed but does not follow any other format requirements.	X1	
					Total Points =	

Poster Presentation and Participation

Category	5 (Excellent) ←	→ 1 (Poor)	Weight	Points
Visual Creativity and Appeal	• Engaging graphics are included • Visually appealing, lacks clutter • Artistic style enhances content • Use of color draws eye to poster	• Not visually appealing, cluttered • Graphics are plain and/or not connected to content • Use of font size is inconsistent, distracting • Black/white with little or no ability to engage the viewer	X1	
Visual Organization	• Discrete sections promote readability and are deliberately placed • Content is ordered in a linear and intentional manner • Organization reflects clear and concise presentation of material/content	• No discernible organization • Content is muddled, incomplete, and/or unreadable	X1	
Content	• Clear statement of purpose • Clear in-text citations and reference page • Major points evident and effectively contribute to purpose	• Unclear statement of purpose • Limited/missing citations and/or missing reference page • Major points not evident and/or do not effectively contribute to purpose	X1	
Professionalism and Presentation	• Presentation flows logically and concisely, clearly practiced • Professionalism is demonstrated through eye contact, clear voice, confidence and enthusiasm • Dressed appropriately	• Presentation is confusing, clearly not practiced • Professionalism is lacking in posture, elocution and/or dress	X2	
Participation	• Form was complete • Responses were thoughtful	• Form was not complete • Responses were limited	X1	
			Total Points =	