Use of Student Self Evaluations to Reinforce the Project Control Cycle

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Abstract
When attempting to teach the project control cycle, the importance of 'evaluate' is difficult to convey to students yet is critical to students' academic and professional success. This paper represents a qualitative case study conducted with freshman construction management students to convey the importance of evaluating project performance – regardless if the project was a success or not. According to the course textbook, the hardest step of the project control cycle to implement is the last step of document, report and evaluate. Of these, the evaluation portion is even more difficult for a team to accomplish. In order to instill in students early in their degree program the importance of evaluation both to their academic and professional success, an assignment was developed and implemented with students enrolled in an introductory construction management course. Participation in this assignment was optional. Out of 110 students enrolled in the course, 52 completed the optional assignment. Thematic analysis was conducted on a sample of the students' papers. The preliminary results provide insight into students' evaluation of their success during their first semester, which is a critical semester in students' college careers.

Introduction

Project Control is an interactive process in which actual performance is compared to planned performance with adjustment(s) being made to address identified deviations[3].The project control cycle has seven basic steps: (1) develop project plan, (2) establish benchmarks, (3) monitor project performance, (4) identify deviations, (5) evaluate corrective options, (6) make adjustment, and (7) document, report and evaluate[4]. When attempting to teach this project control cycle, the importance of 'evaluate' can be difficult to convey to students. Interestingly, the importance of evaluation to successful management of a construction project is very similar to the importance of self-evaluation to students' academic success, especially during their first year of college[7].

During their first year of college, students are faced with many changes that they are often not equipped to handle[2]. Students' academic success often depends on how successfully and quickly they learn to navigate these changes during their first year of college[6,8]. The development of self-reflections skills has been identified as a significant contributor to both their academic and professional success[7]. However, it is often assumed that students will learn these skills while in college and that no specific instruction is needed in this area[1]. This is simply not the case for many students, which means instructors need to identify ways to incorporate opportunities for development of self-reflection skills into their course work[7]. Self-assessment is a technique of self-reflection that is an important skill for students to develop to be successful in academics beyond[7]. This is especially true for construction management students who will be tasked with regular evaluation of both their individual and their teams' success in the management of construction processes[4]. This can be a challenging addition to many course due to other competing purposes set forth for the course. However, an introductory construction management

course provides an excellent opportunity to combine course objectives with facilitating development of students' self-reflection skills through discussion of the project control cycle.

Particularly, this paper represents a qualitative case study conducted with first year students enrolled in CON 101: Introduction to Construction Management on how to convey the importance of evaluating project performance – regardless if the project was a success or not – and facilitate development of their self-assessment skills. The purpose of the introductory course is to provide students with a fundamental understanding of the construction industry including: different industry sectors, different career paths, and the fundamental skills need to design, estimate, plan, and build a construction project. The project control cycle is taught as part of 'building a construction project' under the subheading 'monitoring project performance'. As stated by the author of the course textbook, the hardest step of the project control cycle to implement is the last step of document, report and evaluate[2]. Of these, the evaluation portion is even more difficult for a team to accomplish.

Evaluating means to identify and share information about what worked and what did not work during the project[4]. Throughout the course, analogies are made between the successful management of a construction project and an individual student's successful completion of their construction management degree requirements. For example, one of the determinants of success for a construction project is how well the resources available to build the project (e.g. money, labor, materials, equipment, and subs) are managed. With respect to a student's degree, their success is also dependent on their successful utilization of their resources.

Similar to construction, students have limited funds to cover their schooling expenses and living expenses. They have limited time for work, classes, studying, and socializing. In order to instill in students early in their degree program the importance of evaluation both to construction management and to their individual success, an assignment was developed and implemented with students enrolled in CON 101. This assignment was optional and non-graded to encourage students to provide honest evaluations of their performance over the semester. Students did receive extra credit points for completing the paper, although these points were not a significant portion of their final grade. Students also were given the opportunity to complete an optional assignment if they needed the extra credit points but did not want to do the self-evaluation. Only two students who completed the extra credit assignment choose the alternative option.

In the context of their education, students were asked to treat their performance during the semester as a project they would evaluate. Each student wrote a 1-2 page paper summarizing their evaluation. The instructions given to the students included the following:

- Write a 1-2 page analysis either of your performance in a particular course or your overall performance in all your courses.
- Identify the things that went well for you this semester and the things you can improve upon for next semester.
- Discuss your original goals, deviations from those goals, and corrective actions taken and the outcomes.
- Identify key lessons learned.

This paper presents the lessons learned by students through their self-evaluations and highlights common themes that emerged in the sample set of the students' self-evaluations.

Analysis Approach

Sampling

A total of 52 papers were submitted. A stratified sample of 12 papers was selected, based on student's final grade in the course, for coding. The distribution of students electing to complete the optional assignment was fairly evenly spread throughout the course based on final grade, with one exception as shown in Table 1. Only one student received a D for the semester, and this student did not complete the assignment.

Table 1. Distribution final course grade and papers selected for coding.

Final Grade in Course	Total	Completed Papers	Selected Papers
A	62	32	5
B	35	16	3
C	6	3	3
D	1	0	n/a
F	4	1	1
Total	110	52	12
Average Semester Grade	88.67%	90.00%	85.22%

Selections were based on students' final grade for the course. The top middle and bottom students' papers were selected from both the A and B categories. Since only three C students submitted the assignment, all three of these were included for coding. Last, only one paper was submitted from a student who earned an F for the semester – this paper was also included. The average course grade for students who completed the optional assignment was 90% compared to 88.67% for all students enrolled in the course. The average course grade for the selected papers for coding is 85.22%, slightly lower than both the overall class average and the average for students who completed the optional assignment. The reason for this discrepancy is the stratification of the sample selection process which ensured that the sample papers represented the full grade spectrum.

Coding Process

Initial codes were developed based on the textbook material related to *Monitoring Project Performance,* and the project control cycle as identified in Construction Management Jump Start[4, 5]. As mentioned above, the project control cycle has seven basic steps[4]. Since the purpose of this optional assignment was for students to apply Step 7 – Document, Report and Evaluate – to their performance as a student, the material from the textbook was used to identify initial codes for coding the students' papers (Table 2). The 'number of papers' in Table 2 refers to the number of papers that addressed each of the primary codes. The 'number of references' refers to the total number of references made to each primary code in the students' papers. For example, one paper might reference performance impacts multiple times.

Table 2. Primary codes used to analyze students' papers.

Primary Codes	Number of Papers	Number of References

Goal	11	27
Deviation Identified	5	9
Performance Impact	6	14
Evaluate/Assessment	10	17
Action Taken	11	28
Document or Reporting	1	1
Lessons Learned	11	36

Each primary code category included a number of sub-codes[5]. For example, the sub-codes for 'Performance Impact' are 'work', 'family or personal issue', 'course load', 'laziness', 'lack of preparation', and 'financial'. These sub codes were initially developed when identifying the primary codes but were expanded during actual coding to ensure they reflected the information contained in the students' papers[5].

Results

This section introduces the preliminary results for each of the primary codes used to analyze the sample of students' papers. As indicated above, the overall semester average for the students completing the assignment was higher than the semester average for the course suggesting that the motivation for students to complete the assignment was not related to improvement in their course grade.

Goal

To facilitate evaluation, it is necessary to establish what the students' goals were for their project. The most common goal identified was to meet a target grade. The second most common goal identified was time management. Interestingly, one student identified better management of his finances as a goal. Another student acknowledge that he had never set an academic goal for himself. Other goals mentioned included: attend class, turn in assignments, reduce procrastination, and better study habits. One student did not identify a goal. Below are example goals identified by students:

> "*My original goal was to continue to work and still be a week ahead of each of the deadlines. …"* Student #12
>
> "*The goals I had in mind were to have better study habits, attend class more, and to reduce my tendency to procrastinate."* Student #8
>
> "*I made very realistic academic goals for myself … except these goals were the first that I have ever had academically."* Student #7
>
> *"…I have made it a goal to read and keep up in class and just try to do my best…"* Student #11
>
> *"… to make sure that at a bare minimum I would be getting a B in every class that I took, while striving for an A in a couple of them."* Student #9

Overall, the goals identified by the students tended to be general and ambiguous. While goal setting and identification of benchmarks for a construction project are discussed throughout the semester, it is clear that students need more guidance on setting goals for themselves. This result

is likely due to a backward looking approach and could be improved with clearer guidance on goal setting earlier in the semester.

Deviations Identified

Fewer students clearly identified deviations in their performance compared to their goals. In class, it was discussed that a deviation included both 'not meeting a goal' and/or 'surpassing a goal'. For example, on a construction project, a work item can be behind, ahead or on-schedule. Only the on-schedule options would not be a deviation while the 'behind schedule' and 'ahead-of-schedule' options would both represent deviations from the original goal. The 'behind schedule' option would represent a negative deviation and the 'ahead-of-schedule' option would represent a positive deviation. The deviations that were identified by the students included grade, time and organization deviations. Of these, grade deviations were mentioned the most often, which would be expected due to the high number of students who identified meeting a specific grade as their initial goal. Below are student examples:

> *"… and here I am with a dwindling 2.7 [GPA]."* Student #7
>
> *"…find that I was actually off track in terms of grades, where I would have less of a grade than I was hoping for."* Student #9
>
> *"I struggled keeping up with the workload at first, and felt lost as to how I was to manage my time the best possible way."* Student #6
>
> *"The participation in class is probably the area which requires the most work as of now."* Student #2

Deviations identified by students tended to only focus on negative deviations with the exception of one student:

> *"I succeeded for the first two weeks…"* Student #12

By not acknowledging situations where no deviation existed, or where there was a positive deviation, students as missing an opportunity in their self-evaluation to positively reinforce for themselves those areas in which they are being successful and/or excelling.

Performance Impact

The performance impact most often identified by the students were family or personal issues. For example, one student identified health issues which impacted the amount of time and effort he could devote to his course work:

> *"...I did worse this semester because I ended up dealing with some serious health issues and missed almost a week of consecutive classes…"* Student #8

Unexpectedly, many of the performance impacts identified by the students represented poor choices on their behalf. For example, laziness, choosing not to attend class, or choosing to spend time with friends:

> *"I have no problem doing homework but when my friends get involved it is a problem and … I got side tracked from a lot..."* Student #11
>
> *"The biggest reason that I'm not on track with my goals is simple to state but hard to fix, it's the flaw that I hate the most in humans and that I hate the most in myself – laziness."* Student #7

> *"I was too satisfied with the effort I had been putting into then. So I decided I would take a day off … one day off became two… on the third day I looked at my schedule and decided that I could miss one or two more classes … eventually I found out that I had missed a test …"* Student #10

Other impacts identified by the students included their course load and organization. Interestingly, none of the students specifically identified conflicting time demands, such as working and attending college at the same time, as a performance impact. This is likely due to the sample size utilized for this preliminary analysis.

Evaluate/Assessment

While almost no students identified the lack of a deviation, or the existence of a positive deviation early on, the majority of students indicated that they either met or exceeded their goal(s):

> *"As the semester is coming to an end I can say I will have the best grades I've ever earned at [college]."* Student #4

> *"When putting more time, effort, increased enthusiasm, and a set of new goals, my writing skills dramatically improved, as well as my grades"* Student #5

> *"The grades in my courses for this semester have been a mirror of that improvement."* Student #8

This finding points to the effectiveness of the corrective actions taken by students to address the negative deviations identified. Additionally, while students often missed the opportunity to reinforce their success earlier in the semester (by identifying no or positive deviations), they were very good at acknowledging when they successfully addressed the negative deviations identified.

Action Taken

The actions taken by students, along with the lessons learned, where the two areas the received the most attention in the papers. In total, students identified 14 different actions utilized to address any identified negative deviations. These actions ranged from better time management, to utilizing the library, to changes in study habits, to meeting with professors, to setting boundaries with friends. Those actions that were mentioned the most were time management, meeting with professor, change in study habits, and attending class. None of the students mentioned utilizing any of the time management workshops or other programs provided by the University to assist them with improving their academic performance. This result suggests an underutilization of available resources by the students. It is not clear if this is due to a lack of awareness of the programs or an unwillingness to utilize these programs.

Document or Reporting

Only one student clearly stated his process for document his progress in meeting his goal(s):

> *"…then go in and meet with teachers about test grades and just double check that what I had matched their records as well…"* Student #11

Clearly, identifying the importance of actively documenting progress relative to a goal was missed by the majority of students in the sample group. As a result, the

importance and process for documenting represents another opportunity for significant improvement in developing students' self-assessment skills.

Lessons Learned

Lessons learned had the highest number of references among the coding categories (see Table 2). Students were very honest in the lessons they culled from reflecting back onto their performance during the semester. The lessons learned ranged from how changes in their behaviors impacted their academic performance to changes in their perceptions of other. For example one student noted the importance of participating in class discussions:

> *"I will benefit more if I contribute more participation to class discussions."* Student #2

Others identified the lesson learned relating to relationships:

> *"…personal relationships are key to success…"* Student #1

Others learned how their own behaviors and attitudes had impacted them during the semester:

> *"I realized my attitude and approach were flawed."* Student #5

> *"I was my own worst enemy this year, sabotaging myself every chance I got."* Student #7

Others identified the importance of fundamental requirements for being a successful student:

> *"Even if attendance is not required by the professor, I will require it of myself."* Student #10

> *"…reading the material and matching that [to what] the teacher teaches in class will [lead to] better understanding of the material"* Student #11

> *"I know that I now have the healthy habit of attending class…"* Student #8

> *"As I took more time in clearly understanding the prompt, my critical thinking and reading skills improved. … it was a night and day difference and I received the grades I worked for."* Student #5

Another student identified the importance of the self-reflection process as his lesson learned:

> *"I have learned that debriefing, like this one, helps you realize what has worked and what hasn't and will try to utilize this tool in my studies"* Student #13

A few key themes emerged from the analysis of the students' papers. First, students were motived to take responsibility for their performance. It was expected that students would tend to blame things beyond their control for deviations in their performance. Instead, students were very upfront and honest with their evaluations of their performance. Second, numerous students identified a lack of fundamental academic skills that are necessary for success in college. These

included attending class, reading assigned course materials, allowing ample time for homework, participating in class discussions, and meeting with professors outside of class to either review performance on exams/assignments or to ensure that their grade was recorded correctly. Other themes emerged around setting goals. The vast majority of goals identified by students were very broad and general, highlighting that the students need guidance on goal setting. By identifying more specific goals early in the semester, they will be better able to track their progress relative to their goals and identify any deviations that need corrective actions. It is expected that additional coding and analysis of the remaining assignments will add more clarity to the range and importance of the themes emerging from this project.

Conclusions

This paper introduces an assignment conducted with first year construction management students to convey the importance of evaluating project performance while also providing an opportunity for students to develop their self-evaluation skills. Overall, the preliminary findings indicate that students are willing to engage in self-evaluation since this assignment was not graded and the extra credit given for the assignment was minimal. Results provide insights into how faculty can support students to be more successful by encouraging self-regulation and optimal use of their resources, which are important skills for both academic and professional success.

While this assignment was successful in getting students to apply the fundamentals of project evaluation to their academic career, much could be gained by making a few changes to the assignment requirements and structure, including the following recommendations:

- The assignment should be introduced early in the semester and followed with mid-semester and end-of semester components. This would allow for students to better clarify and document their academic goals early in the semester. It will also allow for better documentation and reporting of their progress.
- The assignment should emphasize the resources on campus available to students to assist them with development of their time management skills, study skills, test taking skills, and other skills necessary for academic success.

In addition, the cause for students not utilizing campus workshops and resources needs to be further investigated to determine the reasons for this lack of utilization. Finally, due to the small sample size used in this preliminary analysis, trend in students' papers were not compared to differences in demographics, which is recommended when analyzing the entire group of papers.

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