

Earned Value Analysis Lesson Plan and Activity

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At California Polytechnic State University, in the Construction Management Department there is a need for a lesson plan which teaches students the concepts of earned value analysis as it applies to construction projects. As many construction management students from Cal Poly go into industry and take part in complex projects, it will be beneficial to understand project management tools such as earned value. Earned value analysis focuses on two critical components, time and money and how they relate to each other and compare to the original estimate throughout the duration of a project. Comparing the estimated values to actual values during construction provides variables to calculate the schedule performance index and cost performance index. These indexes give an accurate estimate as to if the project is ahead or behind schedule and over or under budget. Understanding how to calculate these values will allow for timely action by the project team to keep projects on schedule and on budget.

Keywords: Earned Value, Cost Performance Index, Schedule Performance Index, Forecasting, Project Management Controls

Introduction

In my experience as a Construction Management Major at California Polytechnic State University, I received a very high level of education, and just as the construction industry constantly strives to improve, the education of construction management department does the same. In deciding a project for my senior project, I knew I enjoy teaching people, so the idea of creating a lesson plan for earned value analysis was a perfect match. During an internship with industry, I was exposed to the project management analysis tool of earned value. I was able to see how the analysis influenced decisions and exposed areas in need of improvement. I quickly learned the value of tracking this data, and its positive impact on a construction project. The next school year, earned value analysis was brought up in a class, but unfortunately, the lecture only covered what earned value analysis is. As earned value analysis is a useful tool in the industry, I saw a need for students to learn not only what earned value analysis is, but also how to calculate earned value and how to apply the analysis to improve a project. My goal was to pass along this knowledge through a lesson plan which includes a lecture and activity.

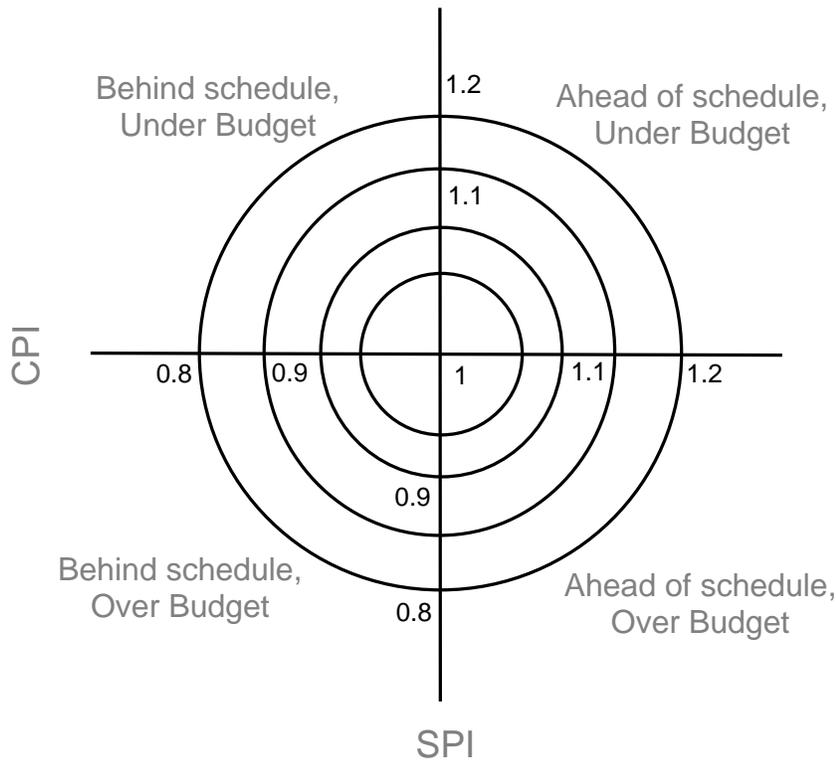
Process

First, I underwent further research to build upon the knowledge I acquired during my internship. Further research uncovered many more aspects of how to use earned value analysis on a construction project, such as better allocation of resources, and labor. With peeling back and uncovering the different layers of earned value analysis, it led to the challenges of creating a lesson plan condense enough to include in a course and figure out what course to include it in. After discussion with Construction Management Faculty, the courses were

narrowed down the Jobsite Management course or the Construction Accounting course for which would be the best fit for the addition of an earned value lesson plan. Personally, I wanted to give students a better understanding of how to calculate and apply the analysis in the field, so the Jobsite Management course fit best.

After the decision to include the lesson plan into the Jobsite Management Course, came the creation of a presentation. With the creation of a presentation the challenge of making a lesson plan condense enough to fit into the already busy course work presented itself. I think the most important concept of the earned value analysis topic are the cost performance index, the schedule performance index, and the graphic representation of the two together.

Next, I created an activity for the class to perform after the lecture. Since this lesson plan is meant to be included into the Jobsite management course, I incorporated the Simpson Strong Tie class project into the activity having each student apply their assigned subcontractor to the exercise. This activity underwent many iterations, adapting to student learning. The addition of graphic representation of the calculations was found most helpful in understanding the concept of earned value. The graph below is not the most common graph used to teach earned value, but its use of ratios to display relationships compared to variances is much easier to understand.



Deliverables

With this project I was able to create a presentation explaining what earned value analysis is, why it is important, how to calculate values, and how to analyze the values to make project management decisions. I also created an activity applying to the Jobsite Management class's Simpson Strong Tie project, which lets the students do earned value calculations, graph their calculations, and analyze their findings. It is my hope, after completing this exercise students will be knowledgeable on the topic, and use this knowledge to make educated decisions in their future careers.

Lessons Learned

Throughout this project I ran into many challenges, some expected and some unexpected. Originally, I was unsure if I could come up with enough content to make a lesson plan, but I shortly found out the challenge was there was too much content I wanted to include. Earned value is very interesting to myself, but I realized it is not so interesting to others. Creating a lecture which is both full of valuable content, and also short enough to maintain the student's attention proved difficult. I saw all of the content as important and valuable, but I was forced to pick and choose which content was most important.

Another lesson I learned, was people learn in different ways. The rough draft of my activity included many calculations and questions, but did not include a graph. Including the graph allowed those who learn better with pictures obtain a better understanding of what the numbers mean. In the final draft of the exercise there is a portion dedicated to graphing the calculations made, and then following the graph are questions.

Following the senior project presentations at the gallery, I also learned a lot of teachers have taught or studied earned value in the past and shared unique views on the concept. This goes to show how you look at a concept changes with different perspectives. My own take on earned value was from the perspective of a project team, while other professors shared their views from the owner/client perspective, and preconstruction/estimating perspective. Looking back, I could have received these different perspectives and research by asking the different professors in the department, and it would have diversified my take on earned value as well as save time on research.

Conclusion

This project was successful in completing its goal of creating a lecture and activity on earned value analysis to help improve student's understanding of the topic. There were challenges along the way, which gives me a greater respect for teachers and how they handle these challenges daily. Earned value is applicable to many different classes and as the activity was created specifically for the Jobsite Management course, it may still be used in other courses such as Construction Accounting. Hopefully the Cal Poly Construction Management Department will use or pull from my lecture and exercise in the future, as earned value is a critical topic.