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Real World Projects, Real World Problems: Capstones for External Clients

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Abstract

Capstones form an important part of the curriculum in many undergraduate and graduate programs in Information Systems. These projects give the students a chance to synthesize and apply the skills they have been acquiring throughout their academic program. These projects can be integrated with another recent initiative in higher education: service learning. By turning the capstones into "real-world" projects for external clients, the students can give back to the community while completing a valuable learning experience. However, these real world exercises sometimes take on real world characteristics – like failure. How do we, as professors, guide students through a service learning capstone to completion, despite the external challenges that come with it? How can we evaluate the outcome of these projects, when we know success may not be a part of the final product? The authors draw on personal experience with service learning capstones to address this problem.

Keywords: capstone, service learning, student learning, facilitation

1. INTRODUCTION

Capstone projects are popular at both the undergraduate and graduate level as a way to force students to integrate the information and skills they have learned from the various classes they have taken in their program (Morgan and Aitken, 2006). Some of these capstones take the form of classroom projects that can be more easily controlled by the instructor (Stillman and Peslak, 2009), while others deal with "real world" projects for clients outside the classroom (Scott, 2006, Reinicke and Janicki, 2010).

While classroom projects have the advantage of being easier to control, there is a recent push for service learning at many universities. The 2006 Model Curriculum for Graduate Degree Programs in Information Systems (Gorgone, Gray, Stohr, Valacich, & Wigand, 2006) recommends an integrated capstone experience.

Enhanced learning concepts are moving faculty to steer more students towards real world projects for external clients. These projects can be very rewarding for students and faculty. However, outside projects face the same challenges as those experienced by external organizations. This adds an additional level of complications to the projects for everyone involved, but it also provides some learning opportunities for the students.

Combining the capstone experience with service learning can provide an excellent way to both

expand the students' knowledge of real world issues for systems projects and fulfill the universities push for service to the community (Lenox, 2008).

2. PROBLEMS WITH THE REAL WORLD COMPONENT

Combining service learning with a capstone experience provides a number of opportunities, but it comes with a number of challenges as well. The authors draw on experience with having worked with students on over 40 capstone projects for outside clients. The clients represented a mix of agencies on campus, area non-profits and even some small businesses. The problems that can be encountered in real world projects are numerous. These are some of the most common problems and some solutions for them.

These projects generally take the form of an integrated back end database to meet some reporting and input needs by the client. In some cases the projects need to integrate with existing systems.

The client doesn't know what they want!

Clients don't always know what they need or what they should expect from the system under development. While this is certainly frustrating for the students, it's also very much a real-world problem they will encounter in the work force. Clients in the real world will forget requirements, lack an understanding of technology and occasionally have difficult personalities.

This can serve as an excellent learning opportunity for students. We have frequently walked groups through what they can do with unclear requirements or what they can do with clients to try to crystallize requirements (i.e. prototypes, requirements documentation, asking for additional details on processes, etc.). While this is frustrating for the students, it does force them to actually apply the skills they (should) have learned in their systems analysis and design classes.

This can also pose problems for the professor guiding the project. Clients who are unclear on their requirements can reject systems when they decide that whatever the students produced didn't meet their rather ephemeral requirements. If this happens, we generally hold the students to their design documents. If they built what they said they would, and it works, then they have met the requirement for the capstone. However, a difficulty here is that the client perceives that the students did not meet their needs (even though they did not define them initially), and the reputation and even future hiring from the university may be impacted.

Project creep also occurs. What starts out in the mind of the client and the student tends to grow. This is very real world, but when you are working in a one year or one semester time frame, management of this issue is immensely important.

Budget cuts?

In the real world, projects can be cancelled at any point due to a cut in funding. Even when the systems are being designed and built for free, the agency the students are working for can still find themselves short of funds. Depending on the timing, this can be very disheartening for the students. Especially if it happens early in the project, the students can lose some of their incentive to work on the project. The best approach found here is to tell the students that they'll be graded on the system they produce, and to point out that if they do a good job on it, their system will likely be the first thing implemented when the budget returns.

What do you mean you don't need it anymore?

Occasionally, a client will suddenly realize that they no longer need the system under development. This can happen because of a changing business environment, a change in priorities for the group or because of another initiative within the organization that provides duplicate functionality. Regardless, the students find out that whatever they develop will not be implemented because it's simply no longer of interest to the client.

While this situation can cause despair in the student groups, it can also create problems with the client. If the client no longer needs the system, they have less incentive to work with the students, and the students will require a fair amount of their time. While the authors have not personally experienced this problem with the clients (they are generally very happy to work with the students and understand that this is a learning experience for them), we have certainly seen this problem for the students. Generally speaking, it's good to tell the students that they'll be graded on the system they produce, regardless of the client's intention to implement

it. Also, we have found that running an in depth "post mortem" on the project to find out what the students learned can be very helpful. This can help them focus on what they learned from the project, rather than focusing on the fact that their project will likely never see the light of day.

No one did it before! Where did that come from?

Student projects take time, but they do not operate in a vacuum. While they are working on their projects, the rest of the world continues to generate new systems and business ideas. While a given product or service may not have been available when the project started, it can certainly be there when they are done (or before).

The first author has only had this happen to one project, but it did present some interesting challenges. The student was working with a small business in the area on their idea for a new Internet based business, and midway through the one year project, another website came out that offered everything the business had been planning on offering, along with additional features. In this case, it was pointed out to the student that there are very few markets with only a single company in them – there is always room for competition. The student continued to work on the project, and while the small business ultimately decided not to pursue the opportunity; it was an excellent learning opportunity for the student.

I can't work with this person.

Group dynamics are problematic for every student group, which is also reflective of the real world. The students have to learn how to deal with difficult people, and this is generally something that is not covered in the curriculum. Thus, these projects can serve as a learning opportunity for this skill set.

If the problem is with another student in a group, there are a variety of ways to deal with it. One of the most common complaints in students groups is slacking, but this is something that can be dealt with in the structure of the projects. One solution for this problem is to have the students grade one another on the level of effort that they put into the project. This should constitute enough of the grade to have the students' attention, which provides the instructor with a way to lower the grade for those students who are slacking.

If this conflict is with the client, it poses a larger problem. Again, this is something that the students will have to deal with in the business world, so giving the student guidance here can be helpful. Some ways to deal with this are to encourage the student to find out which way is easiest to deal with the client (phone, e-mail or in person meetings) to try to reduce the friction and to find ways to get the information required with minimal contact. Depending on how bad the situation is, it may be necessary for the faculty member to mediate between the groups, but this should not be the first solution. After all, the students' future boss won't be happy about the fact that they have to mediate between their newest employee and their clients.

The client changed their mind…again!

Just as with any real world project, clients can be fickle. It's not unusual for the client to shift the scope for the project slightly (or greatly) as the students are working on it. While nothing can prevent the client from changing their mind early in the project, you can take steps to minimize the impact on the student teams later on. Specifically, having the students create a project charter or work agreement for the client (an excellent application of something they should have picked up in Systems Analysis and Design) and having the client sign it is a good way to prevent this from becoming an issue.

A word of caution based on experience. It's important to review the document before the students take the document to the client. There seems to be a tendency for the students to assume a great deal with the documents, rather than taking the time to spell out specifics. However, a vague project charter has doomed more than one real world project! The first author has found that going through a draft or two of the document before submitting it to the client to be beneficial, because you can force the students to go to a certain level of detail. The students are then required to keep a copy signed by the client and emphasize to them that this is their contract with the client for the work they need to perform (and will therefore be graded on).

The client wants me to solve world hunger.

With any real world project, the vision for the system can easily outstrip the available resources, and these types of projects are no exception. It's important to set realistic expectations with the client when you, the

professor, are first discussing the project with them. It's also important to prevent "scope creep" from setting in once the students are on the project. Again, one of the most effective ways of avoiding this problem is to create scope documents for the project that are reviewed with the client, and then signed by the client and the students. So long as that documentation is there, and everyone has reviewed it, this problem can be minimized.

However, it has been our experience that some clients will push the students to add features, regardless of the documentation. Again, this is certainly something that they will see in the real world. In these cases, the instructor can remind the students that they will be graded on whether or not their final product fulfills the original scope of the project. If there is time at the end, they can add in the additional features, but in the meantime tell the client that your first priority is to meet the requirements laid out in the scope document. If the client continues to push, it may be necessary for the professor to talk to them directly about what is realistic for a student project.

We have found at times, that clients forget that these are student teams, and not 'for pay' consultants.

Time Allocation and Learning Curve of the Students.

In our situation the students receive only 6 credits over two semesters for the capstone project. For some of the projects this just isn't enough time for the students to learn new concepts of interviewing, design documents, story boarding, database design and implementation and a final production schedule.

This leaves the issue of what happens with 75% completed projects? Do we let the client hanging? The student has graduated!

We manage some of the client expectation by informing them that if the project is not completed by the agreed upon time, the next semester a high power team of students will complete the project.

How long did it take?

This is less an issue for the students than the professor. A common requirement for service learning initiatives is that the time the students spend on the project be tracked and reported to the university. A simple solution for this is to require the students, as part of the project, to submit time sheets.

This can be done either weekly or at the completion of the project. It has been our observation that the students are more accurate and attuned to this requirement if they have a weekly deliverable to turn in. We have also found it's best not to grade them on the number of hours spent; this leads to a rather predictable inflation of the hours spent on the project. Rather, we grade them on turning in a completed time sheet for the group every week and simply make it a small part of their overall grade.

Who will maintain the system?

At the end of the project, one of the questions that must be asked is who will maintain the completed system. This is less a burden for the students than for the professors who are running the class. Generally speaking, this requires some coordination between the faculty and the clients to transition the system to the clients. For our class, following a final presentation by the students at the end of the semester, the faculty member will work with the client to move the files to a server maintained by the client. Following this, it is the client's responsibility to put the system into production and maintain it. The department has a connection with a hosting service that works with nonprofit agencies if they need help with setting up and maintaining the system.

We have worked with the same clients repeatedly, where new student projects are enhancements to or extensions of existing systems completed by students in earlier semesters.

3. CONCLUSIONS

The twin demands of service learning and capstone projects can be combined beneficially, but there are additional challenges associated with combining these efforts. While combining these places additional demands on the students and the faculty responsible for the projects, this combination can provide valuable learning experiences for the students and can expand the university's presence in the community. However failure to manage both the client expectations and student progress may actually hurt the reputation of the university in the community.

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