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Editors

Introducing IT Strategy in an Introductory Course

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Abstract

Professionals working in technology fields face continuing challenges to be involved in the decision making process about how technology is used by organizations rather than just implementing these decisions. Developing skills for thinking and acting strategically are key skills for our students. This has been recognized by the addition of an IS strategy course in the latest revision of the recommended curriculum, but programs have been slow to add this course. This paper investigates introducing learning activities related to IS/IT strategy in an introductory IT course. Including strategy activities throughout the curriculum could provide an alternative or complement to a dedicated strategy course.

Keywords: IT Strategy, Active Learning, Experiential Learning, IS Curriculum, Pedagogy

1. INTRODUCTION

Strategy is a key concept in the IT and IS curricula. The IS 2010 curriculum (IS 2010) recognizes this explicitly with the IS 2010.7 IS Strategy, Management, and Acquisition course that is recommended for all IS Majors and Minors. Strategy is a broad topic and the IS2010.7 course "explores the issues and approaches in managing the information system function in organizations and how the IS function integrate / supports / enables various types of organization capabilities." Another way to consider IT/IS strategy is the IT/IS activities that help a larger organization achieve its goals.

Elements of strategy can also be found in several of the pervasive themes from the IT 2008 curriculum, including "user centeredness and advocacy," "professionalism (life-long learning, professional development, ethics, responsibility)," and "interpersonal skills" (Information Technology 2008).

Despite this, several recent reviews of IS programs have found a limited presence of strategy courses in these programs. Additionally,

a review of the published literature found few examples discussing how strategy is being taught in IS and IT programs. An alternative or complement to a dedicated IS/IT strategy course could be to include strategy throughout the curriculum.

While the IS 2010 curriculum (IS 2010) recommends that the IS 2010.7 course be a capstone course that is "either the last or one of the last courses that students take," it could be useful to introduce these topics earlier in the course of study in preparation for a capstone activity.

This paper will discuss how two strategy activities were included in an introductory IT class in an effort to help students develop a broader view of the IT and IS fields.

2. STRATEGY IN THE CURRICULUM

As discussed in detail in an earlier work (Woods & Howard, 2015), since the adoption of the IS 2010 curriculum, several studies have found limited progress in the addition of the IS2010.7 course to programs offered in the United States.

One early review (Apigan & Gambill, 2010), looking at courses from the preliminary IS 2009 curriculum, found that only 35.4% of the programs reviewed had an IS Strategy, Management, and Acquisition course.

Later reviews of AACSB and ABET accredited programs found similar results with only 29% of 127 AACSB programs reviewed (Bell, Mills, & Fadel) and only 27% of 37 ABET (Feinstein, Longenecker, & Shrestra, 2014) programs having the IS 2010.7 course.

A more recent study (Hwang, Ma, & Wang, 2015) reviewed 2,229 courses in 394 undergraduate IS programs in the United States. This study found that the IS 2010.7 course was only present in 61 (15.5%) of the programs reviewed.

Another study (Mills, Velasquez, & Fadel, 2012) offers a more in-depth analysis of the IS 2010 curriculum, including some discussion about factors affecting adoption of the curriculum.

Some factors that may affect efforts to add a strategy course may include the measured pace of curriculum updates and pressure to reduce the time students need to complete a program resulting in an effort to reduce the number of required courses. An alternative could be to look at including IS/IT strategy topics throughout the curriculum.

3. THE NEED FOR IT STRATEGY

As programs work to update their curriculum and possibly add the IT 2010.7 IS Strategy, Management, and Acquisition course, there is a continuing need to ensure that IS and IT graduates have developed strategy skills. For this discussion, strategy is broadly defined as efforts to develop a high level plan for achieving goals in an uncertain environment. For IS/IT discussions of strategy must be considered in the context of a business or organizations overall strategy.

While the IS 2010 model curriculum was the first to add a required course with a focus on strategy, the topic has appeared in previous model curriculum. A review of IS Curricula (Longenecker, Feinstein, & Clark, 2013) documented the depth of knowledge expected for the skills included in curricula since 1973. Table 1 in Appendix 1 shows skills related to strategy, when they first appeared in a model IS curriculum and the initial and current depth of knowledge

expected for the skill. For the three skills shown, all have been in the model curriculum for over 30 years and the expected depth of knowledge has increased with time.

Stories about the failure of large IT projects are regularly in the press. In-depth analysis of these often identify a disconnect between organizational and IT understanding of the goals of the project as factors contributing to project failure. Understanding how IT efforts support the goals of an organization is a key part of IT strategy, and features in the topics and learning outcomes proposed for the IT 2010.7 course.

The "Beyond IT Failure" blog (http://www.zdnet.com/blog/projectfailures/) regularly features IT project failures with in-depth discussion of factors, including strategy failures, contributing to the project failure. For example, failure of a $30 million ERP (Enterprise Resource Planning) implementation (Krigsman, 2010) offers material for a class discussion or case study.

Discussions of "rogue IT" are another category of IT strategy failures (Krigsman, 2013). The term "rogue IT" refers to staff in an organization developing and/or implementing technology solutions without involving the formal IT staff of an organizations. Rogue IT occurs for many reasons, but often reflects an IT strategy that is not aligned with the larger organization's strategy.

Other evidence for disconnects between IT and organizational strategy can be seen in surveys of IT and organizational leaders. A McKinsey study (Khan & Sikes, 2014) found that "IT has become less effective at enabling business goals." Similarly, CIO Magazine's 2015 State of the CIO survey (CIO Magazine Staff, 2015) finds that 54% of line of business executives "view the IT group as an obstacle to their mission" and that only 43% of business leaders view the IT group as either a business leader or business partner.

In addition to benefitting students in their future professional career, developing strategy skills could also benefit students in other ways. Students can also apply skills related to strategy to career planning, lifelong learning, and professional development since all of these involve planning for achieving a goal in an uncertain environment.
With a clear need for IS/IT students to study strategy, but slow adoption of the IS 2010.7

course from the IS 2010 curriculum, what other approaches might be useful? One idea would be to add IS/IT strategy learning activities throughout the curriculum and build to the desired depth of understanding over the student's career. The remainder of this paper discusses a recent effort to add strategy activities to an introductory IT course.

4. AN OVERVIEW OF THE COURSE

The Computer and Information Technology Department at Miami University offers several degree options. At the bachelor's level, students can earn a degree in Information Technology or a focused degree in Health Information Technology. Several associate degrees are also offered.

Among the core courses for all of the degrees offered are two Introduction to IT courses. Both are three credit courses covering fundamental IT topics. The course discussed in this paper is the second of the two courses. It covers a range of topics including computer architecture, data representation, operating systems, a survey of programing languages, and tools used by IT professionals. It also addresses problem solving in an IT context, including algorithms, analysis, development, and testing.

When considering how to include IT strategy activities in the course, several potential approaches were considered, but in the end it was decided to look at how IT strategy is part of IT problem solving and also to extend the discussion of tools used by IT professionals to include tools with IT strategy applications.

Another consideration was whether to introduce IT strategy as a separate module or to address it throughout the semester. In the end, one IT strategy learning activity was designed to run throughout the semester while the other was designed as a small, standalone group project.

The particular course session where the activities discussed in this paper were implemented was a fully face-to-face class format where the class met for an hour and twenty minutes two times a week. For this session, the initial course enrollment was 20 students, with 17 completing the class.

5. IT STRATEGY CLASSROOM ACTIVITIES

One IT strategy activity was introduced on the first day of class as a daily discussion activity.

The goals of the activity were to get students to engage with looking at technology developments in the world around us, consider how these technology developments could be used to advance the goals of a business or organization and think about what challenges the technology developments might pose for an IT organization.

Each student was randomly assigned a class meeting when they would be responsible for a brief in class discussion. To prepare for the discussion, the student had to find a short article from a reputable online source. The student posted the article in an online discussion forum in the Learning Management System (LMS) being used for the course one week before the scheduled class discussion. In addition to posting a link to the article, the students were asked to comment on why they found the article interesting.

Students were also told that they didn't need to understand all of the details of their articles, but "should understand the main concepts and be interested in learning more about the idea." To help students with finding articles, several example articles and possible sources of articles were provided. In addition, students were encouraged to discuss potential articles with the instructor.

To prepare for the in class discussion, all students were asked to read the posted article before class on the day it was scheduled for discussion and prepare at least one question for the discussion. Article discussions took place at the beginning of class, with the student who posted the article providing a brief introduction and helping the instructor start a discussion.

The discussions were held at the beginning of each class meeting with the exception of two exam days and one day used for project presentations. Scheduling one article discussion per class period meant the activity covered most of the semester. The schedule was adjusted a couple of times during the semester to deal with students who dropped the course and also a class cancellation due to weather.

To follow up on the in class discussion, students were asked to visit the LMS discussion forum where the article was posted and follow up with at least one follow up comment. This could be the question they prepared before class, something new they learned during the discussion, an idea for how the topic could affect

them personally, a question that was not answered in the discussion or a follow up comment on another student post. To assist with the follow up discussion, one student was randomly assigned to take notes on the in class discussion and post a summary to the LMS discussion forum after class.

In total, the three parts of the activity – posting an article, summarizing one discussion, and participating in the LMS discussion forum for all articles – comprised 8% of the total course grade. The components for selecting an article and summarizing a discussion had a fixed number of points, but the grade for commenting on articles was based on the total number and quality of posts a student made. As an added incentive to students, the total possible points included a bonus so that students could potentially earn additional points equal to 2% of the course point total.

Since this was an introductory course with many first year students, the instructor felt that it was important to provide an example so that students would have a clear idea of what was expected of them. To accomplish this, the first discussion, which took place at the beginning of the second week of class, used an article selected by the instructor. A student earned extra credit by volunteering to post the discussion summary.

The other IT strategy activity was introduced near the midpoint of the semester. The goals of this activity were to introduce students to tools and techniques for undertaking balanced evaluations of options and reaching consensus as a group.

This was done through a group activity to look at technology making a difference in the world. The activity was introduced with an in class discussion on the concept of rubrics. An example of developing a rubric for buying a house was used.

In addition to introducing the concept of a rubric, two specific details were also discussed. The need for objective evaluation criteria to provide consistent scores when used by different people was illustrated by discussing a house buying criteria of "good schools." A discussion of what "good schools" meant showed that different people may focus on different aspects of schools. The students eventually identified that an existing state evaluation of schools could be used for a more objective measure.

The second detail that was discussed was weighting criteria in the rubric. The students' initial instinct was to give all criteria the same weight or the same maximum possible score. Use of different weights was illustrated with the house buying example using a criteria evaluating school quality and whether the yard is fenced for a dog. Both are important criteria, but in discussions, students concluded that school quality was more important because it would have a bigger impact and would be harder to change. The class discussed how to reflect this in the overall rubric and settled on giving the school criteria twice the weight of the fence criteria.

For this activity, students were organized into groups of 3 – 4 students for a total of five groups. Each group then met briefly to pick a topic area. To select topics, students were asked to think about a cause that mattered to them and look for how technology could make a different in that area. Examples of topic areas included helping individuals with chronic medical conditions and supporting the education of young children.

Once a topic area was identified, each group member individually identified four technology projects that were making a difference in the topic area. Each individual also developed four criteria that could be used to evaluate the projects. The projects and evaluation criteria were submitted for review and assessment by the instructor.

After this, each group pooled the individual project ideas and evaluation criteria of the members. This meant that each group had 12 – 16 projects and evaluation criteria to work with. From these, the group worked to develop an evaluation rubric with 4 criteria. This rubric was then used to evaluate all of the group's project ideas.

After evaluating their project ideas, the groups used the evaluation results as a starting point and worked to come to consensus on which project idea was the best. During the period when groups were pooling their individual ideas and evaluation criteria to develop a group rubric, one class period was set aside to allow groups to work together. Other than this time and the initial, brief meeting to pick a group topic, all group work occurred outside of class time. Students were provided group areas within the LMS with discussion forums and other collaboration tools. Students also had access to Google Apps for Education tools.

After reaching consensus, the groups developed a 2 -3 paragraph executive summary discussing their best idea and their evaluation process. The executive summary was posted to a discussion forum in the LMS for review by all students in the course.

A week after the executive summaries were posted, each group gave a 10 minute in class presentation. In the presentation, groups were asked to discuss their best idea and at least one other idea that was considered. They were also asked to discuss their decision process, including their evaluation rubric and any other considerations that factored into their final decision.

Overall, the assignment had three components that were submitted and assessed – the individual project examples and evaluation criteria, the group executive summary, and the group presentation. In total, this assignment comprised 7% of the total course grade. Additionally, after the in class presentations, students were surveyed and asked to order the presentations (other than their own) based on how well they met the goals of the assignment. Students who completed the survey received a small bonus.

6. DISCUSSION

From the instructor's perspective, both activities worked well. As is the norm with a new activity, there was room for some improvement in both activities.

Information on student perspectives were collected in an end of semester survey. For each of the two activities, students were asked Likert scale questions about:

- Whether the activity helped them learn.
- Whether they saw value in the activity.
- How much work the activity was.
- How much the activity helped them understand what IT professionals do
- How much they enjoyed the activity
- Whether they would like to do the activity again.

For the rubric development activity, students were also asked a yes/no question about whether they had developed an evaluation criteria in any of their previous courses.

For each activity students were also provided a free form text question where they could offer other comments or suggestions.

The survey was distributed at the end of the semester, and 10 of the 17 students (59%) responded.

For the article discussion activity, there were a number of excellent articles, but also a few that were challenging to discuss.

One student, selected an article discussing the relative security of operating systems (including mobile OS) with data showing that versions of Windows were among the least vulnerable (Khandelwal, 2015). This allowed discussion about evaluating data sources and the need to rely on hard data rather than received wisdom.

Another interesting article discussed an announcement that a major provider of Electronic Health Records ("Patient records", 2015) software was building a data center and planning to offer cloud hosting of their software. This article was especially relevant since many of the students were Health Information Technology majors. This article also allowed discussion of cloud hosted solutions in use at the university including e-mail and LMS.

Through the course of the semester, two good general discussion questions were identified – "How could a business benefit from using this technology?" and "If you worked for an IT organization, how would you be affected if the company adopted this technology?"

A number of articles selected by students involved consumer technology, especially phone apps. This was not a surprise since students are regular users of consumer technology. These articles presented an opportunity to discuss the consumerization of corporate IT, a topic that is an ongoing challenge to corporate IT and IT education (Law, 2013).

Students had no complaints about selecting an article for discussion, but some students did not post their assigned discussion summary. Also, there were some students with little or no participation in the online discussions following the in class discussion. In general student completion of tasks in this assignment was similar to their completion of other assignments in the course.

The student survey showed that all of the respondents agreed that the discussion activity was helpful in learning about the wide range of technology uses. All respondents also saw the

value of discussing how the technologies from the article could impact an IT organization.

In terms of the work required, the survey showed that most of the students found it easy to find and post an article, with one student neutral on the question. Similarly, 80% found the activity helped improve their understanding of what IT professionals do, with the remainder neutral on the question.

Students were also asked whether they enjoyed the article discussion activity and whether they would like to the activity again. The majority enjoyed it (70%) and would like to do it again (90%), with the remainder neutral.

Reaction to the group assignment involving developing and using an evaluation rubric was similar. From the instructor's perspective, the main challenge was that a couple of groups struggled to find a topic that all members found interesting.

The individual project and evaluation details that were submitted met the instructor's expectations. A couple of students did not submit their individual contributions, but this wasn't a surprise given their participation in other course assignments.

The groups were given some in class time to discuss and develop their group evaluation criteria and build the final presentation. All students, including students who had not submitted the individual component actively participated in these discussions.

The executive summaries posted ahead of the final presentation were generally good, but focused more the best project identified by the group and less on the selection process.

All of the final presentations met or exceeded the instructor's expectations, especially given that this was an introductory IT course where no prior IT knowledge is required. The most notable thing about the final presentations was the enthusiasm that groups had for sharing the details of their "best" project with the rest of the class.

Examples of "best" projects selected by the groups included:
- An app that used word images to help people with speech impediments and learning disabilities.
- Language learning software for young children.
- Technology to improve monitoring of blood glucose and reduce associated pain and discomfort in diabetics.
- An app that used gamification to motivate individuals to exercise.
- An app to help farmers access and manage data on crop prices.

It is interesting to note that several students shared that they were making use of the app identified by their group. As one student said, "I liked the app so much I bought it!"

In reviewing the evaluation rubrics developed by the groups, it was apparent that all of the groups had understood the need for objective evaluation criteria. A couple of the rubrics had different weights for some criteria. For the other groups, there was no way to tell whether they had not understood the idea or not seen the need for it.

The previously discussed end of course survey also included questions about the group activity. 9 of the 10 respondents agreed that it was a helpful way to learn about a method for making choices and all respondents saw the value in the activity. This activity was seen as more difficult than the article discussion activity, with only 70% of the students seeing it as easy and only 70% reporting that they enjoyed the assignment. Again, 80% found that the activity helped improve their understanding of what IT professionals do.

In evaluating prior knowledge, 80% reported that they had not developed an evaluation criteria in any previous courses. In the open ended comments, one student expressed that they don't like group assignments, even though they see the benefits. Another student commented about the lack of participation by the rest of the group, but still thought the method would be valuable with a more active group.

7. CONCLUSION

While technical skills remain important in the IT and IS fields, technology departments continue to shift the emphasis on IT infrastructure to analytics and innovation to improve business efficiency and effectiveness (Khan & Sikes, 2014). Our students not only need technology skills but they also need to learn about IS/IT strategy so that they can work to help

organizations use technology to achieve organizational goals.

The successful inclusion of IS/IT strategy learning activities in an introductory IT course offers an additional way to educate students about this important topic. Even if programs are able to add the recommended IS 2010.7 course, adding IS/IT strategy learning activities in multiple courses could benefit students.

8. FUTURE PLANS

Some minor revisions to the two activities are planned. For the article discussion activity, efforts to encourage more online discussion are needed. For the group activity to develop an evaluation rubric and apply it, specifications for the executive summary and presentation will be updated to ask the groups to include more information about the evaluation rubric. Also, a method for assessing individual's contributions to the group activities will be considered.

I also plan to talk with the departmental industry advisory council to get additional ideas for IS/IT strategy learning activities, especially activities that could allow advisory council members to interact directly with students.

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Appendix 1

Table 1: Expected Skills Depth for strategy related skills in model IS curricula

Skill Name	Skill Keywords (select)	Year Introduced	Depth of Knowledge Expected	
			Initial	Current
Strategic Utilization of IT	Use of IT to support business processes	1973	1	4
IT Planning	Value of IT, end user advocacy	1981	3	4
IT and Organizational Systems	Relationship of business process and IT	1981	2	3

Data from (Longenecker et. al, 2013).

Depth of skill: 1 = recognize, 2 = differentiate, 3 = use (or translate, explain), 4 = apply (without direction or hints)