Case Study:

Michael Bishop Case

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Case Name: Michael Bishop: Implementing Gaming Technologies in Traditional K-12 Contexts (Ertmer, Quinn & Glazewski, 2014, pp. 29-38).

Key Stakeholders

Designer

*Michael Bishop* is a university researcher and director of the Rigglefish project. Rigglefish is a web-based science game that attempts to engage middle-school science students through student-directed inquiry, and to create an environment that encourages students to interpret, question, and analyze using scientific tools. His primary concerns are maintaining funding of the project, and maintaining pilot projects to evaluate the Rigglefish software and provide feedback. Michael believes that the gaming software can be beneficial to all science classes, and does not want the audience limited only to advanced or gifted students, or to special clubs or programs.

Client

The funding agency for the Rigglefish project appears to be the National Science Foundation as part of its Virtual Environments for Learning project (NSF, 2010). The main goal for funding the pilot project is to “hone an innovative model to use technology to increase the engagement of all students in scientific inquiry in their science classes” (Ertmer, Quinn & Glazewski, 2014, p. 33). The main clients for this training are the school districts that may adopt the gaming software and their representatives. For the pilot program, the district personnel included the following individuals.

*Nancy Levin* was a district science curriculum specialist at Oakdale School, a middle school whose test scores were lower than the state averages. Nancy worked with Michael for two years, but has recently returned to her role as a biology teacher after the most recent test scores showed that science proficiency had decreased from the previous year.
Paul Russell is the principal at Oakdale School. He was clearly concerned about the most recent test scores that place the district even farther behind the state averages.

Tara Jones is Nancy Levin’s replacement as the curriculum specialist. Along with the district superintendent, Tara has decided to discontinue the pilot project for Rigglefish. Her main concern with the pilot was that it required too much student time without preparing the students for the science proficiency tests, since each game required more than a week of time that could have been spent on essential topics.

Bailey Richards is a science curriculum specialist at Weyman independent school district. She met with Michael to discuss using Rigglefish, but is also concerned about the amount of classroom time required for the game. In addition, she also expressed concerns that some students might not be able to figure out the games on their own, placing additional instructional requirements on teachers, and possibly defeating the goal of teaching self-directed learning skills.

Laura Kenner and Daniel Brown are both science coordinators in two districts that are currently rated satisfactory on the standardized test, and that are designing a common curriculum in which the same lessons will be taught at all schools on the same days. Their main concern with Rigglefish was that allowing some teachers to customize the curriculum with the gaming software would result in all teachers wanting to customize their curriculum based on their own pet projects. They also expressed concerns about computer usage, since the districts were attempting to limit the science classes’ usage and make the computer labs available to the math and language arts programs. They liked the games, but were only willing to allow them in summer programs, suggesting that while the game may provide some benefits, it would not prepare the students for the standardized tests.
Jim Harrington is the assistant superintendent for curriculum at Mason ISD school district, which is rated in the excellent to exemplary category. His main concern is that pilot software might not be ready for “prime time”, and that any bugs would result in wasted classroom time. He was also concerned about the demands placed on students by the administrative side of the product evaluation, such as surveys and software testing. Jim is allowing Michael to use this program in pre-AP classes and at a magnet laptop program.

Subject Matter Experts (SME)

Craig Dawson was a director of science education with the state education agency and an experienced middle- and high-school science teacher. Craig supports inquiry-based learning, but is concerned with “making the best use of instructional time” and has told Michael that he needs to demonstrate a direct relationship between the game and the standardized test results.

Antonia Fisher is a professor of science at Michael’s university. She likes Michael’s vision and does not want him to change it, but is concerned that the games will not be appropriate for all learners. She believes that the game-play could have beneficial results, such as improved assessment skills and critical thinking. However, the improved skills might not be reflected on standardized tests.

Bob Blanchard is a game designer. He is concerned that direct evaluation of learning might reduce motivation by disrupting the “flow” of the game with multiple-choice tests. He believes that an understanding of learning can be gleaned from the results of the game rather than using traditional testing.

All three experts had concerns about teacher implementation, and expressed concerns that teachers would direct the students rather than allowing for discovery learning, defeating one of the primary purposes of the game.
Audience

The target audience for the program includes middle-school science students and teachers. The main concerns that the teachers have is that they have limited time to teach all the required material that will be covered on the standardized tests, and any additional requirements may negatively impact standardized test scores. Some unstated concerns would most likely include students playing the game for fun (“off-task behavior”) rather than learning, and students getting lost without adequate direction.

Key ID Design Challenges

The main ID challenge facing Michael is to align the goals of the game with those of his potential clients. In addition to teaching critical analysis skills, he needs to tie the game to the standard curriculum and demonstrate that use of the game improves performance on standardized tests. His original goal was for all students to benefit from this program. Given the objections voiced by most of the stakeholders, this program will most likely be used only for a limited numbers of students, either in enriched programs or in summer programs, unless improved student performance can be demonstrated. The gaming approach to self-directed learning is based on constructivist ideas that game-like activities can lead to deep learning (Jong, Shang, Lee & Lee, 2010, p. 208). However, these ideas are not universally accepted. As Michael realizes, those who have not already accepted this approach to learning are unlikely to be convinced to adopt his software without solid evidence.

A related challenge facing the program is how to demonstrate that learning has taken place and how to measure the results of the learning. The main challenge here is to create an appealing, motivating, and engaging game from which learning data may be gathered without interrupting the flow of the game.
Both these issues might have been avoided at the analysis stage during the needs assessment. The main problem appears to be that the goals of increasing student engagement were not sufficient to specify software that would be found useful by school districts.

**Case-specific Challenges and Constraints**

The main case-specific issue relates to the amount of classroom time required to play each game. This results in several issues. Given the need for computers, this creates a competition for scarce resources. It also creates competition for scarce classroom and teacher time, possibly at the expense of essential science skills that are required by standardized tests.

Another issue stems from the pilot program itself. The software has not been thoroughly evaluated and even a quick trial found a few bugs. This could result in more lost classroom time, as well as frustration for students and teachers. Furthermore, the program is enlisting students as evaluators, taking even more classroom time that is not directly used in science learning.

These are development issues related to the process of authoring the software, and can be addressed by modifying the software without changing the overall design.

**Priority**

Michael’s priority should be to the software’s content. The fundamental problem facing the program is a misalignment of goals resulting in content that is difficult to convince school districts to use. Assuming that Michael is committed to his goal of making the software available to a broad range of students, he needs to evaluate the software in light of the requirements of school districts. Specifically, he would need to align all learning experiences with standard curricula and standardized tests. The next highest priority will be the ability to evaluate student learning, preferably within the tool, so that the school districts can justify the time required and see a direct relationship between tool use and student learning.
Weekly Readings

This week’s assigned readings contributed to this analysis in several ways. First, the readings guided my analysis of the main problem by emphasizing that the goals of the project must be aligned with the goals of the stakeholders. Another area that I had not considered was the difference between ID challenges and case-specific challenges. I also learned that a variety of issues, from real analysis and design issues to the politics of the target environment, can derail a promising project. The readings also emphasized the importance of the analysis phase, and influenced my assessment that a new needs assessment needed to be performed to take into account the input from a broader group of stakeholders.

Two areas in my personal experiences contributed to this analysis. The first area is personal experience with case-based learning, specifically in designing a module to use our school’s Outdoor Wildlife Lab with a mobile science van from a local university. This experience helped me to understand the challenges faced by teachers when attempting to work outside the accepted curriculum, as well as the rewards of helping students to gain a deeper understanding of material by creating personal meaning. However, even when working with a special project, we needed to demonstrate what state standards were addressed by the project and justify the time spent.

Another personal experience that was useful in analyzing this case was my final project for EDCI 513, “Opportunities for Instructional Design and Gaming to Positively Impact Instruction.” This project helped me to understand the potential of educational gaming to transform our classrooms and to generate personal learning experiences for students. However, it also helped me understand the challenges facing educational gaming in terms of acceptance of the very idea of games in the classroom, as well as justifying the use of specific games in a particular environment.
**Reasonable Solutions**

Now that Michael has sufficient feedback from multiple stakeholders to more clearly understand their needs and objections, I would recommend that he return to the analysis phase and assess the needs for the educational software. He should then design, develop, and implement the training that meets the needs of a broader group of clients. Specifically, the software should incorporate standard science curricula, or should be customizable so that each state or district may modify it to meet their needs, and a summary of the relevant standards and how they are addressed should be made available. The software should have built-in methods for assessing student learning, preferably without interrupting the flow of the game. For instance, if mastery of a particular skill is required to move from one game level to the next, moving to that level would demonstrate that learning had taken place. Finally, the needs assessment should take into account the objections to the excessive time required to play the game, possibly by allowing students to play outside the classroom, and by modifying the game to allow students to gain deeper understanding more quickly. Once an initial version of the software is available, Michael could first make it available to non-clients (e.g. science clubs or educators) so that the software will be mature when school districts pilot it. This will have the advantage of addressing all the major concerns expressed by different stakeholders, and of ensuring customer satisfaction once the software is available. The main problem with this approach is that it will take time and money to execute, and the funding agency may not be willing to continue funding to repeat work that seemed near completion.

Another approach would be to change the target audience for the software. Many people have indicated that they found the software useful, and it could be targeted for after-school and home-school programs or science clubs. In this case, some mechanism would need to be provided to evaluate learning, but this could be simple multiple-choice questions. As suggestions and user
data are provided, the software could be enhanced to fix any maturity problems and to extend the functionality in relatively simple ways. Once the program becomes established among this audience and is seen as high value and low risk, it might migrate into the mainstream educational system. On the other hand, making the program available may inspire imitators that can exploit the broader market, reducing the chances of becoming the dominant software in this market. The main drawback of this approach is that without addressing the objections of the school districts, this software will most likely remain a niche product for a limited client base, which was never the goal of the project.

**Final Recommendation**

If possible, I would recommend that the first solution be implemented: that a complete needs analysis be performed and that the software be modified to incorporate the needs of the potential client base. I recommend this solution because one of the primary goals of the program was to create a game that was available to a broad range of students, and this solution provides the best chance of meeting that goal.

Since this program is Michael’s pet project, he will undoubtedly be willing to spend whatever time is required to make the software appealing. However, funding may be an issue. If the current funding agency declines to continue funding in light of the current setbacks, funding might be obtained from other sources, such as state agencies or universities.
References

