

GAME ON! – REDESIGNING THE INTRODUCTION TO INFORMATION SYSTEMS COURSE USING GAMING MECHANICS

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ABSTRACT

This paper describes the redesign of an introductory information systems course using game mechanics to enhance student engagement. This “gamification” of the course was found to affect the nature and intensity of student participation in the course. A post-course survey showed which game-based elements in the course were most successful.

INTRODUCTION

The Introduction to Information Systems course is a common undergraduate offering at universities. This course benefits students pursuing a degree program in an information technology-related field, as well as students enrolled in related fields such as business, public administration, engineering, etc. This course commonly provides a high-level overview of the information systems discipline, touching on topics to be explored in greater depth in subsequent courses.

The author has taught such a course many times in the past fifteen years, and has noticed substantial changes not only in the content of the course and in its various instructional technologies, but also in the students enrolled in it. While the content of the course is sound, student engagement and participation have become an issue in recent years. Some of the students for whom this is a required course do not see the necessity of this introduction to information systems as part of their educational experience. While this necessity is clearly explored in the course itself, it remains difficult to engage students who have a negative opinion about the validity of the course from the start. Disengaged students commonly perform poor in the course or fail the course altogether. The author took the initiative to radically redesign the course in order to better engage students, enhance student learning, and improve overall course outcomes for the students as well as the university.

To enhance student engagement, the course was redesigned to feel more like a game to the students. The potential of games as a means for enhancing participation, motivation, and engagement has received much interest in recent years. Several observers have noticed how many corporate employees lack sufficient motivation at work (Reeves & read, 2009, p. 36) or how students dread doing homework (Young, 2010), resulting in poor efforts. The problem may just be that “reality doesn’t motivate us as effectively. Reality isn’t engineered to maximize our potential.” (McGonigal, 2011, p. 3) Yet these same workers and students – when playing video games – will “happily spend hours on difficult tasks, and actually learn quite a bit in the process.” (Young, 2010) It could even be argued that, given the thousands of hours that young

people spend playing video games, students entering universities are often gaming experts above all else. (Penenberg, 2010)

This observation, then, raises the possibility that the use of concepts and activities obtained from games may positively alter the behavior of participants in an activity. Smith-Robbins refers to this as “gamification,” or “the application of game mechanics such as points, badges, and levels to non-game processes.” (Smith-Robbins, 2011) Indeed, Reeves and Read suggest that “the future of work is about engaging workers more than commanding them” (Reeves & Read, 2009, p. 6) and note that “gamers already perform every category of information work imaginable, from grind-it-out drudgery to sophisticated analysis and team building.” (Reeves & Read, 2009, p. 5)

THE COURSE AS A GAME – LAYING THE FOUNDATION

The Promise of Games

This particular course redesign effort was originally inspired by the book “Reality Is Broken: Why Games Make Us Better and How They Can Change the World” by Jane McGonigal. (McGonigal, 2011) This book explores the nature of games, the ways in which games manage to attract such voluntary, dedicated, and focused efforts from their players, and the collaborative efforts encouraged by games. Its author argues that engagement in a variety of activities can be enhanced by making them feel more like a game to their participants. While McGonigal provides a comprehensive and engaging description of how to apply game mechanics as a means of enhancing participation and engagement in non-game efforts, her work was not the first to envision such use of games. A decade earlier, Prensky, in discussing the “‘new’ students of today’ – whom he famously referred to as “digital natives” – mentioned that ‘They prefer games to “serious” work.’ (Prensky, 2001)

Hence the goal of this course redesign project was to reimagine the course as what Sheldon calls a “Pervasive Game,” which is “a game where the line between the game and reality blurs to the point where it is difficult to distinguish one from the other.” (Sheldon, 2012, p. xvii)

Examining the Nature of Games

If we are to apply a “game layer” to a real-world activity – such as an undergraduate course – it is important at the outset to formally define the concept of a game and clearly understand the mechanics of game construction.

McGonigal quotes Suits who stated that “playing a game is the voluntary attempt to overcome unnecessary obstacles.” (McGonigal, 2011, p. 22) According to McGonigal, games are made up of four defining characteristics: a goal which players attempt to achieve, rules which limit how players are able to achieve the goal, a feedback system which lets player know how much progress is made towards achieving the goal, and voluntary participation which means that players knowingly and willingly accept the previous three characteristics when playing the game. (McGonigal, 2011, p. 21) This echoes Suits’ description of a game as an “attempt to achieve a specific state of affairs, using only means permitted by rules, where the rules prohibit use of

more efficient in favor of less efficient means, and where the rules are accepted just because they make possible such activity." (Suits, 1978, pp. 54-55)

Dignan refers to Salen and Zimmerman who defined a game as “a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome.” (Dignan, 2011, p. 35) Dignan then provides a detailed and actionable list of game characteristics. These include the *player profile* which highlights player traits relevant to the game, the *objectives* or goals of the game, the *activity* the players will perform in order to achieve the objectives, the *resistance* encountered by players in the form of chance and competition, the *skills* to be mastered by a player while performing the activities, the *resources* available to players as they perform the activities, the *actions* or moves permitted to the players in the game, the *feedback* provided by the game in response to a player’s actions, the *black box* or rules engine which observes the player’s actions and provides the feedback, and the eventual *outcome* of the game, which may be positive or negative. (Dignan, 2011, pp. 88-96)

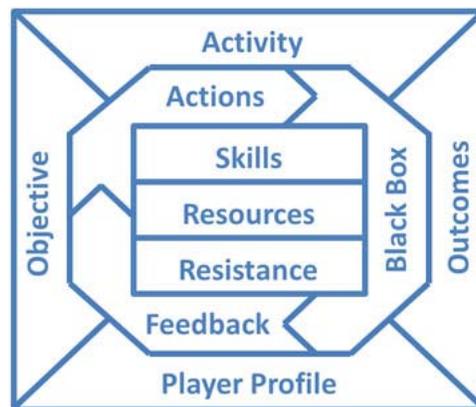


Figure 1 - Dignan's Game Frame. (Dignan, 2011, p. 110)

Reeves and Read also provide a clear list of game characteristics. These include a player's representation or profile, an environment in which the game takes place, a game narrative which informs players of their motivation, a feedback system to guide player behavior, the tracking of player achievements through ranks and levels, a marketplace in which players obtain game resources, rules which guide competition among players, teams in which players collaborate, a communications system which allows players to interact, and time pressure which induces player activity. (Reeves & Read, 2009, pp. 64-89)

The Potential of Gamification

The “gamification [of] non-game processes” (Smith-Robbins, 2011) can be achieved by superimposing a “game layer” on top of real-world activities – modifying them using a “system of skills-based play,” (Dignan, 2011, p. 81) To show the great potential of gamification, Reeves and Read identify 40 specific work-like tasks – such as monitoring processes, categorizing and analyzing information, developing strategies, scheduling activities, communicating with supervisors and subordinates, negotiating, coordinating work among team members, and controlling resources – all of which are already being executed by players of digital games and

which consequently can be gamified. (Reeves & Read, 2009, pp. 42-58) Applying game mechanics to the work environment would mean that “some people will soon do their jobs *inside* a game, and many more will thrive in information environments that have features borrowed from today’s best games.” (Reeves & Read, 2009, p. 4)

Recent research efforts suggest that the application of game mechanics improves the engagement of individuals in real-world tasks, such as school and work. Two specific characteristics of game play appear to drive this higher engagement: enhanced positive emotions during the process of game play, and a greater sense of individual accomplishment upon completion of game tasks.

The activities performed by players in a game can be specifically designed to be much more enjoyable than real-world tasks. By reducing players’ fear of failure, offering the potential for an “epic win” (McGonigal, 2011, p. 68), and strengthening social interactions through multi-player games (McGonigal, 2011, p. 82), games offer the potential for meaningful experiences for players (McGonigal, 2011, p. 98), as well as positive emotions and greater engagement. (McGonigal, 2011, p. 36) Consequently, players experience games to be “more inspiring, more exciting, and more equitable than reality.” (Dignan, 2011, p. 75) Gamification, then, aims to redesign real-world tasks through the application of game mechanics to elicit similar positive emotions. As a result, individuals are expected to better engage with these real-world tasks and perform them better. (McGonigal, 2011, p. 124)

In addition, games are generally designed to require a completion of a clear set of tasks which result in the accomplishment of a well-defined goal, such as the destruction of a specific number of green pigs in a game-level of Angry Birds. The game’s feedback system informs the players when such a goal has been successfully completed, resulting in a game win. Gamification transfers this “win” sensation into a real-world context, and consequently its participants experience a more clearly defined sense of accomplishment. Through gamification, participants in a real-world effort are provided with clear and focused missions to complete in which they can put their personal strengths to good use in pursuit of a “win.” (McGonigal, 2011, p. 22, p. 38, p. 55) As game designer Jesse Schell puts it: “a good game gives us meaningful accomplishment, clear achievement that we don’t necessarily get from real life.” (Penenberg, 2010) This is echoed by Amabile and Kramer who argue that “everyday progress – even a small win” provides significant boosts to an individual’s emotions, motivation and perceptions. Subsequently this sense of progress makes individuals more likely to be “creatively productive in the long run.” (Amabile & Kramer, 2011)

Once workers become more engaged with real-world tasks, the improved motivation to perform and successfully complete these tasks will provide direct benefits to the organizations the individuals work for. (Dignan, 2011, pp. 64-65) Reeves & Read argue that workers can “benefit from game ideas while they are making money for shareholders” (Reeves & Read, 2009, p. 4) and that transforming repetitive jobs and difficult collaboration in the workplace into compelling activities has the potential to improve organizational productivity and worker job satisfaction. (Reeves & Read, 2009, p. 7-8)

An individual’s heightened engagement with a real-world task and the enhanced motivation to complete it successfully also carry an economic benefit for the organization: game-based rewards

for a task (such as points, recognition, badges, etc.) are much more economical than traditional compensation (such as money). By appealing to a player's investment in the game itself, the intrinsic gratification the player receives from participating, and the in-game rewards awarded to a player, a gamified activity may become more economically sustainable for an organization. (McGonigal, 2011, p. 244) This aspect is particularly appealing in an academic setting where students can't be awarded monetary benefits.

IMPLEMENTATION – GENERAL DESIGN PRINCIPLES

Reeves and Read recommend building a “conceptual map linking games and work” (Reeves & Read, p. 228) in order to effectively apply game mechanics to real-world work. This section provides a broad mapping of game mechanics to course objectives, performed within the limitations of the academic environment.

Academia is traditionally quite receptive to innovative ideas in educational practices, and generally supportive of well-designed experimentation. However, this environment also provides some key constraints on the course redesign, which were incorporated from the start of this effort.

- The course redesign must not diminish the quality of the course content, nor of the student work performed. Subsequent courses – for which the Introduction to Information Systems course is a prerequisite – rely on the students having mastered a key set of concepts. This constraint affects both the content as taught by the instructor and the assignments provided to the students.
- The assessment of student performance needs to remain relevant to the academic environment. This means that existing standards for the skills and knowledge acquired by the students in the course must be reliably addressed.
- The confidentiality of student grades must be honored. In most multi-player games, player scores are shared among players in order to foster competition. Given existing privacy requirements, the grades obtained by individual students can't be shared with other students in the redesigned course. Competition will need to be facilitated in some other way.

Based on both the possibilities offered by games and the above constraints, as well as Dignan's list of game characteristics (Dignan, 2011, pp. 88-96), the following general gaming characteristics were implemented in the course:

- **Player Profile:** Cognitive skills and interests of individual students; a self-assessment of academic and information technology skills formed a starting point for the course.
- **Game Objectives:** The long-term objective for students is to pass the course; this can be achieved by meeting a series of short-term goals represented as individual assignments for which the students perform certain activities and acquire knowledge and skills.
- **Game Activities:** Individual and team assignments provided in the course.
- **Resistance:** A small amount of competition among the students was introduced, but in a non-zero-sum manner so that all students would have the opportunity to excel.

- **Game Player Skills:** Students entered the course with basic academic skills, such as reading comprehension and writing skills. In addition, key information technology skills such as web browsing, e-mail, and word processing can also be assumed to be basic student skills.
- **Resources:** Many students used the World Wide Web as a resource to obtain the information needed to complete assignments, but the instructor was a resource as well when asked to review work in progress.
- **Player Actions:** Students performed research, analysis, writing, speaking, design, and collaboration actions.
- **Feedback:** The students received rapid and detailed feedback each week.
- **Black Box/Rules Engine:** The “rules” of the course were provided in the course syllabus. These rules were overseen and – if needed – executed by the instructor.
- **Game Outcome:** Student knowledge and skills obtained, as evidenced by points scored and course grade achieved.

IMPLEMENTATION – ACTIVITIES AND OTHER GAMING MECHANICS

The following sections detail the actual course redesign, based on gaming mechanics.

Points Categories

The points that students earn in most courses are completely fungible: that is, there is no distinction between points earned taking an exam and those earned writing a research paper. In many role-playing games, points need to be earned in various categories simultaneously in order to succeed: categories such as health, skill, wisdom, etc. Using this concept in a course makes it possible to award points for specific student activities: collaboration within a project group, researching a topic, writing an essay, etc. Assigning points in categories permits students to realize “that ‘in these parts I got an A, but in these other parts I got a failing grade.’” (Young, 2010)

In the redesigned course, points were awarded in six categories, three based on course content and three based on skills. A single course activity would often combine points in various categories.

- **Application Points:** Points applied to activities which explored the great variety of uses to which information technology can be put in organizations of all types and sizes.
- **Organization Points:** Point applied to activities aimed at helping students understand how organizations work and how information technology can support them.
- **Technology Points:** Points applied to activities which specifically explored information systems, information technologies, and the techniques for developing these systems.
- **Collaboration Points:** Points awarded for student collaboration efforts in project teams.
- **Communication Points:** Points awarded for verbal, written, and technology-aided communications to various audiences.
- **Knowledge Points:** Points awarded for obtaining or creating new knowledge, insights and ideas; performing research; and integrating concepts from related disciplines.

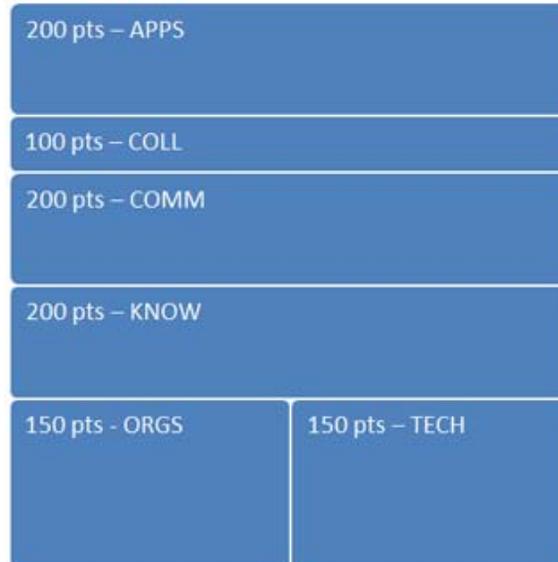


Figure 2 - Points Categories Visualized.

Each course activity was assigned a specific number of points in several categories, emphasizing the applied content and skills in each activity. Following each activity, students received specific scores in these categories, reinforcing the categories.

Skill Categories Applied	Score Level Maximum
APPS	10
KNOW	5
ORGS	5
TECH	5

Figure 3 - Points Assignment for Individual Mission Shows Points per Category.

Course Dashboard Metrics

Students were able to track the progress of the course on a web-based course dashboard. Using graphic elements, the students themselves could see the level of engagement in the course, the progress of the term project teams, due dates for assignments, etc. The dashboard not only provided students with easy access to the assignments and reminders about when they were due; it also showed directly how their own efforts (such as handing in assignments and attending student presentations) affected the overall course metrics. This dashboard was updated several times each week as updated data became available. Countdown timers for assignment due dates created a sense of urgency for the students, and provided them with a small amount of time-pressure which helped them pay attention to a sequence of tasks (Amabile & Kramer, 2011)

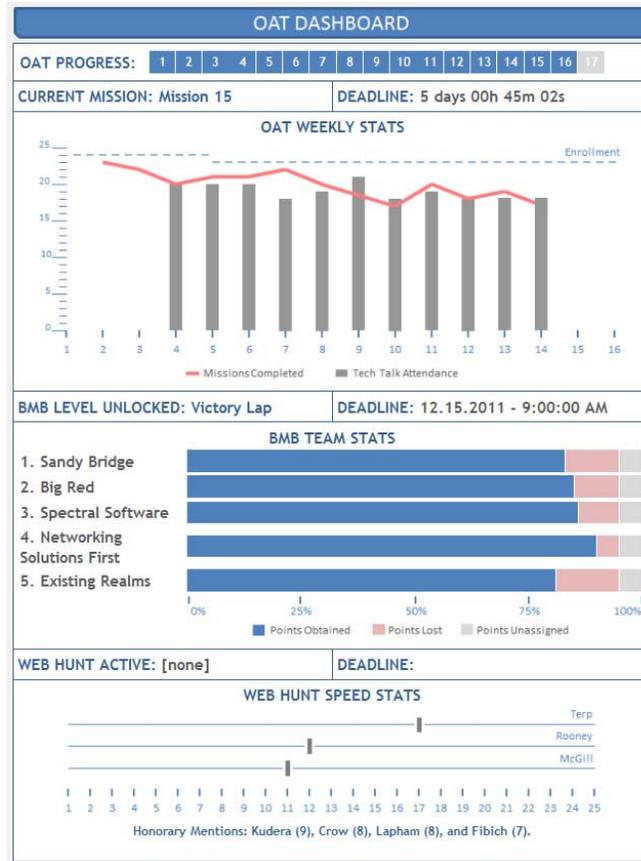


Figure 4 - Full Course Dashboard.

Weekly Missions

The information systems discipline is quite applied by nature and lends itself well to hands-on tasks for students. And so instead of exams to cover the course contents, each week a short assignment – termed a Mission – was assigned to all students. These missions focused on the content covered in the course that week and were due in a week’s time. It was expected that the students would spend an hour or two performing these missions, and in the process become acquainted with some of the concepts and activities of the information systems field.

The design of these missions was informed by an approach suggested by Curran: "In this world of abundant information, we do not need to spend our time telling students what the book says—we need to present them with targeted tests that reflect real world problems and applications of knowledge, and we need to coach/guide them in harnessing abundant information towards the task of solving these problems." (Curran, 2011) Sample missions included designing a Smartphone app, designing a data model for a small video game competition, researching the viability of a new tablet computer in a foreign market, assessing the risks of a new online book ordering system for the university bookstore, and so forth.

CURRENT MISSION: mission 1	DEADLINE: 4 days 00h 34m 32s
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Figure 5 - Mission Link with Deadline Counter.

Term Project Levels and Competition

A semester-long term project is common in many courses. A different approach was applied in the redesigned course. A large project (which involved the development of various parts of a business plan for an online business) was provided to the students in small sections. At the start of the semester, the students were organized in small teams of information technology consultants. These teams were first asked to create an identity for their team (a team name and logo) as well as job titles for each team member. This provided for a way for the team members to become acquainted and get used to a creative approach. Subsequently small portions of the entire term project were provided to each team in the form of Levels. Each level had a due-date as well as a minimum number of points that the team needed to earn in each points category in order to “level up” to the next level of the project. If the team failed to earn the minimum required points in all categories, the team had to redo and resubmit the work until it was of acceptable quality. This approach was based on a recommendation by Curran, who suggested that instructors "scaffold" skills to keep students "in the zone of proximal development and progressing towards greater and greater mastery of the content," while at the same time "not allowing progress beyond one skill if it has not been mastered." (Curran, 2011) Individual peer evaluations provided for collaboration points for the team members on top of the points earned by the team as a whole.

Skill Categories Applied	Score Level Needed To Advance	Score Level Maximum
APPS	5	10
ORGS	1	5
TECH	10	20

Figure 6 - Portion of Term Project Assignment, Indicating Minimum Points Required to Level Up.

The achievements of each team (excluding the individual collaboration points) were documented on the course dashboard. This created some friendly competition among the teams. While the teams were unable to affect each other's score, the competition did appear to encourage the teams to produce quality work.

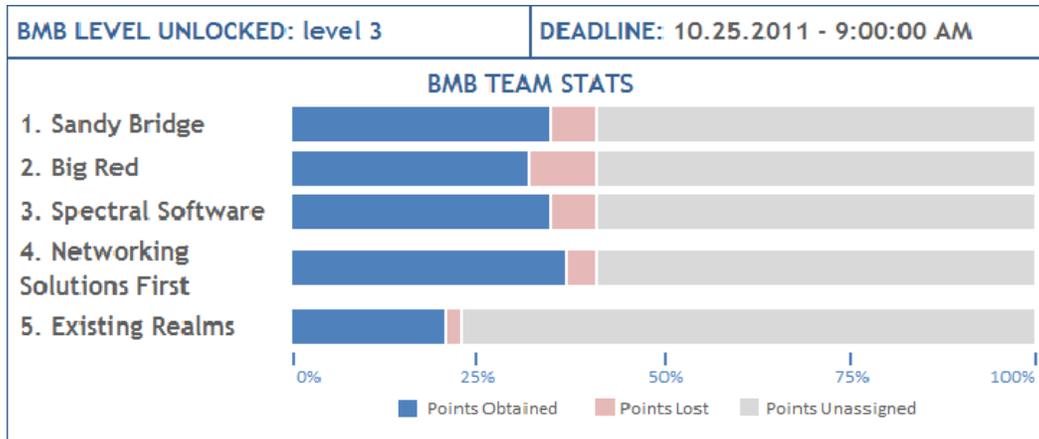


Figure 7 - Team Progress Visualization – Team 5 Failed to Level Up.

At the end of the semester, the final Level of the project was titled “Victory Lap,” in which the teams share their online business idea with the entire class during the final class session. It was designed for the teams to review their submissions as a single piece of work and to take some pride in their achievements.

Tech Talks

Oral and verbal communications skills remain a high priority for students in the information systems discipline, and hence student presentations were a part of this course. Based on their own interests, students were encouraged to select a unique information technology-related topic they were passionate about and present it to the class. In addition, the students were required to write a short research paper. The selected topics – which ranged from the software used in a student’s glucose monitoring device to control diabetes to a student’s efforts to develop an “independent” video game for established game consoles - were an interesting mixture of their interests and the information systems field.

In the past, students would often skip class on student presentation days; as if they felt no valuable new content would be provided for them. To encourage the students to attend and participate in post-presentation discussions, Knowledge points were awarded for attending. This handily resulted in very good attendance at these Tech Talks; as a consequence, it also exposed the students to the ideas presented by their classmates.

Web Hunt Contest

A true contest was created called the Web Hunt. At five times during the semester, an odd question would be posted on the course website. The nature of these questions was such that the only way to solve them would be some kind of internet search. Some questions involved the identification of somewhat odd images, others the solving of digital codes. While all students could earn course credit for solving these questions (which was done to encourage all students to participate), the first five students to submit a completely correct answer to a question were awarded special Speed Points, ranging from 5 Speed Points for the first student to do so to 1

Speed Point for the fifth student. These Speed Points did not apply to the actual course grades, and applied to the contest only. The student with the most Speed Points at the end of the semester received a small prize. The students very quickly picked up on this contest; by the third iteration, answers started to arrive within minutes of posting the question.

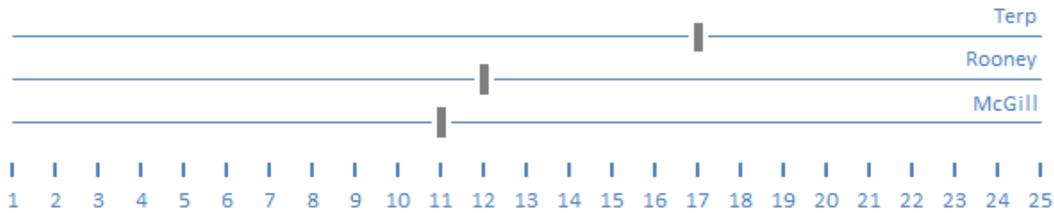


Figure 8 - Web Hunt Leaderboard.

Fast Feedback using Student Stats

According to Goetz, present-day information technology allows for the quick gathering of individual data, permitting the tracking of individual performance and resulting in near-immediate and hence highly effective feedback to the individual, who can react in real-time to this feedback. (Goetz, 2011) Given this potential of rapid feedback, the course was designed to provide a quick response to student work. Feedback on the individual Missions and team project Levels were provided within 24 hours of submission, and feedback on Tech Talks was provided within 4 days. This allowed students to quickly adjust to the requirements of the course, particularly as some of the technical aspects of the assignments (such as proper technical writing and citation techniques) were required several times during the semester.

The feedback was sent to the students in the form of a Student Stats sheet. This sheet identified the student, the week of the semester, and then provided a brief verbal evaluation of the work performed in the most recent Mission. Below this was a matrix which tabulated all the points in each assignment (rows) and each point category (columns). The large amount of numbers on this sheet was inspired by the detailed character achievement sheets common to many role-playing games; it was designed to arouse student curiosity and exploration. In practice, the Student Stats sheet provided both the student and the instructor a quick and frequent assessment of individual student performance and progress in the course.

STUDENT STATS								
Candidate:	Team: 4. Networking Solutions First			Week: 16				
Week in Review:	Tech Talk Browse: 12 attended.							
	APPS	COLL	COMM	KNOW	ORGS	TECH	Total	Max
IT resume			10				10	10
Hunt 1			15	5			20	20
Hunt 2			15	5			20	20
Hunt 3			15	5			20	20
Hunt 4			15	5			20	20
Hunt 5			0	0			0	20
Mission 1/2	5				13	4	22	25
Mission 3/4	5				15	5	25	25
Mission 5	0			0	0	0	0	25
Mission 6	4			5	5	4	18	25
Mission 7	5			5	5	5	20	25
Mission 8	6			4	3	5	18	25
Mission 9	5			5	10	5	25	25
Mission 10	10			5	5	5	25	25
Mission 11	10			5	5	5	25	25
Mission 12	8			5	5	5	23	25
Mission 13	5			5	5	5	20	25
Mission 14	10			5	5	5	25	25
Mission 15	0			0	0	0	0	25
Tech Talk			40				40	50
Tech Paper	20		40		8	20	88	100
Tech Browse				120			120	120
BMB Level 0		6	5			5	16	20
BMB Level 1	12	15			13	3	43	50
BMB Level 2	10	15			5	20	50	50
BMB Level 3	20	15			5	10	50	50
BMB Level 4	12	15			10	10	47	50
BMB Level 5	15	15			15	5	50	50
Victory Lap		10	15				25	25
Total	162	91	170	184	132	126	865	
Max	200	100	200	200	150	150		
Speed Score:		0	4	5	3	0		

Figure 9 - Student Stats Sheet.

WIN OR LOSE? ASSESSMENT OF THE COURSE REDESIGN EFFORT

The redesigned course was first offered as a single section in the Fall 2011 semester. At the end of the semester, the instructor performed a self-evaluation of the effort and the students were administered a survey to assess their perceptions of the method by which the course was delivered.

Assessment: Instructor Evaluation

The actual teaching and administration of the redesigned course turned out to be both an invigorating and labor-intensive experience for the author/instructor.

At the start of the course, it became necessary for the instructor to "sell" the concept to the students quickly. A small number of students were excited about the course concept right away, but most took a wait-and-see attitude. And so the instructor - especially in the early weeks - had to assertively push the course concept. This required a substantial amount of confidence in an approach to the course that had yet to prove itself in practice.

What became clear quite quickly is that the weekly assignments, along with overlapping teamwork, became a set of challenges to which the students responded quite enthusiastically.

Compared to traditional administrations of the course, the instructor realized that the students actually completed more work. Moreover they did so without complaining about the workload, possibly because the work was doled out in small pieces. The rapid feedback to all assignments resulted in student work improving over time: skills that needed improvement (such as writing clearly or referencing sources) were noticeably done better in later assignments.

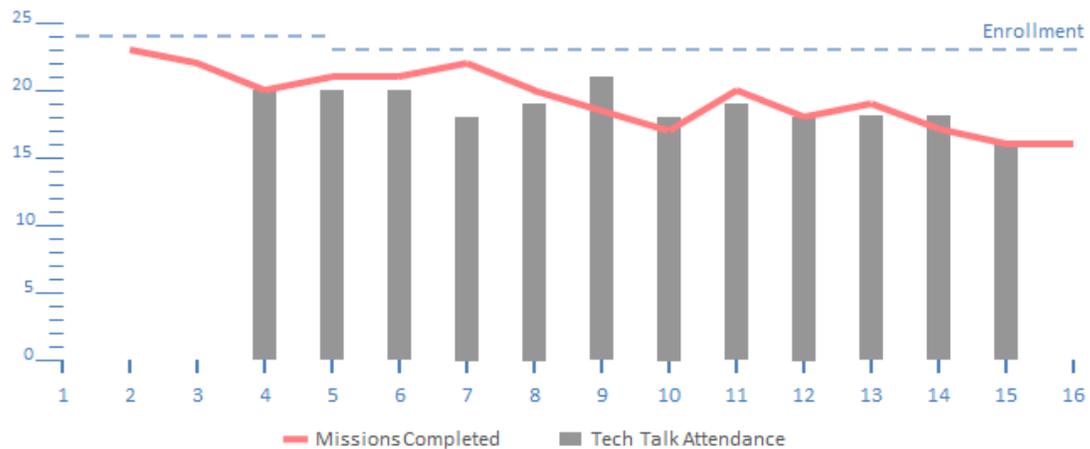


Figure 10 - Visualization of Student Engagement with Missions and Tech Talks.

The competitive elements in the course did appear to motivate student behavior. For example, once students realized that team scores were visible online, some teams became quite motivated to excel. One of the teams in particular worked hard to maintain a lead throughout the semester, and many of the e-mail messages exchanged by the team (some of which were shared with the instructor) mentioned the team's goal of "domination" of the team competition. The web hunt competition - while not actually affecting class grades - was often discussed by students before and after class.

While the instructor was happy to see these elevated levels of student engagement with the class (which was after all the main goal of the course redesign), an unexpected consequence was that the instructor became more engaged with the course as well. As the students started to react positively to the gaming aspects, the instructor responded by spending more time on the redesign of course lectures and the creation of more creative assignments. As a result the time and effort spent on the redevelopment of actual course content was much greater than planned.

The high level of instructor engagement turned out to be quite needed. The redesigned course with its weekly missions, team levels, web hunts, student stats score sheets, and web-based dashboards required a substantial amount of time each week. The course redesign called for quick feedback on student work in order to maximize its effect, and so the instructor's work schedule needed to accommodate that. In addition, the course required a substantial amount of bookkeeping; tracking student and team points on all assignments and in all categories meant that details had to be carefully managed. In the end, the instructor came to realize that just as engaged students will work harder to meet a challenging course, a more engaged instructor will be more motivated to put in the time and effort required for a more labor-intensive course.

Assessment: Student Evaluation

To gauge student opinions regarding the course format, a short survey was administered on the last day of the semester. 19 students provided responses to this anonymous survey which covered six key areas in the course. The results of this survey are summarized below. The bar graphs summarize the scores for all questions in each key area, while the comments address some key findings on the individual questions.

Weekly Missions – The instructor feared that the large number of weekly missions might be perceived as too much work by the students. This fear turned out to be unfounded.

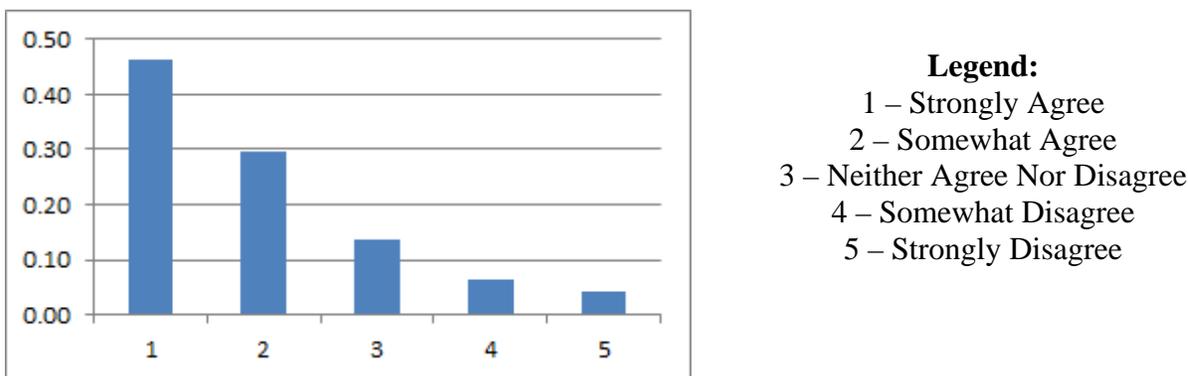


Figure 11. Percentage scores for summarized evaluation of Weekly Missions

75% of the students perceived the weekly missions to be positive. 68% found them highly relevant to the course and 32% somewhat relevant. 79% of the students strongly preferred the weekly missions to regular in-class exams.

Term Project – The incremental team project was perceived positive by 82% of the students.

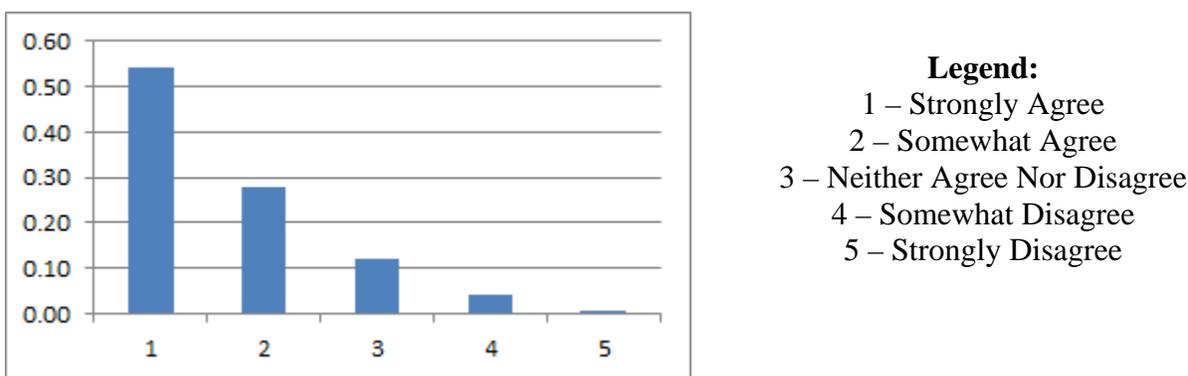


Figure 12. Percentage scores for summarized evaluation of Term Project

100% of the students responded positively to the concept of an incremental project, rather than one with a single deliverable that would be due at the end of the semester.

Tech Talks – The Tech Talks received a positive evaluation by 82% of the students overall.

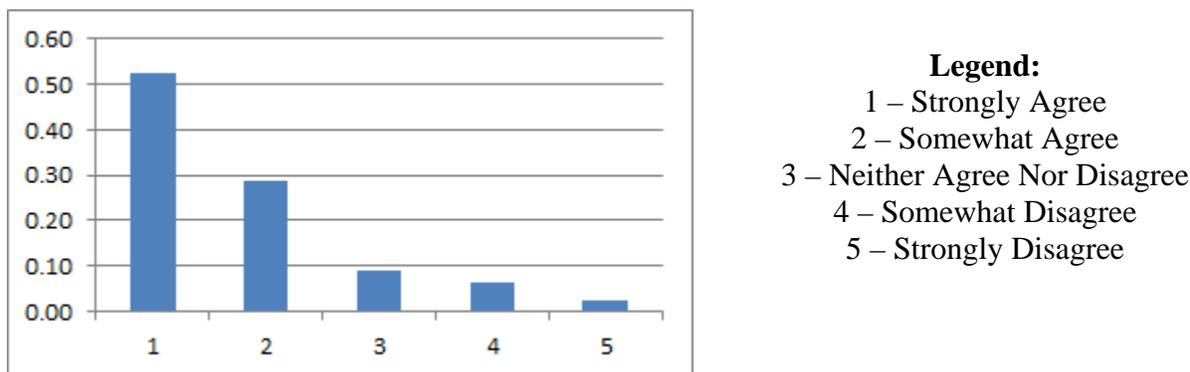


Figure 13. Percentage scores for summarized evaluation of Tech Talks

The cumulative evaluation of the Tech Talk component was slightly less positive than all other aspects of the course. This might be due to this activity being very similar to traditional student presentations; among all activities in the course, the Tech Talks were the least gamified. The author is currently exploring options to apply more substantial game mechanics to this activity.

On individual questions for this component, the students were most positive about getting points for attending the Tech Talks. Evaluations on having to write a research report to accompany a Tech Talk were considerably less positive.

Web Hunts – Overall 75% of the students perceived the web hunts positively.

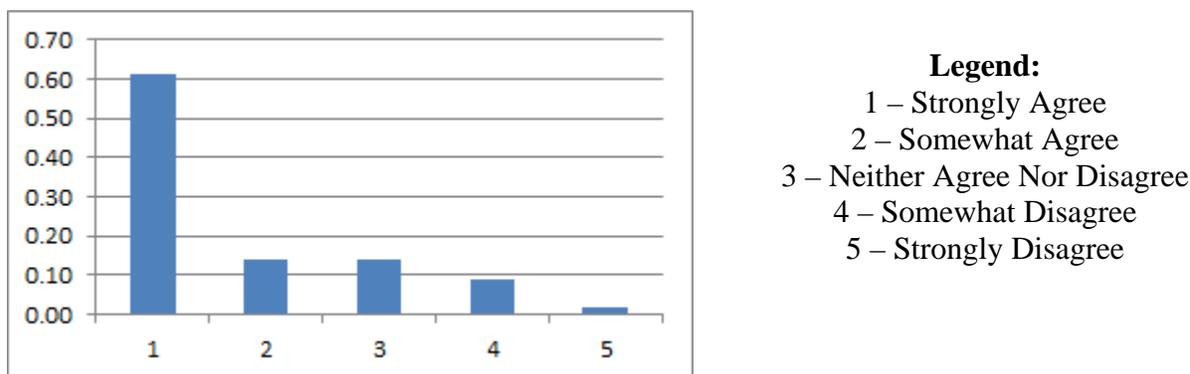


Figure 14. Percentage scores for summarized evaluation of Web Hunts

The students mainly perceived them as a fun addition to the course, and a majority did indicate that their web search skills had improved as a result.

Course Web Technology – 90% of the students gave a positive evaluation to the use of web-based technologies in the course.

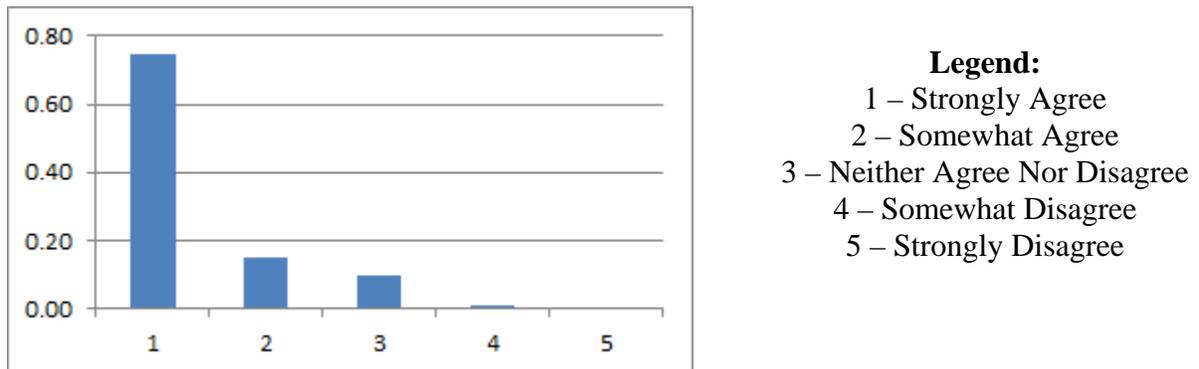


Figure 15. Percentage scores for summarized evaluation of Course Web Technology

Student responses indicated that the course website was considered a useful addition to the more standard features found in the Blackboard learning management system that was also used by the course.

General Course Evaluation – For the overall evaluation of the course, 96% of the responses were positive.

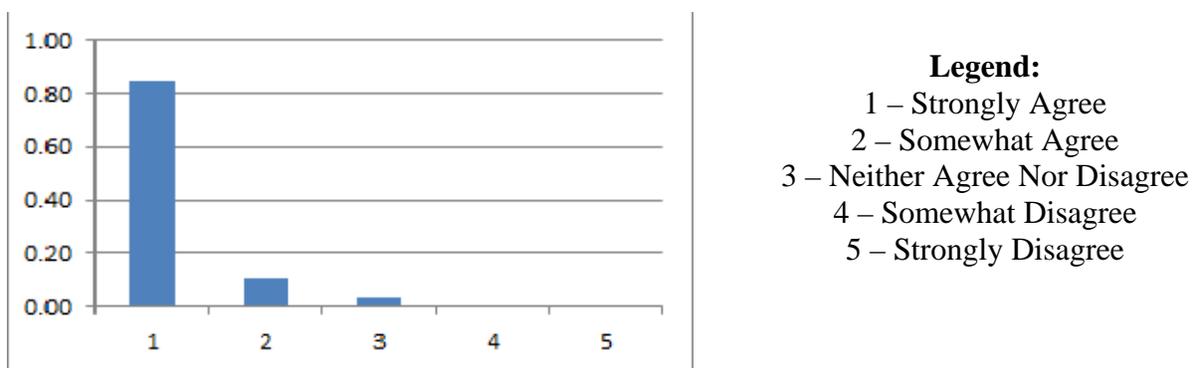


Figure 16. Percentage scores for summarized evaluation of General Course Evaluation

The game-based orientation of the course was perceived as positive by 84% of the students. Practically all students would recommend the course. One question in this category scored 100% “Strongly Agree” responses: the students were completely positive regarding the fast feedback of the Student Stats as it allowed them to measure their progress in the course.

While it is heartening to see such a positive response to the course, it must be kept in mind that the survey only covered 19 students enrolled in a single section of the course. However, for an initial attempt at course gamification, these results are quite encouraging.

ON TO THE NEXT LEVEL: LESSONS LEARNED FROM THIS COURSE REDESIGN EFFORT

Gamification is an instinctively appealing concept, which may explain its popularity in recent years. Most research into gamification at this point is exploratory, and hence much of the evidence of its benefits is still anecdotal and not generalizable across settings and activities. When a concept is still relatively new, such exploration is beneficial, as it advances and refines the concept, and helps gather useful evidence of its benefits and limitations.

This course redevelopment project explored the application of gamification in a college setting. A common and somewhat routine course had game mechanics applied in order to more effectively engage students, enhance student learning, and improve overall course outcomes for the students as well as the university.

An assessment by the instructor and a survey of the students indicate that the gamification ideas were reasonably successful in this regard. The instructor appreciated the greater involvement of the students in the course and the amount and quality of the work performed by these students. The students appreciated the frequent and short assignments as well as the rapid and detailed feedback on their performance.

That said, the full gamification of a course is not guaranteed to not engage all students in all settings. It may not be appropriate to apply to all courses. Instead, some small elements explored here (such as graphical indicators of student or team progress towards a goal or fast and detailed feedback) can be applied to courses without the need to apply gamification extensively.

A few important limitations must be noted. First, gamification is essentially proposed as a means to make routine and unappealing activities more appealing to individuals through the application of game mechanics. However, it can't take away the actual work involved in the activity. Whether gamification is applied in the workplace or in the classroom, the underlying activity still has to be performed, regardless of whether an individual is awarded badges or not. When applying gamification, care must be taken to ensure that the content and quality of the activity are not diminished.

Second, the gamification of the course turned out to be an ongoing addition to the instructor's workload. Assignments were turned in and needed to be graded each week. The investment in time required to execute the gamification approach described in this paper may not be acceptable to all instructors.

Third, this paper describes only a single administration of the course, and hence only a small amount of data was obtained. A second administration of the gamified course is currently underway and additional data will be gathered, which may provide a more detailed insight into the effectiveness of the approach.

At this time, however, the instructor is optimistic about the use of gamification in appropriate settings. In this particular instance, game mechanics energized a long-running course with an updated approach to pedagogy. As we learn to better communicate with and teach a new

generation of students, experiments such as these can only help us improve our efforts at effective education.

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