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Garrett Egan

Design & Development Project Report
Instructional Psychology & Technology, Brigham Young University

1 Executive Summary

1.1 Purpose

BYU's Center for Animation has established an award-winning reputation over the past 15 years for producing some of the best student-created films in the industry. This success has in turn made the animation program highly competitive, attracting highly qualified students from around the world. While animated films remain a key focus of the program, program directors and students recognized that the videogame industry highly depends on animation skills as well. To address growing industry demand for animation, the animation program created a videogame track alongside its film track. Dr. Seth Holladay, an Animation professor tasked with directing this videogame track, is quickly building up a competitive gaming track, with the games created over the first three years winning national accolades at E3, the official conference of the entertainment software association.

While the game track appears to be going well, Dr. Holladay recognized an area where students are less well-prepared: applying good game design to the games they develop. He proposed the creation of an introductory course in game design. This class is intended to eventually become required for students in BYU's Animation major who are pursuing the video game track. Dr. Holladay advises the video game capstone class, which students may choose to take to fulfill the required capstone experience as part of their major in Animation. The proposal came as a response to seeing students in the video game capstone class struggling to understand and apply good game design principles to the class's video game project. Dr. Holladay hopes that a course that focuses less on production and more on design will enable students to more effectively and efficiently make game design decisions during their capstone experience, eventually raising the quality of their resulting games.

The purpose of this design and development project was to design the curriculum for the proposed introductory game design course.

1.2 Background and Justification

Students in the video game capstone class are expected to collaborate with all other students in the class on the design and development of a video game. This is the major culminating experience of their undergraduate program in Animation. But, students in this class have little to no formal education in game design, which lowers the overall quality of design of the game projects made by the class. Every student working on the capstone project—artists, programmers, designers, producers, etc.—must have a foundation in game design in order to make a cohesive final project.

General design skills are taught in some of the Animation classes; however, some students continue to make decisions based on what they like, rather than focusing on the intended audience, and others make decisions by trial and error, lacking direction altogether. Dr. Holladay and the other advisors of the video game capstone project have implemented a just-in-time teaching approach in the class, giving design direction at targeted points of the project's

development where specific game design principles apply, but students have still struggled to apply what is being taught because they are mid-development and often do not have sufficient time to absorb and practice the concepts alongside the demands of a game mid-development.

To help students more successfully apply game design principles in the capstone class, the Center for Animation asked that I create a new introductory course in game design. This course will allow students to learn game design principles and practice their design skills before diving into the final video game project where they will not have sufficient time to learn the requisite design skills.

Over the past five years prior to this project, I have worked as a lead producer, teaching assistant, and mentor for multiple BYU video game capstone projects. I have worked closely with various development teams on different game projects and have seen numerous examples of good and bad game design along the way. The Center for Animation has asked that I design and develop this curriculum because of my experience in this area.

1.3 Product Description

The delivered product is an introductory game design course in BYU's Learning Suite LMS with supplementary materials housed in a Google drive. It includes reading assignments, weekly reflection and critique prompts, culminating project descriptions and templates, and assessment rubrics for each of these assignments and projects. It also includes lecture materials, resources, and in-class activities to introduce concepts and allow students to practice key design skills.

I met with Dr. Holladay several times to discuss the learning outcomes for this course. This resulted in several drafts of objectives, which I presented to him as well as IP&T faculty. These were narrowed down to three learning objectives. The selected learning objectives for this course were:

1. Students will produce a game design document
2. Students will pitch their game ideas
3. Students will critique existing games

These learning objectives were chosen because they are critical tasks for a game designer working at a game studio. The primary form of assessment in a project-based learning environment should be authentic performance (see section 2.8.2). Writing a detailed game design document and presenting a compelling game pitch are two of the most critical performances for a game designer in the field (see section 2.8.1). Critiquing games is a necessary skill in order to effectively create a game design document or pitch (see section 2.7.2.2). There are many sub-goals considered within each of these learning objectives, such as the ability to balance game mechanics, but they are considered prerequisites of these overarching goals, and were considered when assessing class projects and assignments.

These learning objectives were taught and assessed through the course activities and materials provided. The main course activities and structure consisted of: reading assignments, weekly

assignments, projects, assessments, and in-class activities. Each of these is briefly described below.

1.3.1 Reading Assignments
The majority of readings for this class came from the book *The Art of Game Design* by Jesse Schell, which was used as the textbook for the class. Through consulting similar game design courses as well as with Dr. Holladay, this text was one of the most consistently used books in game design (see section 2.6.1). Readings were spaced throughout the semester to introduce important game design concepts, as well as prepare students to develop their own game design documents and pitches.

Chapters in *The Art of Game Design* include examples and illustrations from the author's experience in game design, which allows students to connect the design concepts with existing games by illustrating specific examples. This helped students connect their learning to their previous experience (see section 2.6.3). It also prepared students to analyze games on their own, improving their ability to give targeted feedback.

Readings were discussed in class (see section 1.3.5), but were not graded (see section 1.3.4).

1.3.2 Weekly Assignments
Each of the first 10 weeks of the semester, students were required to submit a reflection and a game critique. The reflection included the students' thoughts on what they were learning at that point in the semester; the critique asked students to apply the concepts they were learning to analyze existing games for good and bad game design.

Questions in the weekly reflection prompts are listed below.
- What is new? What have you learned?
- How does this week's topic(s) relate to game design as a whole?
- How are you developing as a game designer? In what ways are you strong/weak as a game designer?
- What questions do you still have?

These prompts encouraged reflection from students and allowed them to critically analyze and synthesize their learning. This helped students to deepen their understanding of game design and the processes followed by a game designer.

Students were also asked to find examples of games that embody good and bad design principles based on the topics discussed that week. Prompts for this section were to "Choose a game you have played or watched and critique it based on a topic we discussed this week. Discuss the strengths and weaknesses of the game, as well as how you would recommend improving that game. Be sure to include sufficient specific details to support your ideas." This challenged students' analytical thinking skills by giving them a chance to apply what they were learning in class to an existing game. It prepared students to critique their own work as they created their final projects.

1.3.3 Projects

There were two major projects in this class: a game design document and a game pitch. These are the core assignments of the class, as well as the main sources of assessment.

The game design document should be a detailed communication of a game's core experience, intended audience, mechanics, story/aesthetics, and any other information necessary to clearly communicate the features involved in the game (see section 2.7.1). The purpose of the game design document is to communicate how to develop the game, should the development team need to build the game off of the game design document's specifications without any additional instructions.

The game pitch should succinctly communicate the core of a game's experience. Pitches should only last 3-5 minutes and should focus on the core of the game rather than the details. These were presented at the end of the semester as a part of the class.

1.3.4 Assessment

Weekly reflections and final projects (i.e., game design document and pitch) were assessed using rubrics designed to assess good game design principles. The principles focus on three core competencies, listed below:

1. Students can identify and design a core experience
2. Students can identify and design for a target audience
3. Students can communicate justification for their design decisions

These principles were used as the basis of the rubrics for the final projects, and informed the weekly reflection prompts and rubrics. Details and justifications of these principles can be found in the assessment plan section of the appendix (see section 2.13).

1.3.5 Lecture Materials, Resources, and In-class Activities

Materials, resources, and activities used during class were created based on the needs and content of each class. Materials included lecture slides, visuals, and lesson notes with key concepts to teach; worksheets, example games, and other pieces to be used as part of in-class activities. In-class activities included videos, games, discussions, brainstorm sessions, and other activities designed to generate and iterate on game ideas and to illustrate game design principles in action.

1.4 Design Process

To maintain consistency of instruction, as well as efficiency of design and development, I decided to design the course from a high level before designing the specifics of any particular piece. I divided my process into 4 general phases: Design, Development, Implementation, and Evaluation. I will discuss each individually.

1.4.1 Design

The first step in creating this course was to conceptualize the goal. Providing myself a clear set of outcomes helped me to focus on what mattered rather than being distracted by whatever I was interested in that day.

In the design phase, I focused on conceptual development; analysis of learners, resources, and other constraints; and creating a roadmap of the deliverables that would be needed as a part of the complete course.

I did not physically develop any of the materials in this phase. It was hard to restrain myself at times, but I found it important to understand the big picture before diving into the details. The level of conceptualization I was going for can be described best in an example.

One of the major deliverables of this class was a timeline of when concepts would be taught in the course. This deliverable would eventually need to be revised based on the likelihood of students completing all of the associated assignments within the given timeframe. However, for this phase I disregarded the specific timeline and focused instead on the general sequence of concepts and how they connected to each other.

Focusing on the broad structure first made it much easier to add developmental details later without needing a complete restructure of course content or assignments.

1.4.2 Development

The next step was to create tangible resources to be used as a part of the course. This included the actual assignment descriptions, templates, and rubrics.

Unlike the previous phase, I focused entirely on the details of how to communicate with students and assess learning. A major task of this phase was to create the final project game design document template. This template was over ten pages long and included detailed instructions for students to follow to be successful in creating their own design document. In the design phase, I had decided that I would assign a final game design document as a summative assessment technique, and I defined the specific learning objectives I would measure with that assessment, but I did not determine exactly what content would be required as a part of the assignment. I also did not set a specific deadline, specific work days, or specific grading criteria and points until this phase.

Assigning specific point values to each assignment was pretty simple once I had determined what assignments I would include in my course and what importance they played in determining the growth and ability of each student. The goal in this phase was to define how implementation would be completed before I began implementation.

1.4.3 Implementation

Once the design and development were complete, it was time to actually teach the course. This phase included all of the actual teaching, grading, and in-flight revisions to the course. This was the most clearly time-defined phase because it began on the first day of classes and ended once final grades were submitted.

This phase is described in detail in section 1.6.

1.4.4 Evaluation
The last step of this project was to reflect on the process and product to see what worked well and where potential improvements could be implemented. This phase was the least time-defined, occurring throughout the entire process more than I had intended.

This phase is described in detail in section 1.7.

1.4.5 Conclusion
These phases helped keep me focused on the task at hand. I found that I had a tendency to consider the future-, and even end-, state of this course at every point in the process. While this sometimes helped me to remain grounded on the overall goal of the course, it also sometimes caused me to become distracted by minor details that were not yet determined, and which were not important to consider at the time. Using distinct phases helped me to maintain focus on the immediate goal, recognizing that future phases would address the concerns that surfaced earlier in the process.

They also helped me to know when it was necessary to move forward. If given infinite time, I'm not sure I would exit the design phase at all. But, with specific deadlines and an understanding of all of the major tasks that needed to be completed, I could more easily move forward with an imperfect or incomplete solution as opposed to becoming held back by the imperfection of the design. Sometimes good is better than nothing when perfect is not achievable in the constraints of time, resources, etc.

1.5 Design Evolution

Despite my attempts to maintain a somewhat rigid compliance to the design phases I had established for myself, there was quite a bit of overlap between all adjacent phases because of the fluid nature of the design process. I had to adapt at many points in the process. I will consider some of the major tasks, adaptations, and lessons learned from each phase in the following sections.

1.5.1 Design
This phase included the conceptual creation of all parts of the course. The course structure, content, sequencing, pacing, and assessment techniques were decided upon in this stage. This gave me a solid structure to build within, as well as a firm understanding of what a final state would look like for this first iteration of the course.

1.5.1.1 Deconstructing and reconstructing the content model
There is a lot of content to analyze in game design (see section 2.7). It incorporates the entire field of design as well as computer science, visual art, music, storytelling, product marketing, psychology, anthropology, economics, mathematics, physics, and any other field whose subject matter is addressed within the designed game. It is very common for expert game designers to be educated in many diverse fields in order to make a cohesive design.

Defining the specific topics of focus, and distilling the essence of game design to its most simple structure was very complicated, but very important. Once that had been completed, I had a strong structure to use to organize this course's lectures, assignments, and in-class activities.

1.5.1.2 Identifying key constraints
Every design is done in a specific context. The context for this class included the specific students (see section 2.4), university culture, classroom precedent, physical resources (see section 2.5), and other affordances of the university, instructor, and learners.

Knowing what constraints I would experience was critical in keeping me grounded in the task at hand. Sometimes, it is easy to drift into contemplating the ideal game design course structure, forgetting the real-world constraints that it must comply with. Knowing the constraints before designing helped me to focus on building a usable solution rather than just a theoretical solution.

1.5.1.3 Defining the purpose
Before developing any specific assignments or classroom activities, I needed to understand the role each element would play in my overall course design. This helped me to narrow the scope of the project and focus on what really mattered rather than what was interesting to me at the time.

For example, I learned from my research in project-based learning that the primary forms of assessment should be authentic performance and reflection (see section 2.8.2), and that assessment opportunities should be given frequently. So I decided that the core assignments, which were primarily used for assessment, would be some form of authentic performance and reflection. Authentic performance could not feasibly be measured frequently, so I set that as the major summative assessment, and used reflection as a formative tool each week for the first two-thirds of the semester.

I constrained myself to specific deliverables because of the purposes they served in ensuring student learning and growth, and I resisted adding more assignments or activities unless they contributed to a key learning objective or to aligning my course curriculum to my chosen learning theories or design strategies.

1.5.1.4 Conclusion
Design is hard. Without making a single assignment or diving into the details, I gave myself a broad-stroked idea of how this course should be structured and implemented. I defined clear guidelines that helped me to focus on the important materials and activities that would drive student learning. This phase gave me the end goal and the general outline for accomplishing it without being distracted by the specific details of development and implementation.

1.5.2 Development
This phase included the physical creation of the necessary materials for the course. The assignment descriptions, rubrics, and templates were created during this phase, along with all of the student resources, such as a video game genre list, player types list, and example materials.

1.5.2.1 Starting with a rough draft
I frequently found it hard to get started on a task, but could easily revise a rough draft once I had one written down. Some of the developed materials, such as the game design template, required quite a bit of specific research into how to structure the document and write clear instructions so that students would understand it without much additional support. The task was daunting, and I often found myself procrastinating tasks that I didn't feel like I was capable of completing effectively the first time.

What helped me to get through this barrier was just starting with something. Accepting that my first draft was not going to be my final draft allowed me the freedom to not know all of the answers from the beginning. It gave me the motivation to write down my ideas even though they were not all fully formed and perfected. Then, once I had something written down that I could critique, I found it easy to revise over and over until I was satisfied. Questions arose, and answers were found. I did not need to stress about the imperfections of my deliverables because I knew I had given myself plenty of time to get it wrong many times before I needed to get it right.

1.5.2.2 Revising the design based on identified constraints
Designing around so many constraints is complex. I found it effective to design loosely first, and then revise my design by critiquing it through a particular lens. For example, I might look at my design for in-class activities from the lense of physical constraints. I had originally planned to have students play games such as Uno in groups, adjust the game's rules, and then play again in order to see the effect of different mechanical changes. Given the physical constraints of using the animation theater (see section 2.5) as the classroom, I found that group activities like that would not be effective in that space. As a result, I added more time for us to watch and discuss gameplay during class and to play games as a part of the game critique assignment outside of class.

My designs required constant revisions, including during and after implementation. My goal was to have all of these revisions completed before the semester began, but I inevitably found issues and areas of potential improvement during implementation that I could not have seen before. I found it much easier to develop something quickly and revise it often as opposed to designing every aspect before moving on to development.

1.5.2.3 Gamifying the classroom
I am personally passionate about the motivational effects of gamifying learning experiences. I wanted to give students of this class the opportunity to have control of their learning and to be intrinsically motivated by the projects I was asking them to complete. Plus, I knew that students would likely begin viewing the course through the lense of game design, and I wanted to make sure I had designed a proper game for them to play.

There were two main developmental constraints that came from this desired outcome.

1. Final grades should be given based on a point-based system with a base 10 final grade point total and no decimal points awarded. I set my course total points as 1000 for easy calculation of final grades, and I made all assignments worth enough points that I would not need to give non-integer scores such as 1.5 points or 25.2 points. Every assignment grade was easily calculable and each grade percentage was understandable without

needing to use a calculator. This made it very easy for students to understand how many points they needed from each assignment in order to achieve the grade they wanted, which in turn helped them to take control of their learning experience from the start.

2. Assignments needed to be less prescriptive and more open-ended. Every reflection focused on general improvement rather than content regurgitation; every game critique needed to be based on a different game, but it could be any game students wanted to critique; and the final projects could be based on any game genre or style students wanted to pursue. Expectations of each assignment was based on the quality of the design process and final product cohesion rather than on the predicted market value of the game or the subjective excitement generated by the game idea.

Gamifying the classroom in this way helped students to feel like the instructor was a partner in their development, rather than a gatekeeper or judge who simply determines which students succeed and which students fail.

1.5.2.4 Conclusion
There were many deliverables I created during the development phase that are not described in this report. I have focused here on the goals and general tasks and lessons learned from each phase, rather than the final specifications of each deliverable. For more in-depth information on each deliverable, see section 2.10.

Overall, the purpose of this phase was to make my designs tangible and executable. It was about turning "use authentic performance as assessment" into a specific game design template that assisted students in creating their own game design document and pitch in just half of one semester.

The hardest part of development is deciding which specific activity/assignment/project/rubric to use for each part of the design. Ultimately, choosing something has been better than being paralyzed by indecision. And seeing everything start to come together is what makes it all worth it.

1.5.3 Implementation
This phase included everything involved in actually teaching the first iteration of this course, including preparing the classroom, teaching lectures, facilitating discussions, grading assignments, and resolving conflicts and exceptions. For more information on the specifics of this phase, see section 1.6. In this section, I will focus on my design thoughts and changes that occurred in this phase.

1.5.3.1 Teaching the class
Defining what concepts to teach as a part of this course is difficult enough, but in this phase those concepts need to be communicated to students in an effective manner for their understanding. This at times felt like working as a professional translator, communicating my expert knowledge in a digestible form for all of the novices in the room.

The main challenge with this step is not fully understanding what examples and metaphors would resonate with the students in the class. It would not matter how masterfully I had structured the course, assignments, and concepts if students did not understand it all in their own terms.

To resolve this challenge, I used many current challenges I experienced as a game designer in industry as well as constantly soliciting feedback from students on whether they understand concepts or have questions about the course structure. Simplifying the content during the design phase helped tremendously in making the content stick in students' minds.

1.5.3.2 Grading assignments
Each week, students would turn in three to four assignments: any applicable reading assignments, a weekly attendance quiz, a weekly reflection, and a weekly game critique. This was the majority of the grading burden until the end of the semester when final projects were due.

In order to reduce the burden of weekly grading, I graded all of the reading assignments and attendance tracking through online student-graded self-assessments. Students simply reported on whether they completed all of the reading, some of the reading, or none of the reading and whether they attended all of, some of, or none of class for each class period. These were important activities for driving student learning, but were not formative or summative assessment items. For this reason, I decided to make them worth some points, but not instructor-graded.

Grading final projects took much more time, although I was very familiar with each student's project before the end of the semester. I had the opportunity to review each student's game design document various times throughout the semester, and I consistently provided feedback to students about how I would grade each section of their design documents. This helped to align the expectations of students and instructor, as well as to speed up grading at the end of the semester.

The lesson learned here is that grading should be used as a way of providing formative and summative feedback on a student's progress. If it's not an important feedback mechanic, it may not be necessary for the instructor to grade it manually.

1.5.3.3 Conclusion
The implementation phase of this class was very smooth because of the simple, well-organized course structure and student materials. Students did not need to relearn how to complete a reflection each week because each week's reflection prompts were the same, and the grading expectations were consistent as well. There was plenty of ongoing development during this phase, but it was minimal because of the strong initial design of the course.

1.5.4 Evaluation
This phase included the reflection and analysis of the first implementation of this course, including the gathering of evaluative materials (student assignments, reflections, evaluations, etc), compiling results, and making recommendations for future iterations. For more information on the specifics of this phase, see section 1.7. In this section, I will focus on my design thoughts and changes that occurred in this phase.

1.5.4.1 Gathering student feedback
I wanted to know what students thought of each aspect of the class. I asked students to provide feedback whenever they would like, whether in person or through email. This was an effective

form of receiving feedback because students could provide their feedback in the moment they were struggling or pleased, rather than waiting until a specified time. Students also had the chance to evaluate the semester as a whole during a final retrospective meeting (see section 2.14.2).

Gathering formative and summative feedback from students gave me both an in-the-moment view as well as a holistic view of their experience in the course. The challenge was collecting meaningful, generalized, actionable feedback. Sometimes students provide feedback based on temporary pain, individual circumstances, or parts of the course that cannot feasibly change. Gathering the feedback, then, must be followed by evaluating the feedback. I tried to identify common themes and root causes of frustration as well as enjoyment in order to reduce pain and increase satisfaction in the course.

1.5.4.2 Reviewing with an expert
Throughout the semester and after the semester had completed, I reviewed the successes and failures with Dr. Holladay. He provided meaningful insight into what he saw was engaging students without feeling the pressure of being the instructor himself. He also helped me to see areas of strength and potential improvement that I did not see on my own. The synergy of reviewing student feedback, assignments, and in-class behavior with an expert helped to clarify the core issues driving frustration or disengagement in the class.

1.5.4.3 Conclusion
Overall, I found it valuable to review all of my experiences with an expert instructor. Receiving constant feedback gave me new ideas every class period, and reviewing that feedback helped me to focus on the most important pain points without being distracted by a one-off issue.

1.5.5 Conclusion
Design requires evolution. I think my initial thought was that I would be sufficiently organized that I would not need to perform significant design revisions or make significant adaptations while in implementation. I was wrong. I luckily did not need to do any major overhauls of this course while in implementation, but I constantly revised my approach and my design. These changes proved extremely valuable to the success and growth of this group of students.

1.6 Implementation

I both developed the course curriculum and taught the first iteration of the class. Dr. Holladay, as the primary stakeholder, assisted in the design, development, and teaching of the course.

All course materials and documents are available to Dr. Holladay as a part of the finished product, and instructions were provided for all activities and assignments that require specific guidance. As a co-designer and developer of the curriculum, Dr. Holladay is well-versed in the materials and techniques used in teaching this content, and will therefore not require specific instructions in order to use many of the developed materials.

A brief explanation of the setup and use of these materials is included below.

1.6.1 Before the Semester Begins

For this iteration, students were asked to enroll in a 2-credit special projects class with Dr. Holladay, and were notified of the class schedule and details prior to the first day of class. They were also allowed to add/drop the class in a similar manner as with other BYU classes.

Grading in this class erred on the side of leniency in order to encourage students to participate in a pilot class and to allow us to gather more honest student feedback about the difficulty of the content and skills taught in the class.

The course was set up by the instructor before the semester began so that all assignments and quizzes were available for students to view from the beginning of the semester. In this iteration, this early setup provided the class a smooth, simple start to the semester.

1.6.2 During the Semester

The major tasks to be accomplished by the instructor during the semester are listed below.
- Classroom preparation. Before each class period, the instructor should set up the classroom, including erasing the whiteboard, loading any video or other online materials to be used in class, and reviewing the class notes for that class period.
- Classroom activities. During each class, the instructor will lead the various activities outlined in the class notes. These activities sometimes require the instructor to participate in classroom activities, such as a design pitch or group discussion. The instructor should play the role of a facilitator and a mentor more than a presenter.
- Classroom cleanup. After each class, the instructor should clean up the classroom, including erasing the whiteboard, closing any online materials used in class, and putting away any physical resources used during that class period.
- Grading. After each instructor-graded assignment is turned in, the instructor should set aside time to grade these assignments. With the weekly cadence of assignment turn-ins, I set aside time after class each Tuesday (when all weekly assignments were due) to grade the weekly assignments. This routine made grading much easier and allowed me to provide quicker feedback to the students.
- Revising. After each class, the instructor should identify concepts or areas where students are continually struggling or where students are excelling. The instructor should then adjust future class periods, where possible, to accommodate for the pace students are learning.

1.7 Evaluation

This section provides an overview of the evaluation criteria, methods, and results from this project. For more details, see section 2.14.

1.7.1 Criteria

Ultimately, the goal of the Center for Animation is to help students to be hired at professional film and game studios. This is not an immediate outcome of this course, but is the ultimate purpose of the program. In preparation for designing this class, I met with Dr. Holladay to discuss potential evaluative criteria for this course specifically. The general criteria we determined is listed below.

1. Students will produce something that demonstrates good design principles
2. Students will be able to design within constraints
3. Students will be able to critically analyze finished and in-development games

1.7.2 Procedures

The primary methods of evaluation were expert review by Dr. Holladay, grade data gathered from student assessments, impromptu feedback throughout the semester, and a final "post-mortem" (a term used in the video game industry to describe a meeting where team members review their successes and failures during the previous development cycle) where students were able to provide feedback on the course. This feedback will inform future iterations of the course.

Our discussions in expert review were guided by these general criteria. Some student assignments, such as the weekly reflections and game critiques were designed to produce evaluative feedback. And the final post-mortem was structured to elicit feedback in these areas.

1.7.3 Evidence

I will briefly mention some areas where the results of these criteria is evident in the following subsections.

1.7.3.1 Demonstrating Good Design Principles
The two major projects in the class—the design document and pitch—were designed to give students an opportunity to demonstrate that they can follow good design principles in producing a final product.

The criteria for good game design were determined by a review of relevant literature (see section 2.6.1) and a content/task analysis (see section 2.7).

Students averaged 91.8% on the final game design document, which was graded predominantly on students' ability to create a cohesive game design based on good design principles. They also pitched those same ideas, and averaged 89.4% on their final pitch presentations.

Students also had many other opportunities to demonstrate good game design principles throughout the semester in discussions, critiques, and impromptu feedback sessions. They all demonstrated increased ability to communicate clearly about game design as the semester progressed.

1.7.3.2 Designing Within Constraints
One of a game designer's toughest challenges is to design within the constraints of a specific audience, genre, and culture. Add on top of that the constraints of technology, design ability, time, resources, and many other factors. In order to identify if students successfully designed within appropriate constraints, it was important that their final projects were graded primarily on general cohesion, and not completion or instructor interest.

Every category in the grading rubrics for the final projects centered on the ability of students to connect their design choices to a central experience they were trying to create for a particular

audience. This focus helped students to design intentionally, rather than making arbitrary design decisions based on their shifting interests.

With this focus, students excelled in their final projects, creating cohesive final products that clearly demonstrated that they were capable of not only following constraints in their designs, but also that they were able to set up constraints for themselves and their projects.

1.7.3.3 Critically Analyzing Games
Every week, students were asked to critique an existing game in preparation of critiquing each other's final projects. These critiques began as subjective reviews of favorite games based on criteria such as general appeal, visual quality, or fun. By the end of the semester, these critiques had changed to a much more objective dissection of a game based on a specific characteristic.

For example, students frequently defined a game's successful experience as something "that just makes you feel really cool" or that is "unique" or "different." These are not bad attributes for a game, but they are not a core experience. Good game design is not based on merely being unique, and feelings such as "cool" or "awesome" are purely subjective, and do not convey *why* those games were successful, just that they *were* successful.

By the end of the semester, these critiques became much more specific and targeted at core elements of the game and how that element contributed to the overall success of the game. For example, one student commented on the game *Amnesia: The Dark Descent*, a first-person horror game, and noted the use of the first-person camera as part of the experience: "*Amnesia's* designers knew they needed to immerse the player as fully into their game world as they could, and this is reflected in the gameplay. The game is played from a first-person perspective, so although the main character has a name and a backstory, the main character is really just the player standing in Daniel's shoes. Every action they take is entirely their own, and they get to see the consequences of their actions first-hand."

This additional detail and focus on *how* and *why* the game's designers may have chosen the mechanics they did show a deeper understanding of game design principles and how they should be used to enhance a player's experience.

1.7.4 Outcomes
Overall, students performed very well in this class and the projects and activities used in this class were highly effective at developing students' abilities in game design. And beyond increased ability, students also developed a greater appreciation for the work a designer performs, noting specifically how much work there is to be done.

There were a few recommendations that surfaced as a result of these evaluations. These recommendations are listed below. For a more in-depth understanding of these recommendations, please see section 2.14.

1. Move the class to another classroom or other more collaborative space.
2. Intersperse short assignments that ask students to submit sections of a design document.
3. Lengthen the class time to 2 hours if possible.
4. Provide more resources for deeper learning.

1.8 Reflection & Critique

The process of designing, developing, and teaching this course has taught me many lessons that can be applied to design overall. I will describe a few of the most prominent of these lessons and how I learned them below.

1.8.1 Set Constraints and Follow Them
I'm a very intuitive person. I typically prefer to follow general guidelines rather than strict rules or procedures. This may be a personal preference, but whatever the designer's style, it is critical to set real constraints and follow them.

During the design phase of this project, I found myself wanting to incorporate elements of practically every learning theory and every design methodology into my work. Essentially, I was not just designing a university course, but also trying to design a new learning theory and design process. It's not effective. It is much more successful to pull specific rules of thumb or other important guidelines for my specific project rather than try to create a universal ruleset.

For example, I knew I wanted to follow project-based learning theory, but I also wanted to gamify my classroom. These ideas are not mutually exclusive, but they are also not the same. So, in order to create an effective classroom setting, I needed to identify the specific constraints I had to follow in order to accomplish both of these goals in this course. I focused on actionable constraints so that they would be easily measurable. Listed below are a few of these actionable constraints I identified from these two goals.

1. Projects should be central to the course curriculum.
2. Projects should be ill-structured to encourage unique solutions and play-like exploration.
3. Grades should be assigned based on a build-up points system that encourages students to take risks and course-correct frequently.
4. The instructor should play the role of a mentor, not a gatekeeper or judge.

These constraints helped me to develop a course that meets the core requirements of both learning theories while also providing me concrete evidence of whether I was succeeding or not in these goals. Without these constraints, I likely would have continued to rely solely on my design intuition, which would not have ensured success as well, and it certainly would have slowed down my development process.

1.8.2 Start With Something
I frequently found myself procrastinating development because I felt like I didn't know enough to be able to develop a successful course. The problem was that I didn't know what I didn't know. I needed to attempt a first draft before it was made clear to me what knowledge I still lacked.

I could have saved a lot of time and frustration by simply writing my ideas down on before going back to the drawing board. This simple exercise of identifying what I already knew helped me to create a plan for moving forward. I could identify areas I felt strong in, areas I felt were weak, and potential strategies for resolving any issues.

It may sound simple, but I think many designers experience a similar feeling of needing more background knowledge before starting anything at all. Instead of worrying about all that you don't know, just start with something. It does not have to be perfect because the first draft does not have to be the final draft. And once you have something concrete, the gaps begin to appear more clearly and it is easier to fill them in.

1.8.3 Ground Yourself with Learning Objectives

Everything I did tied back to my learning objectives, even more than learning theory or design methodology. This is because the learning objectives themselves were built on these theories and methodologies and because it is much simpler to align to specific goals created for my project than generic goals created by a theory/methodology.

At the beginning of my project, I spent a large amount of time narrowing the learning objectives I would focus on. Initially, I wanted to accomplish much more with the course I was creating, but I quickly found that a single 2-credit course just wasn't meant to accomplish everything I wanted. Through much revision with mentors, I settled on a greatly simplified list of learning objectives, and those proved to be hard enough to accomplish in one course.

After defining the learning objectives, the next challenge was to maintain my resolve not to reintroduce the previous objectives I had wanted to accomplish. They were worthy objectives, but were outside the scope of this course. By explicitly defining not only what the objectives were, but also what they were not, I was able to design and develop the course much quicker, and with greater focus. Instead of adding everything interesting in the field of game design, I could focus all of my energy on the key objectives I had identified. This established the target I was trying to hit, and my learning theories and design methodologies supported me in effectively hitting that target.

The lesson learned here is that every design project is based on an attempt to hit a desired target, and that means that every designer needs to know exactly what that target is before they can expect to hit it accurately.

1.8.4 Pros and Cons of Designing and Teaching

One of the unique aspects of this design and development project is that I both designed and taught the course. This provided a few pros and cons, and I will list a few of the major ones below.

Pros
1. There were fewer voices involved in the design/development process. This made it easier to make decisions and move forward because I didn't need to get as much buy-in for my ideas. It also meant that the division of responsibilities was simple: I was responsible for everything.
2. I could rely on my own understanding of my design. I didn't have to communicate all of the specific details of my design, knowing that the instructor who would use them for the initial prototype would be me as well.

Cons

1. I didn't test my design as much as I would have if I were to hand it off to another instructor. Knowing that I would be teaching the course I designed, I knew that I would understand my design as intended, and so I didn't feel the need to test my design as much before using it with students. It would have been better to test my ideas in practice, even though I didn't have to teach myself what I should do in each class.
2. I left some of my design without enough specific details. Having an uninformed instructor responsible for understanding and teaching my course would benefit me by providing questions about the specific details of how this design would be implemented specifically. Those questions would push me as a designer to ensure the details of the project would work not only in theory but also in practice.

Overall, I enjoyed designing and teaching the course. There were some clear benefits and drawbacks to this approach, but it ultimately resulted in a successful final product. If I were to do it again, I might have asked for more specific feedback from some of my mentors and I would have tested my designs more thoroughly. That would have allowed me to avoid some of the negatives of designing and teaching this course while maintaining the positives.

2 Appendix

2.1 Guide to the Appendix

Actual Product
This section contains a sample of materials used in the design and implementation of the class. These materials are packaged in a zipped folder for easy download as a single packet.

Product Walkthrough
This section contains a 5-minute overview video of the final product, as well as some of the design thinking that went into the creation of this course. I provided a view of what I had envisioned when creating the course as well as a view of the final product.

Learner Analysis
This section contains a review of student demographics, an interview with Dr. Holladay, and an analysis of past student work. This analysis gave me a foundation for understanding how to approach the design and development of the class based on the kind of students who would be taking the class, the challenges they might face, and a current benchmark of student success.

Environmental Analysis
This section contains a review of available resources that could be used in the design and development of the course curriculum. This review helped me to know what constraints existed around the design and development of this course.

Consulting Products / Precedent
This section contains an analysis of existing products that teach game design. It also includes a review of top university game design programs and how they teach the content and skills involved in game design.

Content / Task Analysis
This section contains diagrams of the content and tasks involved in game design. I provide an explanation for how I created those diagrams, as well as how they relate to each other.

Annotated Bibliography
This section contains a literature review of relevant literature in game design, learning theories, and instructional design approaches. I provide a brief analysis and takeaways for each section.

Budget and Timeline
This section contains a table with a rough estimated budget and a Gantt chart for a proposed timeline for design, development, implementation, and evaluation of the curriculum. It also contains the actual budget and timeline for the project.

Design Specifications
This section contains a detailed list of deliverables included in the development of this course, along with details for each major deliverable.

[Design Representations / Prototypes](#)
This section contains a draft of a game design document template, a weekly assignment example, and example lecture notes. These prototypes represent the various learning activities used in the class.

[Assessment](#)
This section contains a description of the assessment tools that were used. An example rubric is presented, along with the justification for each core competency assessed.

[Implementation](#)
This section contains a description of the implementation steps and resources required. A description of how implementation was performed is included.

[Evaluation](#)
This section contains a description of the evaluation tools that were used. A justification for the intended evaluation tools is provided.

2.2 Actual Product

The final course was provided as a combination of a LearningSuite course and a package of materials that were housed in a Google Drive. Some sample materials from the Google drive can be accessed [here](#). While this is not a comprehensive set of materials for the class, it does represent the major assets used in the design and teaching of this course.

2.3 Product Walkthrough

A short (5-minute) walkthrough of the final product can be seen [here](#). This walkthrough includes some of my design and process thoughts along with a view of the final product.

2.4 Learner Analysis

Over the past five years working directly with students in the Animation program, I have learned much about students' experiences in the program, including challenges in designing games for the capstone project class. As a lead producer for multiple projects, I conducted one-on-one interviews with each of the up to forty development team members every semester, using it as an opportunity to gather data on student experience so that I could help resolve tensions and improve student performance. Though I had gathered experiential data over years of interactions with students, I had not collected formal student assessment data from final projects or other sources of authentic performance. This gave me information about student perceptions, but not necessarily student performance. While important, it could be augmented by gathering data from other sources as well.

In order to better understand the students that may be taking this class, I reviewed student demographics from previous years' video game capstone classes; met with Dr. Holladay to discuss what he sees is lacking in students' design abilities; and reviewed previous game

projects' design documents, pitches, and team communication logs. In each activity, I specifically looked for evidence of students making, or not making, well-reasoned design decisions based on appealing to a target audience or core experience, connecting to design precedent or rules of thumb, or using other logical rationale that demonstrates the students were making intentional design decisions rather than ungrounded decisions. I also looked for students' ability to communicate their design ideas through documentation and presentation.

2.4.1 Student Demographics

Students in BYU's Animation program must participate in one of two culminating capstone experiences: making an animated short film or a video game. Potential students of the game design class are most likely to be those currently taking, or planning to take, the video game capstone class. They generally come from two undergraduate majors: Animation and Computer Science. Animation majors and Computer Science majors with an Animation emphasis are required to participate in one of the two capstone project options (i.e., animated film or video game), and thus will comprise the majority of students in this class. These two majors teach very different skills, and therefore students will enter the game design class with very diverse educational backgrounds. Though the majority of students in these classes come from these two majors, students who have participated in previous video game capstone projects have also come from majors such as Music Composition, Graphic Design, Photography, Illustration, Theater and Media Arts, Statistics, Mathematics, and others. This diversity brings a wealth of skills to a cross-disciplinary project like this one, but also provides a challenge when teaching a game design class.

Some game design programs, courses, and resources focus on teaching game design within a particular game development program, such as Unity or Unreal Engine, which requires students to have the ability to code in order to learn game design (see section 2.6.2). This prerequisite can make game design less accessible to students with no coding experience, and can discourage participation by students who are not interested in becoming game designers themselves, but would just like to gain some experience in game design in order to make better artistic or programming decisions based on the game's overall design vision. This meant that I needed to ensure that activities, examples, and assignments in the class did not require specific prerequisite technical skills, such as coding.

Video game classes and programs have historically experienced large gender disparity in them, with more males than females in almost all related classes. This is true of BYU's program as well, although female representation has been increasing in recent years, with this most recent school year seeing an almost gender-equal split in the capstone class. The game project's supervising professor, Dr. Holladay, would like to continue the high rate of female participation in the program by ensuring inclusive teaching of the game design class as well. This meant that I needed to ensure that activities, examples, and assignments in the class are not gendered so that they do not unintentionally discourage women from participating.

2.4.2 Interview with Dr. Holladay

As the professor of the video game capstone class since its inception, Dr. Holladay has years of experience advising teams of students building games. Over the years, he has noticed mistakes that students consistently make that could be resolved through more direct instruction of game

design to students before they begin the capstone experience. A summary and examples of some major identified issues are included in the following subsections.

2.4.2.1 Lack of a Long-term Vision

Students in the video game capstone class often lacked a long-term vision of what the game could or should be when development was completed. A long-term vision could provide greater alignment between developers and allow the team to work more effectively and efficiently. Without it, students generated and tested ideas in a trial-and-error style, often doing a lot of work for little or no progress. The work sometimes never combined into a cohesive final product. He described it as "working with their feet, and not with their heads," which illustrates the need for more well-reasoned design decisions, as opposed to trial and error.

A well-designed game will have a clear vision of the end product before development begins. The vision should include a clear core experience as well as a detailed target audience for the game. This enables team members to more effectively combine their efforts in development and make more focused decisions based on the needs and vision of the game.

2.4.2.2 Lack of Understanding the Role of a Game Designer

Most students in the capstone class believed that a game designer's role is primarily to decide what mechanics will be used in the game. While mechanics are certainly part of a game designer's toolkit, their decision-making tasks are much more broad and all-encompassing than just mechanics. Designers work with artists and programmers to define how the game should look and feel, and how that experience should be created. They collaborate with musicians, writers, graphic designers, and producers to ensure that the key elements of the game—those pieces that create the core game experience—are included in the game in such a way that the target audience experiences the desired feelings.

A good game designer will understand their role within a development team and will be able to work within the constraints of a diverse team to produce a product that creates a compelling experience for a target audience. This kind of design understanding will help students to produce better games by having a more detailed understanding of design and by encouraging them to design every aspect of the game, rather than just the mechanics.

2.4.2.3 Lack of Player Empathy

While playtesting a recent capstone game, students in the class observed new players playing an early iteration of their game. This iteration, though unfinished, had all of the core game mechanics and a few demo levels. While observing, they noticed that new players weren't executing the fighting combos that they had intended players to use. When asked whether they liked the game or not, many new players commented that they did not enjoy the game because the fighting was boring. The students responded by telling the player that they had not used the combos the way they were intended to be used.

A common response to improper implementation of a product is to defend the product, and blame problems on the user. In game design and many other fields, however, the product should always be built for the user. The end goal of game design is to create a compelling experience for a target audience. Blindly blaming the user for a poor experience demonstrates a lack of player empathy and desire to please the end user.

Another common example of this comes when students make decisions based on personal preference. If making a game for a demographic group different from our own, it is important to define success by what that group wants, not what we want.

A good game designer will be able to make decisions based on the desires of their target audience, removing their personal biases from the equation.

2.4.3 Evaluation of Documents, Pitches, and Communication Logs

Over the past five years, I have worked as the lead producer and teaching assistant for multiple video game capstone projects. I have worked closely with various development teams on different game projects and have seen numerous examples of good and bad game design along the way. To better understand the state of design decision-making in the capstone class, I reviewed all of the game design documents, pitches, and communication logs for recent years. Dr. Holladay has provided me access to any capstone game design documents, game pitches, and team communication logs that I did not already have access to. I reviewed these artifacts using the rubric for good game design principles as pulled from the related literature (see section 2.6.1). The identified core competencies in good game design are listed below (see section 2.12).

1. Students can identify and design a core experience
2. Students can identify and design for a target audience
3. Students can communicate justification for their design decisions

2.4.3.1 Game Design Documents

An important note to make is that there was no formal game design document created for most of the capstone game projects. With no central document, students were likely to experience confusion when trying to develop features of the game. They were also likely not to base their design decisions on a target audience or core experience.

Some years had a 1-2 page explanation of key "pillars" (i.e., core tenets) of the game, but the pillars were often vague or driven by core mechanics rather than player experience. For example, one of the pillars of a recent game was "Short games", identifying the target game length as between five and ten minutes. While this may have been an important aspect of the game, it did not relate to the experience of playing the game, such as "fast-paced" or "thrilling". It also doesn't demonstrate clear rationale behind this pillar. Does the target audience prefer short games? Is the shorter game more conducive of a thrilling, fast-paced experience? There was a clear lack of connection to either the core game experience or the target audience.

In addition to the lack of connection to a core experience and target audience, these design documents lack sufficient detail. A major goal of the game design document is to communicate to the development team what kind of game should be created. This communication needs to be unambiguous and actionable. Pillars such as "Easy Onboarding" or "Strategic Depth" are vague and could be interpreted in multiple ways, resulting in wildly different games. There is danger in including too much detail; however, I have not found an example of this in any of the game design documents I have reviewed.

A well-designed game design document should have clear connections to a core game experience and a target audience. The document should then vividly communicate the experience such that the development team members are not confused about what kind of game they are attempting to create. It should include sufficient detail that it is unambiguous, but also not burdensome.

2.4.3.2 Game Pitches
Game ideas are pitched in a formal presentation and voted on before development begins. A single game idea is selected as the capstone game project for that year. Each year, about a dozen ideas are submitted for consideration, with a few selected by Animation department faculty members for presentation and vote. The goal of the pitch is to quickly and effectively communicate the experience of a game such that it is clear what kind of game will be created. It should also spark the interest of the development team, who will need to work on this game for the following year.

In reviewing the submitted pitch documents and presentations for recent years, almost all lacked a clear communication of core experience and target audience. They also lacked in clarity of mechanics, using vague language to describe the intended game. In one representative pitch, the opening line included what was meant to be a succinct description of the game experience. It describes the location of the game world, and says that this place is "where the two greatest of powers are put head to head in all out controlled warfare." Not only is the description vague and somewhat contradictory, it does not give any indication of what players will experience when playing this game, what actions they will take, or how they will win, if that is even the goal. It is likely that the creator of this pitch had an idea of how some of these things would work, but it was not clearly communicated in the pitch.

Almost none of the dozens of pitch documents reviewed included information about a target audience, and few included information about a core gameplay experience. Most focused on the mechanics of the game, the narrative or story of the game, or the characters or world of the game. While these elements are important to develop as a part of the overall game design, this focus on the peripheral elements is indicative of a lack of a core game experience. The core game experience should form the foundation for the long-term vision of the game.

2.4.4 Conclusions
From the analyses performed, there are a few key implications for the design of the new curriculum.
- Activities/assignments/etc. should be gender-neutral
- Activities/assignments/etc. should not require prerequisite technical skills, such as coding
- Content should be based on designing a core game experience for a target audience
- Emphasis should be placed on clear, detailed communication of ideas

These conclusions were derived from the aforementioned analysis and discussion with Dr. Holladay. These constituted important tenets of the new game design course.

2.5 Environmental Analysis

The Center for Animation had many physical resources available, including multiple dedicated classrooms, that can be used for this game design class. The professors in this department were also very flexible and open to using the best pedagogical strategies to ensure the best teaching and learning experience. There was also an important classroom precedent to consider, since most students in the game design class had taken multiple classes in the Animation program and were accustomed to that teaching style. The largest limitation was time, especially for me in the design phase of this project. A more detailed breakdown of each is provided below.

2.5.1 Physical Assets

There were three rooms dedicated for classes in the animation program: the animation theater, the animation lab, and the game lab. The Computer Science department also had many classrooms in the same building that might have been available for this class as well, if the dedicated rooms were not available. Each location had different resources available, and I considered the values of each one when considering how to structure this course because it was not previously decided which classroom would be available for this course. Ultimately, the animation theater was selected as the classroom to be used for this iteration of the course, so I will focus on that room's available resources as a part of this report.

The animation theater was a theater-style classroom with 40 chairs bolted to the floor and to each other in rows. This seating configuration created limitations for collaborative activities in that classroom. There was a desk at the front with a dual-monitor computer, including a touch-screen drawing monitor designed for use in digital art, such as painting, drawing, 3D modeling, texturing, rigging, animating, and visual effects. The computer had high-speed internet and all of the appropriate software programs installed for use in the game capstone project, such as Photoshop, Maya, Houdini, Unreal Engine, Slack, and others. There was a projector and screen, a whiteboard and markers, and a panel to control the projector, the projector screen, and the lights in the classroom. All of the chairs faced the front and each row was set higher than the row in front of them. This was an optimal location for lecture, but not for small group discussion or other collaborative activities.

Inside and outside of this building, students had many other resources that were used in creating the video game capstone projects, such as computer labs, collaborative spaces in the library and student center, recording studios, and many other resources provided across BYU's campus. With such an interdisciplinary project like a video game, it was common for students to use resources from many places across campus. These labs and other spaces had the necessary resources for completing the associated work, but were not expected to be used frequently in this class because they were more specialized in creating specific game components, such as music composition or voice overs. Students were free to work wherever they found most convenient and effective, although most students worked in the animation theater during class time in order to receive one-on-one assistance from the instructor.

Based on the majority of game design activities revolving around collaboration, discussion, and playing games, it may have been more advantageous to teach the class in the game lab rather than the animation theater. It would have been helpful, though, to have both the theater and the game lab available for presentation/lecture and collaborative work.

This is not an exhaustive list of available resources, but it does demonstrate some of the primary physical resources and limitations that affected the implementation of the game design class. The classroom selected caused me to adjust my design to fit the resources and limitations of the classroom. Before the classroom was selected, I needed to be flexible in my design, knowing that the classroom might limit the ways I could teach the material.

2.5.2 Professors and Precedent

Although I took many animation classes while studying at BYU, I also discussed the specifics of class enrollment and procedure with Dr. Holladay, pulling on previous class data whenever we needed more detailed information.

The Animation program had set a precedent of studio-style classes. Almost every class in the Animation program followed this same style of teaching. These classes did not use exams as a form of assessment, tending toward large-scale real-world projects instead. These roughly-defined projects often lasted a large portion of the semester, and students were expected to self-direct and self-motivate. They often required a large amount of time per week to complete, more than the average credit requirement. There was not always explicit instruction, with professors preferring to assist students one-on-one as they were working through a difficult problem as opposed to providing a lecture or other demonstration to the entire class. They would demonstrate specific techniques if there was widespread challenge, but otherwise students were expected to learn much on their own. This correlates strongly with project-based learning, where students are expected to work on real-life problems and professors act as mentors and guides through the project. There may be a few small assignments or readings assigned, but the bulk of the class work is directed at completing the large project(s).

This project-based approach was effective for the game design class as well, with students able to focus on one or two major real-world projects throughout the semester. These projects were used as the primary sources of assessment, and class time could be dedicated to working on these projects with instructor guidance.

Another important precedent to acknowledge was class size. Most of the classes in the Animation program had between 15 and 30 students in them, with most classes enrolling about 20 students per semester. The game design class was expected to have between 10 and 15 students in it because not all of the students in the Animation program would be going through the video game track. There were a few students from outside the Animation program taking this class, but their numbers were minimal.

2.5.3 Limitations and Other Considerations

The largest limitation was time, specifically my time during the design and development phases. I only had about ten hours per week to dedicate to designing this curriculum, and I only had about four months to complete the front-end analysis, design and development of the course before the beginning of Fall semester, when this class was taught.

A major implication of this constrained timeline is that I was not able to use some of the activities I had envisioned. For example, I had considered creating high-fidelity prototypes of video games for the class to test and critique. This would take a considerable amount of time, and there was

not sufficient time to complete enough of these games for use as a part of the curriculum. It was still possible to do these test-and-critique activities, but they needed to be done on existing completed games, rather than on specially-designed game prototypes.

Another major issue, resulting from the specific timeline of working across Spring and Summer terms, was that I did not have easy access to professors or potential students of this class while designing and developing this curriculum. This was because many of them were on vacation or otherwise preoccupied during their semester off. I was still able to connect with professors and students in the program to ensure that the curriculum was appropriately aimed at the intended students and professors in the class, but it took even more time to test materials and receive formative feedback.

Another major consideration to make was that we were only teaching an introductory game design class, and as such were not to include all aspects of game design in it. Instead of trying to teach all of the necessary material, my focus needed to be on helping students to gain sufficient skill to create simple game designs and to learn how to improve their design skills on their own.

2.6 Consulting Products/Precedent

In assessing consulting products and precedent, I had two main driving questions:

1. What content should be included in this course?
2. How should the content be taught?

In order to address these questions, I surveyed popular online courses and books in game design for what content is taught. I also compared university game design classes and programs to see what learning theories and methods were used to teach and assess learning. These investigations helped me answer my two driving questions and gave me a solid foundation for developing the curriculum for this game design class.

2.6.1 Survey of Online Courses and Books
I gathered three of the most popular introductory online courses in game design and three of the most popular books on game design. My criteria for determining which resources to analyze were 1) courses/books that appeared first in general search engine searches, 2) courses/books with large numbers of students/readers, and 3) courses/books with high consumer reviews. The final list of courses and books can be found in the "Domain Knowledge" section of the Annotated Bibliography (see Section 2.8.1).

My focus when reviewing these products was to see what concepts and skills were taught. The method of instruction was not important during this investigation because the medium of delivery was so different from the course I was developing.

While each product used different section names and sequencing, there were many commonalities between all products reviewed. The most common concepts and processes that I found throughout (in the most common order) were:
- Concepts

- ○ *Design intro*. This includes a discussion of the foundations of design as a skill, and how that translates into game design. It also includes a description of what a designer does, inside and outside of games.
- ○ *Game intro.* This includes a definition and description of what constitutes a game, as well as a general breakdown of a game into its high-level parts.
- ○ *Core experience*. This was sometimes called the core game loop or core feedback loop. The general concept here is that games provide an experience for a player, and that experience is what designers are trying to create. Designers are not just trying to create games, but experiences.
- ○ *Target audience*. Some products focused almost entirely on the notion of a target audience because the experience of a game is subjective, and the psychology of the player makes a significant impact on the resulting experience of the game. This section often included examples of games for various audiences, and how each was designed differently. It also included sections on human psychology and player types, illustrating the need to understand the intended audience of your game.
- ○ *Game mechanics*. All games are built with rules and relationships that dictate how the game will work, and how the player can interact with the game and with other players. These sections were often long lists of various types of game mechanics that could be used in games, and their respective effects on the core game experience.
- ○ *Story and aesthetics*. Many of these products included multiple sections for various aspects of a game's story and aesthetics. Some focused on the game world and characters, while others focused on game artwork and music. I have combined these into one concept given the qualitative nature of these aspects of the game. In essence, this section is the skin of the creature, the qualitative, motivational part of the game, rather than the structural part.
- ● Processes
  - ○ *Generating ideas*. This section focused on how a designer can come up with ideas for new games. It often provided methods or activities for generating creative new ideas.
  - ○ *Iteration/Prototyping/Playtesting*. This section included strategies for developing early prototypes of new game ideas. It focused on using prototyping as a way of answering questions about what kind of game should be built based on the experience, and how to use those prototypes to gather information through playtesting. Some products taught each of these three concepts separately, but I have combined them under the umbrella of iteration because they are all part of the cyclical improvement process.
  - ○ *Pitching ideas*. Every product included a section on pitching ideas. Some focused on how to use pitches to garner investment funding, while others focused on using pitches as a way of marketing the game to players. In either case, a solid ability to quickly communicate the essence of a game is demonstrably important.
  - ○ *Game design documents*. Few of the products included any kind of assignment, assessment, or learning resources. But, when they did, the most common of them was a template and instructions for writing a game design document. This is because most games are developed by many people, rather than one singular developer, and therefore communication is paramount. Game design documents

are the single most-used communication method for game design and development teams, and every resource described the need to adequately communicate your game ideas to your team, your investors, and your players. Some of these products even devoted multiple sections to helping the learner develop their own game design document.

This investigation gave me a solid foundation for both the content and skills that should be taught as part of this course.

2.6.2 Consulting Existing University Game Design Courses and Programs
Three of the largest universities with the most successful game design programs were 1. University of Southern California, 2. DigiPen Institute of Technology, and 3. University of Utah. While these programs did not provide public access to classroom curriculum or syllabi, they provided quite a bit of depth into their overarching learning philosophies as well as a high-level list of concepts taught in their programs. A brief summary of each is provided below.

2.6.2.1 Learning Philosophy
The University of Southern California advertised its undergraduate game design program as one where students would collaboratively work on real-world projects (video games), and would graduate having worked on multiple commercially-released games. DigiPen's program was founded on the goal of preparing students for careers in the video game industry, with a focus on making games as a major part of the curriculum. The University of Utah's degree description was similar.

Each university boasted the number of commercially successful games that had been created by their alumni. They also touted the amount of direct industry mentorship their students received. A major selling point of these programs was the number of game projects each student would be expected to participate in before graduation. All of the programs included a culminating senior project class, similar to BYU's capstone class, where students were expected to design and develop a video game. Before that final class, students took a variety of classes including game programming, art, music/sound, and design.

The game design courses were all advertised as studio-style classes where students designed their own games, including writing their own game design documents in teams and individually. Ideas were pitched throughout the class, and students were expected to collaborate and give feedback on their game ideas and designs. Professors acted as mentors, and all of the projects in the class were built to replicate real-world situations, such as the realistic design and development of a video game. Students were then given ample time to work on their projects, with professors aiding when needed.

My initial impression when considering the design of this course was to use a project-based learning approach. This approach seemed to be used in all of the top game design programs in the United States as well, so that may be a good way to go. Some important takeaways from this investigation were:
- Game design courses should be focused on real-world projects
- Professors play the role of expert mentors who demonstrate good technique
- Projects are collaborative and student-driven

- Ample project work time should be given

2.6.2.2 Content
Much of the specific content was obscured when written on the universities' websites, but some of the major concepts found across programs (in a similar order as presented previously) were:
- Game mechanics
- Story and aesthetics
- Generating ideas
- Iteration/Prototyping/Playtesting
- Development. Most websites included both game design and development together. This is likely because as a program, it is expected that students will learn to both design and develop games, and so many of the classes incorporate both skills concurrently. This will be a limitation on BYU's design class, but is necessary given that BYU is only developing a single design class, rather than an entire design program.

Interestingly, the introduction, core experience, and target audience sections that were identified from the online course and book analysis were not included in these websites. Perhaps these were not highly motivational topics, or were not common concepts associated with game design. Having worked closely with multiple professors from the University of Utah's Masters of Game Design program, I was confident that these were topics included in their classes, even if they were not included on their website.

The websites also did not include descriptions of any specific assignments or assessments, although they did mention that every class was focused on helping students to be able to design and develop video games from start to finish.

The amount of overlap between the top university game design programs and other online resources gave me a lot of confidence in the content that I should include in the course curriculum. It was clear that each of the previously mentioned topics, aside from game development, should almost certainly be included in BYU's game design course. It was also clear that I should approach the development of this class using a project-based learning approach, creating a studio-style classroom where projects are collaborative and student-driven.

2.7 Content / Task Analysis

This section includes a content analysis and a task analysis. The content analysis summarizes game design content and how it interrelates. The task analysis demonstrates processes commonly applied in game design. These two in conjunction are important to the design and development of this curriculum because they provide a foundation for what game designers do, how they do it, and why they do it the way they do.

2.7.1 Content Analysis
The content of game design is, broadly speaking, the content of games. That is, it answers the question, "What is a game, and what are its parts?" Since every aspect of a game should be designed before being developed, it makes sense that understanding the content of games would make a game designer better equipped to make games. This might not be true of all

design disciplines, but it appears to be true of game design. This is not an exhaustive definition of all content related to game design, but it does provide a solid foundation, which I find to be sufficient for an introductory game design class.
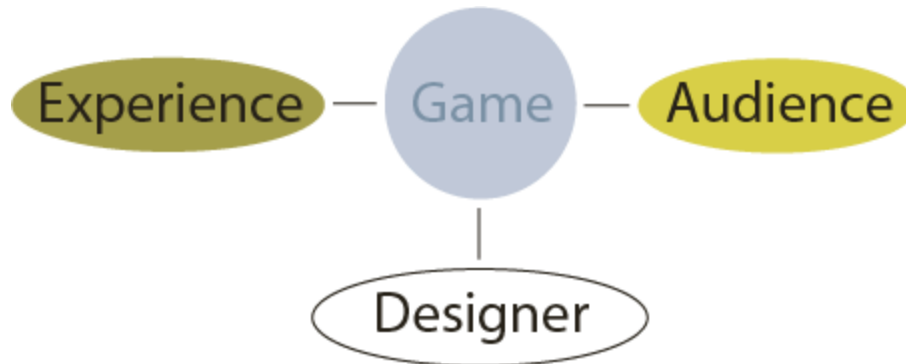
2.7.1.1 Overview

Figure 2.1. An overview diagram of the major parts of game design.

The ultimate goal of any game designer is to create an experience for a player. At its most simple, a game is just a vehicle for player experiences.

Experiences are subjective. Each person is unique, and therefore sees and feels experiences differently than any other person. It is important to not only understand the pieces of the game artifact, but also the nature of the experience and the audience.

2.7.1.2 Experience

Figure 2.2. A concept map of topics related to experience.

Everything we experience is, by definition, an experience. This could be as simple as the experience of waking up in the morning, or as complex as the experience of losing a loved one. Each experience takes place in a specific venue (or multiple venues), is felt through a specific medium (or multiple media), and is colored by the surrounding context. Change one parameter, change the experience.

It is complicated to detail all that goes into an experience because experiences are varied and intangible. We don't "feel" experience the way we feel rough stone, a gentle breeze, or physical pain. We "experience" experience, and that is something we are all familiar with, but can not always describe or control.

In game design it is common to use the term "core experience" as opposed to just "experience." A core experience is not the same as a complete, authentic experience. If we want to create, for example, the experience of a snowball fight, we cannot create a true, authentic snowball fight experience without real snow, a group of friends or other people, and a physical space with plenty of excess snow. None of this is possible through a digital medium. What can be created is a core experience, which attempts to capture the essence of the authentic experience and replicate it in a digital form. This might include digitizing the experience of struggling against feeling cold; gathering longtime friends; wild, unstructured play; or frantically tripping through snow in oversized boots and a puffy jacket. The core experience, then, is not the same as the authentic, real-life experience, but it is a meaningful simulation.

Though it is hard to accurately dissect experience, these aspects of experience are meaningful examples of the kind of variables that affect a core experience, and they give game designers things to think about while designing a core experience for a player.

Experiences are contingent on the audience who is doing the experiencing. I have excluded those details in this diagram because it requires its own diagram, which is included in the next section. Suffice to say that games are made for people, and will be experienced through the subjective lens of the player.
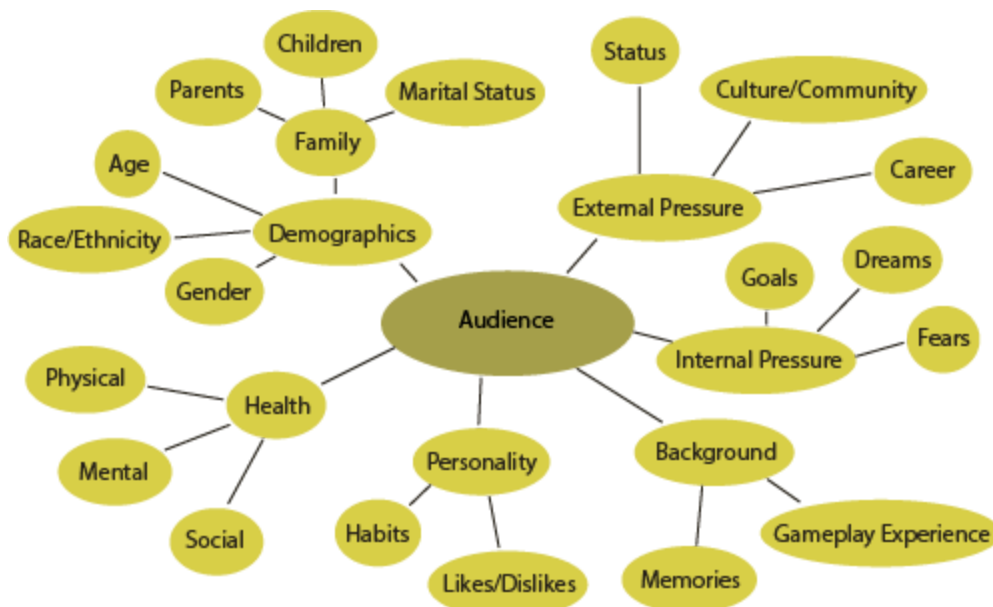
2.7.1.3 Audience

Figure 2.3. A concept map of topics related to audience.

People are complicated. And unique. No two people have the same background, personality, or challenges. As such, it could be assumed that no game can truly be designed for more than one player. A good game will be aimed at a target population based on the likeliness that they will enjoy the desired core experience created by playing the game.

This is why game designers create generalizations, or profiles, of their audiences. If many young boys like trucks, then we can make a game where players drive, fix, and even talk to trucks. Though the experience will be unique for each player, the core experience, or fantasy, is sufficiently compelling for many members of our target audience that they choose to play our game again and again. This is obviously not representative of all young boys of all backgrounds and cultures, but it gives the game designer an idea of the kind of people they are trying to please. And a good game designer would recognize that they are not actually trying to target all young boys, but rather young boys that like trucks.

This is not a comprehensive list of factors that account for the subjective lens of a game's audience. It does, however, give designers a foundation to understand our audiences, which helps guide our design decisions.
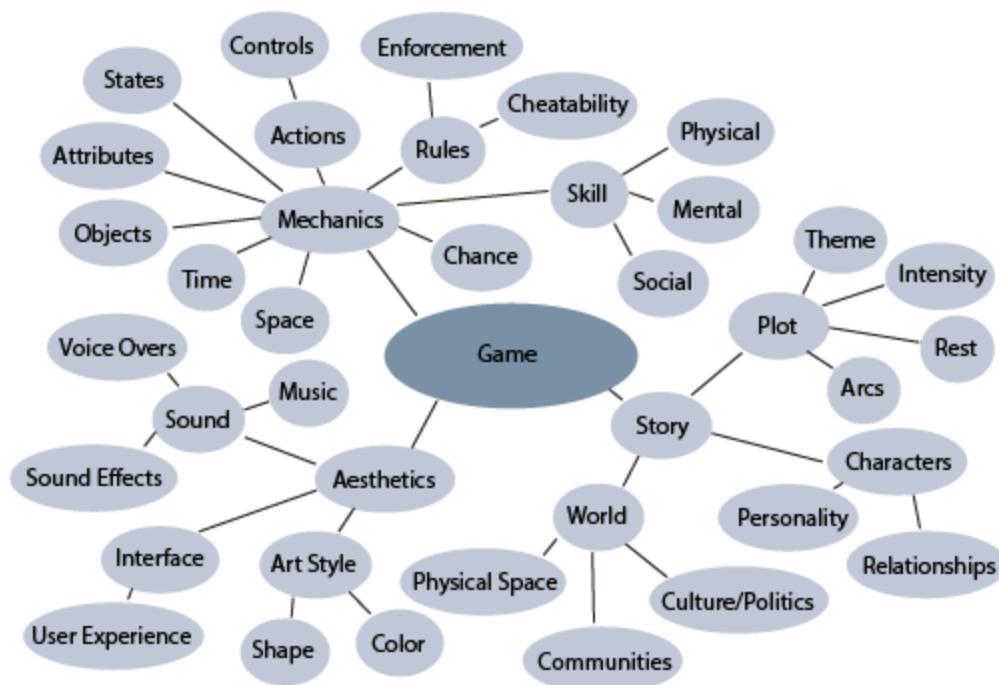
2.7.1.4 Game

Figure 2.4. A concept map of topics related to games.

There is no single, agreed-upon definition of what constitutes a game. There are many common elements that often contribute. And if we take the perspective of a video game, then these are almost universal elements of every successful video game in the market.

Mechanics are the internal rules and relationships of the game that dictate how the game operates and how the player can interact with the game. When connected to a core gameplay experience, mechanics enhance the experience for the target audience.

Story includes all of the narrative elements of the game: the plot, the characters (good and bad), the structure of the world, and the experience arcs based on pacing and experience arcs. Players advance the story through the controls, and the story impacts players' future decisions.

Aesthetics includes everything visual, audio, and otherwise tangible, such as the visual art style, music, sound effects, and user interfaces. A controller vibration would also be considered aesthetics since it is a tangible effect that creates a realistic connection between the player and the game. The goal of aesthetics in a game is to make the game more "real" or "tangible." This gives players a more authentic experience.

2.7.1.5 Conclusion
Games are complex combinations of mechanics, story, and aesthetics that provides a core experience to a target audience. The game, which is comprised of the mechanics, story, and aesthetics, is a vehicle for giving a core experience to a target audience. Game designers need to understand these elements in order to effectively create experiences for their audience.

I have organized these key elements into a pyramid diagram that depicts the importance of each aspect on the game designer's decision-making.

Figure 2.5. A concept diagram showing the core aspects of games, and how they relate to each other.

I have separated "game" into mechanics and story/aesthetics. It is illustrative for novice designers to recognize that a game has a "back end," or invisible parts, such as the game rules and controls, that determine the interactivity of the game. A game also has a "front end," or visible parts, such as the game characters, worlds, colors, sounds, and themes. Although story and aesthetics are different pieces of the game, they have the same purpose, which is to make the game more tangible and help players feel the core experience of the game more authentically.

This is certainly not an exhaustive list of potential game parts. These key aspects form a simple, solid foundation for designing video games, and they have broad application to other game types and media as well.

2.7.2 Task Analysis

The tasks involved in game design are, broadly speaking, the tasks involved in design generally. That is, they answer the question, "What is design, and how does it work?" Though game design does have the important prerequisite of being design for games, it is design first. In my analysis of design approaches generally (see section 2.8.3), game design specifically (see section 2.8.1), and a discussion of game design intuition with Dr. Holladay (see section 2.4.2.), there emerged some common steps or moments in the design process. Those steps formed the basis for my general game design process, which I have put into graphical form below.

Figure 2.6. A diagram of high-level game design process.

The steps in the process align closely with general design processes, but through a game design lens. These steps are iterative, and should generally begin again at step 1 after completing step 5. This gives a high-level view of the game design process, but does not give a novice game designer the intuition that an expert game designer uses to better ensure successful design.

Below is an analysis of each step in this process, along with its purpose and suggestions for completing it successfully.

2.7.2.1 Identify a Problem or Question
The purpose of this step is to identify a question that, if answered, would improve the experience created by the game. The prerequisite for this step is an understanding of the experience, the audience, and the game (in its current state), as described in the content analysis (see section 2.7.1).

Early on in the design process, these questions may be very broad, such as:
- How can I make a computer game that teenagers will really like?
- How can I make a game that feels like a surrealist painting?

In the "real world," the initial question will often come from real world constraints, such as how to make a profit through a video game or what game genre will be the most popular with certain demographic groups. These questions form the basis on which the game, and the core experience within it, is built.

Later on in the design process, these questions will be much more specific, such as:
- Is level three too long?
- Should the "A" button or "B" button be used for jumping?

These questions will often come from the constraints of the game technology, such as requiring a control for player input or maintaining player engagement through shorter, more intense levels. Whatever the cause, these questions should ultimately be based on an understanding of the player and the core experience and should attempt to improve the experience for the player.

A well-designed question will give a large amount of improvement to the game with minimal cost. This means that earlier in the design process, designers should focus on questions that impact the core of the game, not the details. This will help steer the game in the correct direction without spending large amounts of time or resources on specific details that are dependent on the core experience of the game.

By using this approach, designers have greater creative freedom, clearer assessment of success, and better communication when working with a team.

2.7.2.2 Generate Ideas
The purpose of this step is to explore the possibilities, the ways of addressing the question or problem identified in the previous step.

From the literature on game design tactics (see section 2.8.1), I have created a list of various tactics expert designers use to generate ideas more effectively.

- *Write or type your ideas*. This process helps to maintain your ideas so that you don't forget them. It also helps you to manipulate those ideas later, combining them with other ideas or changing them based on a later thought.
- *Sketch your ideas*. Sometimes words don't describe well what you're thinking. Instead, draw your ideas. This will give a visual representation of the idea, which can carry emotional or other information that is difficult to convey in words.
- *Play with toys*. Games are often trying to create an experience of fun and play, which is also created by toys. Using toys can also give a low-fidelity simulation of the game's core experience while helping the designer to think outside the box.
- *Change your perspective*. Designers can get in a rut when they think too often in the same way, following the same pattern. Lie on the floor, stand on a chair, go outside, or travel the world (if you can) to get a different view on life. This will help the designer break out of their traditional habits and think in a different way.
- *Break the norm*. We follow a strict set of social rules and often don't realize that we are restricting our design choices by arbitrary requirements. For example, a designer might want to create the next best mobile game, which is constrained by the platform (mobile). Though many of the most popular games currently are made for mobile, this is not necessarily a true constraint, and can keep the designer from realizing a truly great idea. Write on the walls, sit on the floor, try something new, challenge your assumptions, and mix disparate things. These activities help free the designer of their natural constraints, which can help generate some of the best ideas.
- *Immerse yourself in the experience*. In order to reproduce an experience, you need to know what the experience is like. Try it, and think about what makes it unique.
- *Make jokes*. Designers experience immense stress to succeed in generating ideas, when ideas are often not something we can create at will. Let it be fun and wild. Ideas don't come under pressure.
- *Talk to someone about your ideas*. Some of the best ideas are created by the synergistic thoughts of multiple people. Other people are great sources of inspiration for your games, especially if those people are different than you.

The key to this step is to think freely. The designer will ultimately need to select an idea to prototype, but they shouldn't be concerned with that while generating those ideas. Writing both the good and the bad ideas helps maintain a large list of inspirational ideas that may inform future decisions.

2.7.2.3 Prototype a Solution
The goal of this step is to create a tangible representation of the core experience that answers the core question. Ultimately, the game that is created should be the final prototype that answers the initial question.

Some types of prototypes are:
- *A game prototype*. This could be a digital representation of the game, a board game equivalent, or other higher-fidelity representation of the core experience.

- *A paper prototype.* This is a simple version of the game, or a part of the game, that can be represented using low-cost materials, but that still provides a representation of the core game experience.
- *Any other physical prototype.* Some games, such as sports video games, are best represented physically by creating physical versions of game assets and playing the game in real life. This could also include any other experience that simulates the core game experience, such as going to the movies, attending a sporting event, or sculpting with clay. The distinguishing factor here is that the experience is interactive, and you can engage test players in the experience without going through the designer.
- *A pitch or explanation.* Sometimes, designers do not have the resources to create tangible prototypes, and must explain certain aspects of a game before they've been developed. For example, if you are making a game with a unique system of gravity, that experience may not be easily replicable in a physical prototype, but can be explained easily. This is not an ideal prototype because testers experience it only through interaction with the designer, but it is a valuable tool when playable prototypes are not available.
- *Concept artwork.* Similar to a pitch or explanation, concept artwork can give an idea of the experience of a game without having an interactive prototype. Though not as valuable as a playable prototype, this artwork can help testers understand the experience of a game without many resources expended. This makes it especially useful during the initial stages of design.

2.7.2.4 Playtest the Solution

The purpose of this step is for testers to experience the prototype. This might be as simple as having the designer pitch the game idea or as complex as inviting a group of playtesters to come to the game studio to play through a digital version of the game. This is the step where the identified question should be answered. A well-designed playtest will have clear criteria for answering the identified question.

Designers should ask themselves the following questions:
- Why? This relates to the focus of the playtest. If the designer does not have a clearly defined question or problem to address, they will be less likely to improve their game through playtest.
- Who? The audience that playtests the prototype is critical because the game is being made for a particular target audience. Sometimes, it is appropriate for the designer to open up the playtest to anyone willing to test the game. Other times, it is necessary to have members of the target audience test the game. It is always more valuable to test with members of the target audience, but it is often impractical or impossible.
- Where? The venue for the playtest can impact the experience of the game as well. It could take place in the game studio, in a designated playtesting lab, in a public location, in the player's home, or online. Some venues provide more access to players, while others provide a more accurate-to-life experience.
- What? This question is not asking what players will test. That was answered in the prototyping step. Rather, it is asking what the designer is looking for from the playtest. Answering this question should provide the designer with criteria to use to determine if the question is answered or not. The designer should consider things they know they are

looking for and things they do not yet know they are looking for, and should consider collecting data that may be peripherally impactful on the experience.

- How? There are many questions included in this one. Should the designer be present during the playtest or not? If they are, where should they stand and look during the playtest? How much instruction should they give to testers? And how should they collect testers' thoughts on the experience? The most common forms of data collection are observation, a survey, or an interview. Each has advantages and disadvantages, and should be selected based on the best way to gather the necessary information for answering the identified question.

The closer the playtest replicates the end experience, the better. This is a constant balancing act between authenticity, cost, and value in collecting accurate player experiences. There is no clear answer to how to playtest, and the designer's best judgment is required in order to effectively answer their design questions.

2.7.2.5 Evaluate the Solution
The goal of this entire iterative process is to answer questions or solve problems in order to improve the experience of the game for the target audience. This step asks the question, "Did my idea answer my question?" Designers should use the criteria determined in the playtest to evaluate the effectiveness of the idea generated in answering the identified question.

Both "yes" and "no" answers are valuable. They both help the designer come closer to the correct answer, and they inform the designer for future iterations. Often, the answer will not be a clear "yes" or "no." Instead, it will be a "sort of" or "not yet." These answers are valuable as well because designers may need to clarify the core experience or the target audience in order to more effectively design their game.

Since so much is wrapped up in an experience, the prototypes used are not exact replicas of that experience, and playtesters are unique and potentially not representative of the target audience, responses can vary wildly. It is critical for game designers to use their intuition to decide if their idea actually answered their question, or if their prototype/playtest was flawed in some way, keeping them from generating accurate player feedback.

Ultimately, this evaluation will likely lead to more questions to answer. The process is repeated for each future question until the game is completed, which is often due to time or budget limitations rather than true completeness or a lack of future questions.

2.7.2.6 Conclusion
This is not an exhaustive list of all game design tasks, but does constitute a list of critical steps and guidelines for all game designers to follow, and was considered sufficient for an introductory game design course.

To simplify this process, I taught the five high-level steps described above along with a series of simple, succinct statements that were used as game designer "rules of thumb." These game designer rules of thumb are listed below.

1. A good game designer designs experiences, not just games

2. A good game designer loves their audience
3. A good game designer makes decisions intentionally
4. A good game designer works within constraints
5. A good game designer communicates their ideas effectively

Each statement was intended to be short enough to remember easily, but with enough detail to sufficiently communicate the point. They were considered when creating rubrics for student assessment (see section 2.12). They also benefited students in the video game capstone class as quick, simple reminders of what makes a good game designer.

2.7.3 Main Implications

In order to effectively design games, a good game designer needs to understand the parts of a game as well as the processes for creating those games. They also need to know how to make appropriate design decisions based on the goal of the end product, integrating their individual work with the work performed by their team to create a cohesive final product. These three criteria formed the basis for the content and skills that were taught in the game design course. The content and tasks were taught concurrently because the design process applies to every content area, and the concepts could be learned with more depth if learned through application.

Lastly, the rules of thumb created were used as general guidelines to keep in mind throughout the process and as part of all aspects of game design. These were introduced at appropriate points in the semester based on their connection to the topics taught, and were used as a sort of informal assessment tool for students and instructors. This brought alignment in expectations between students and teachers.

2.8 Annotated Bibliography

2.8.1 Domain Knowledge

Holcomb, J. (2017). The white box essays. Falcon Heights, Minnesota, USA: Gameplaywright.
    This is a series of essays on game-related topics, compiled and sequenced in a way to teach game design from the beginning. It focuses on board games and can be purchased with a box full of board game components to be used in prototyping new games. The essays are each between 5-20 pages long and discuss one topic in depth. There is a lot of information about publishing and distributing games, which is a topic rarely seen in other game design resources. These essays could be used as supplemental readings for the class.

McIntyre, G. (2018). Harness the power of play: The 5 steps of game design. Retrieved from https://www.udemy.com/thgamebeyond-begin/
    This course provides a deep dive into how games have been used in various ways, from entertainment to medical research. It breaks down the uses of games, and how aspects of games can be used to achieve all of these diverse purposes. It then gives an explanation of a series of game mechanics that can be used to target a specific audience for a specific purpose. It has a lot of interesting case studies in the diversity of games that have been created, but focuses less on how to actually make those games, focusing instead on the psychology of play.

Rogers, S. (2014). Level up: The guide to great video game design (2nd ed.). West Sussex, United
Kingdom: John Wiley and Sons, Ltd.
This book contains a plethora of video game design tips. There are examples of how
existing games use certain design techniques to achieve the desired experience. There
is also a series of templates for game design documents of all lengths and amounts of
detail. This is a great resource for building project templates, in-class activities, and
discussions.

Romero, B. (2017). Game design foundations. Retrieved from
https://www.linkedin.com/learning/game-design-foundations-1-ideas-core-loops-and-goals
This 3-part course starts with an introduction into games and designers; what they are
and how they work. It demonstrates ways that game mechanics influence the overall
game experience. Then it dives into how game mechanics interrelate, and how those
mechanics can be used to create specific game scenarios. The last section focuses on
how to communicate your game ideas through pitching and prototyping. It emphasizes
iteration as a means of getting the best versions in front of other people. This course
gives a great amount of information on how to build and use game mechanics, but does
not focus much on the intended audience, which makes it feel less appropriate for a
novice learner.

Schell, J. (2014). The art of game design: A book of lenses (2nd ed.). Boca Raton, Florida, USA:
Taylor & Francis Group, LLC.
This book is considered by many to be the official "game design bible." It contains a
conceptual breakdown of what games are, how they work, and how the designer designs
them. It also comes with a series of over 100 lenses, which are used to view a game from
a specific perspective. Each lens has a title, a brief description, and questions to ask
yourself in order to analyze your game from that perspective. These lenses will give a
great basis for the weekly reflections. Unlike many of the other resources, this book
focuses on game concepts rather than game processes, which gives it a deeper
theoretical feel and makes it a great introductory resource.

Wright, W. (2018). The fundamentals of game design. Retrieved from
https://www.masterclass.com/classes/will-wright-teaches-game-design-and-theory
This course is a series of lectures from Will Wright, the creator of SimCity, The Sims, and
many other super-successful simulation-style video games. He offers many great tips for
improving the design of a game, but the course feels more appropriate for an expert
audience. Many of the concepts are specific to the style of game he makes and does not
give concrete ways of getting started as a new designer. It is, however, a great resource
for inspirational thoughts and rules of thumb for good game designers.

These resources all cover similar content, and there are no major contradictions that I needed to
resolve. A more complete synthesis of topics covered in these resources is given in the
Consulting Products and Precedent section (see section 2.6.1). Given the depth of theoretical
information and the ease of implementation, I used The Art of Game Design book as the textbook
for this game design class. It provides the most conceptual information in the clearest way and is
available for free online through the BYU library's partnership with Safari Books. This textbook

was a great benefit for students who have little or no game design experience. Plus, the use of the book's lenses benefited students in this class as well as in the capstone class. The lenses were available for purchase as a deck of cards with one lens on each card, or for free as a downloadable mobile app.

2.8.2 Learning Theories and Instructional Strategies

Brigid J.S. Barron , Daniel L. Schwartz , Nancy J. Vye , Allison Moore , Anthony Petrosino , Linda Zech & John D. Bransford (1998) Doing With Understanding: Lessons From Research on Problem- and Project-Based Learning, Journal of the Learning Sciences, 7:3-4, 271-311, DOI: 10.1080/10508406.1998.9672056
> This literature review provides a series of principles that lead to "doing with understanding rather than doing for the sake of doing," a core tenet of project-based learning. It gives criteria for good learning goals, scaffolds, assessment, and collaboration within a project-based classroom. These criteria will be helpful in evaluating whether this course is successfully designed. This article also advocates incorporating some aspects of problem-based learning into the project-based environment to ensure that the "why" is taught along with the "what" and the "how." This relates strongly with the importance placed on understanding the core game experience and target audience that was found in the domain knowledge research.

Helle, L., Tynjälä, P. & Olkinuora, E. High Educ (2006) 51: 287.
> https://doi.org/10.1007/s10734-004-6386-5
> This article defines project-based learning, gives models of project work, and provides criteria for successful project-based learning. The model of project work that most closely relates to this game design class is the third called "project orientation," which is where projects are the end goal of the curriculum, and teaching activities are developed to help students successfully complete those projects. Students in the game design class will be taught how to create a game design document and a game pitch. The project, then, is the end goal, and successful completion of these projects is evidence of the intended learning. This article provides many great criteria for successful implementation of project-based learning.

Larsen, Lasse Juel (2018) Juicing the game design process: towards a content centric framework for understanding and teaching game design in higher education, Educational Media International, 55:3, 231-254, DOI: 10.1080/09523987.2018.1512445
> This article gives a theoretical breakdown of the game design and development process to better define what constitutes game design and how to teach it. The major focus of the article is achieving juiciness, which is defined as a sort of depth of experience created by ensuring that all of the aspects of the game relate back to the core experience. It compares vertical and horizontal design patterns and advocates for a focus on vertical over horizontal design. Vertical design is defined as the player-centric approach where everything added to the game is intended to make the game feel more real and tangible. Horizontal design is defined as a game-centric approach where new complex features are added to the game experience with no regard to the player experience. It is found in this article that novices often design primarily horizontally, while experts design primarily vertically. Suggestions are given to improve the juiciness of the game design. These

suggestions, along with the vertical-versus-horizontal concept, will be very helpful for designing in-class discussions and activities.

Thomas, J. W. (2000). A review of research on project-based learning. Retrieved from
https://www.asec.purdue.edu/lct/HBCU/documents/AReviewofResearchofProject-BasedLearning.pdf
This article summarizes research on project-based learning. It gives a great, succinct set of criteria for ensuring project-based learning is occurring, as opposed to similar learning theories such as problem-based learning or exploratory learning. It provides strategies for teaching in a project-based environment, along with challenges that can be faced throughout the process. These strategies for success and potential challenges are a helpful resource for me as I design and develop this curriculum. It gives criteria for evaluating the class as well.

There was a general consensus about what constitutes project-based learning. There were a few slight variations, but the general criteria were:
- Projects are central, not peripheral, to the curriculum
- Projects are used to solve a realistic (not school-like) question or problem
- Projects help students transform their conceptual knowledge into practical knowledge
- Projects are student-driven to a significant degree

Along with the central criteria for ensuring project-based learning, these resources also provided a series of recommendations for ensuring successful project-based learning. Each resource prioritized these suggestions differently, but the general consensus was:
- Problems that form the basis of the projects should be ill-structured, not prescribed or pre-packaged
- Students should have autonomy as much as possible in the pacing, sequencing, and actual content of learning
- Ample time should be given for students to form solutions and complete projects
- The learning environment should be modeled after the "real world" as much as possible
- The primary sources of assessment should be authentic performance and reflection, and opportunities for assessment should be frequent
- Instructors should play the role of expert mentors who model expert performance regularly

These recommendations gave me a lot to consider as I designed and developed the course curriculum. This style of teaching matched closely with many of the Center for Animation's existing courses. Implementing a project-based learning environment was beneficial for students because it seemed like the pedagogically best way to teach game design, and it was a style many of the students in the class were familiar with.

2.8.3 Instructional Design Approaches
Keller, J. M. (1987). Development and use of the ARCS model of instructional design. Journal of instructional development, 10(3), 2.
Keller's ARCS model was created as a way of increasing and maintaining motivation in learning through instructional design. The four major conditions for people to become and remain motivated, as identified by Keller, are 1) Attention, 2) Relevance, 3)

Confidence, and 4) Satisfaction. Strategies related to ensuring each of these four major conditions are provided, as well as the steps to implement each strategy. The steps are 1) Define, 2) Design, 3) Develop, and 4) Evaluate. These steps resemble many other design approaches, and are not particularly useful on their own. The goals of the four conditions are very helpful, however, because I am looking to increase and maintain students' natural motivation for game design.

Krathwohl, D. R., Bloom, B. S., & Masia, B. B. (1964). Taxonomy of educational objectives the classification of educational goals handbook II: Affective domain. New York, USA: David McKay Company, Inc.
Bloom's taxonomy of the affective domain is focused on feelings, values, and motivations. The aspects of Receiving, Responding, Valuing, Organization, and Characterization gives a way of understanding the different levels of valuing certain knowledge or skills. It provides an important conceptual foundation for the affective domain and measurements that can be used to measure values and motivations; however, it does not give as much concrete design strategies for how to improve motivations in the classroom.

McCarthy, B. (1997). A tale of four learners: 4MAT's learning styles. Educational Leadership, 54, 46-51.
McCarthy's 4MAT cycle of learning suggests that there are four types of learners, each with a unique style of learning. This article suggests activities and teaching styles for each type of learner. It also suggests that all learners experience each of the four types at certain points in the learning process, and that there is a natural progression from one type to the next. The phases in the cycle can be represented by the questions 1) Why do I need to know this? 2) What exactly is this? 3) How will I use this in my life? And 4) If I do use this, what possibilities will it create? These questions are summarized as "Why," "What," "How," and "If." I do not agree that learners are so easily categorized into four types, but I find value in the questions included in the cycle. These questions match the design process well and could be used to motivate students to think deeper about their projects and processes.

Merrill, M. D. (2002). First principles of instruction. Educational technology research and development, 50(3), 43-59.
Merrill's first principles of instruction are 1) Activation of prior experience, 2) Demonstration of skills, 3) Application of skills, and 4) Integration of skills into real-world activities. These principles line up well with project-based learning theory, which uses these principles as basic requirements of a project-based environment. This article even suggests that these principles are best used when solving real-world problems is the source of learning. This design approach is very concrete and straightforward, which will be very helpful when designing curriculum for a course whose content is not so straightforward. It will give structure to an otherwise nebulous discipline.

I focused my research on instructional design approaches related to improving and maintaining motivation in a project-based learning environment. There were many different approaches to choose from, and I quickly noticed that they all had some similarities, but many more differences. I ultimately decided to design primarily focusing on Merrill's first principles of instruction because they lined up well with project-based learning as I understood it, and it was a simple structure to

follow in implementation. That being said, I found value in the four questions in McCarthy's 4MAT cycle of learning. I also found a lot of value in the specific criteria for success given in Keller's ARCS model. I heavily weighed my strategy on Merrill's principles to ensure that I did not create an unintended grab-bag of design approaches.

2.9 Budget and Timeline

I was not paid by the Center for Animation for this project, but if I were I would have expected roughly $3,000 for the analysis, design, and development of the curriculum and another $2,700 for teaching a section of the class. Material costs for the class, including for textbooks, games, and any other items to be used as part of in-class activities or as resources for students were projected to be roughly $500. Maintenance costs for development and instructional tools used, such as my personal computer, design and development software, internet, and any other tools used in the design, development, teaching, and evaluation of this curriculum were projected to be roughly $1,000. This sums to a rough total of $7,200. This is summarized in a table below.

Budget Item	Initial Estimate	Actual Cost
Analysis, design, and development salary (18 wks, 10 hrs/wk, ~$16.6/hr)	$3,000	$4,482
Teaching salary (16 wks, 10 hrs/wk, ~$16.6/hr)	$2,700	$6,640
Material costs (books, games, prototyping materials, etc.)	$500	$655.82
Maintenance costs (hardware, software, internet, etc.)	$1,000	$715.22
Total	$7,200	$12,493.04

After completing the project, including the design, development, and implementation of the course, I reviewed the associated costs and added them to the above table. My estimates were fairly close, with the exception of the teaching salary.

I expected to only work about 10 hours per week during implementation because the design and development of the course was completed before the semester began, and I was planning to take a full load of classes while teaching this course. Instead, I spent an average of 25 hours per week working on this course. Between teaching the course, grading assignments, evaluating previous classes, preparing for upcoming classes, iterating on the initial design ideas, and investigating/developing new materials, I found that there was much more to be completed throughout the semester than simply preparing, grading, and teaching. In future iterations of this class, the time spent may decrease, but if continuous improvement is involved, it may still require quite a bit of time.

The timeline for this project can be communicated best in a Gantt chart (cf. Fig. 2.7). In order to complete the design and development of the course before the start of Fall semester, the analysis and initial design phase was condensed into eight weeks, with ten weeks for

development. I made design changes throughout the implementation of the course, which is why it was valuable to have a testable design before the start of the semester.
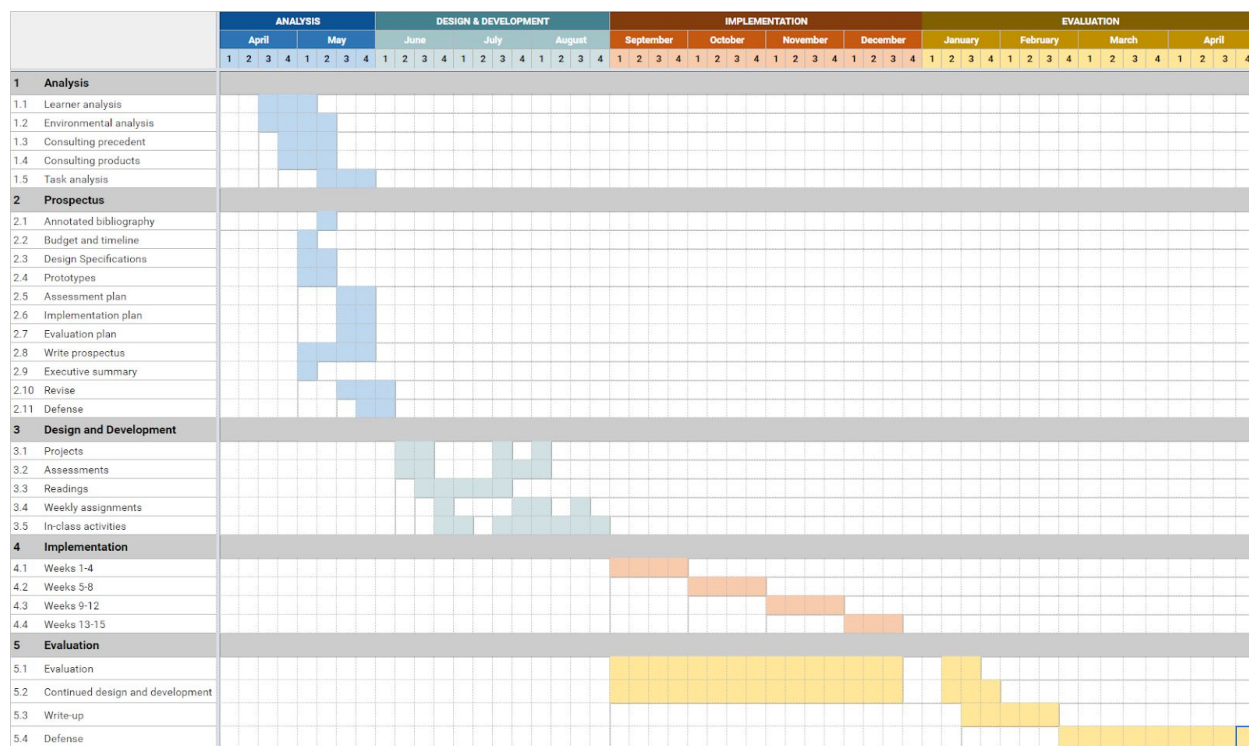

Figure 2.7. A Gantt chart of the project timeline. To view a full-size version of this timeline and compare with the proposed timeline, click here.

2.10 Design Specifications

The curriculum for this course can be divided into a few sections: 1) Projects, 2) Weekly assignments, 3) Readings, and 4) In-class activities. There was also an extra credit final exam created. It does not constitute its own section simply because it is not a major portion of the course contents.

All of these sections were packaged into a course through BYU's Learning Suite LMS. A brief overview of specific deliverables is listed below.

Section	Deliverable	Number	Description
Projects	Game design document template	1	A game design document template that students can modify for their game ideas.
Projects	Game design document rubric	1	A rubric for assessing successful design documents.
Projects	Game pitch rubric	1	A rubric for assessing successful pitches.

Weekly assignments	Reflection instructions	1	Instructions for reflecting on the week's topic.
Weekly assignments	Reflection rubric	1	A rubric for assessing successful reflection.
Weekly assignments	Game critique instructions	1	Instructions for critiquing existing games on specified criteria.
Weekly assignments	Game critique rubric	1	A rubric for assessing successful game critique.
Readings	Readings	15	A list of required readings for each class period. Many class periods did not have any required reading.
In-class activities	Lecture notes, in-class activity instructions, and materials	15	Implementation instructions and a list of any required materials or setup. Many class periods did not have structured in-class activities but were reserved for project work time.
Final Exam	Final exam specifications, instructions, and questions	1	A 15-question extra credit final exam. This includes the writing of the specifications/questions as well as implementation in the online LMS.
Course	Learning Suite course	1	A Learning Suite course with all of the necessary resources linked and scheduled based on the semester in which the course was initially taught.

2.10.1 Projects
There were two main projects for this course: a game design document and a game pitch. These were used as the primary forms of assessment as well. The primary project-based learning theory key points that influenced this decision were:
● Projects are central, not peripheral, to the curriculum
● The primary sources of assessment should be authentic performance and reflection

Merrill's first principles of instruction is built to help learners ultimately achieve the ability to integrate their learning into a real-world application. These projects are used as that real-world application in this course. Rather than using a few smaller projects, I opted for two larger projects because of the tie to Merrill's first principles.

These two main projects formed the basis, and ultimately the end goal and learning objectives, for the course.

2.10.1.1 Game Design Document
The game design document is a detailed document describing the specifications and justifications of game design decisions. It was expected to be between 15-30 pages, depending on the level of detail and number of visuals included.

The sections required in the game design document were:
1. Title page
2. Table of contents
3. Game overview. This section includes a brief statement to describe the unique features of the game, the game's genre and platform, the core gameplay experience, and the target audience.
4. Story & Setting. This section includes details about the game's story, world, characters, and any other qualitative aspects of the game. This also includes specific development instructions for music, sound, 2D art, 3D art, and story.
5. Gameplay. This section includes details about the game's mechanics, gameplay pillars that describe key guidelines for developers, and development details for all game rules and relationships.

A template was provided to students while working on this project. This template can be found in the Design Representations/Prototypes section (see section 2.11). The template did not include a complete list of topics needed in a good game design document (as shown above), but it provided scaffolding for students. Students were able to manipulate the design document template or disregard it completely based on the needs of their game. Games of different genres require more detail in different areas and less in others. Plus, it is important as a part of a project-based learning environment that students have choice in how to complete their projects (see section 2.8.2). Ultimately, it was important that students understand that there is no one single right way to design a game, but rather that there are many good ways.

A large portion of the semester was dedicated to working on this project, and students were given ample time to complete it.

2.10.1.2 Game Pitch
Students were given instructions about how to create and present an effective game pitch. They were also given ample time to create their pitch. It is expected that students will pitch the same game for which they have created a game design document.

At the end of the semester, as part of the final assessment, students were asked to present a pitch of their games. These pitches were expected to be between 3-5 minutes long and included only the essential elements of their game, including a justification of their design decisions based on creating a compelling core experience for a target audience. It should sell the game by describing the unique features of the game or the clear experience created by the game.

The assessment of game pitches occurred during the presentation by the course instructor.

2.10.2 Weekly Assignments
For the first ten weeks of the semester, students were expected to turn in a weekly reflection and game critique. Prompts were provided to enhance reflection and to instruct the game critique.

After the first ten weeks, students were expected to provide updates on their game design documents and pitches, rather than turn in a weekly reflection and game critique. This provided more time for students to work on the major projects of the class while also providing a large amount of formative assessment data throughout the semester.

The reflection and game critique were turned in as two separate documents, one page for the reflection and one page for the game critique. The reflection was used as a source of formative assessment and as a tool for developing deeper meta-analytical skills in students (see section 2.8.2).

These weekly assignments were used as a way to allow students to connect their learning to their prior experience and apply what they learned in smaller practices. Originally, I had intended to include specific games to critique, but that would have potentially created a biased assignment, and also it would not have tied the learning to the learner's prior experience. In order to better align with Merrill's first principles, I decided to allow students to choose the games they critiqued as well as included questions in the reflection that aimed at tying the learning to the learner's prior experience.

2.10.3 Readings
Almost all of the reading assignments for the course came from The Art of Game Design book. Only one reading assignment came from outside the Art of Game Design book, and students were allowed to select what reading they wanted to complete for that assignment in order to connect their reading assignment to their specific project and needs. Chapters were assigned based on the topics to be covered that week in class and the relevance to the projects.

There was not a reading due every class period. Readings were due more often during the first half of the semester, and tapered off throughout to provide more project work time.

Readings were described in the Learning Suite course, and instructions to access the course textbook online were provided as part of the first class session.

2.10.4 In-class Activities
Some class periods included an in-class activity where students practiced the skills learned in recent weeks. These activities were designed to promote deeper learning of concepts and apply that learning to real-world situations (see section 2.8.3). For example, during the unit on target audience, students had the opportunity to practice researching a target audience during class. These activities were almost always followed by a debrief discussion to help students synthesize their experiences and to learn from each other (see section 2.8.2). This style follows Merrill's first principles by connecting to the learner's prior experiences, showing a demonstration of the skill, and then providing an opportunity for learners to apply what they've learned.

2.10.5 Learning Suite Course
All course materials were distributed to students through the Learning Suite course. This LMS was selected because it was used for all other courses offered by the Center for Animation, and was the standard LMS for BYU courses. It was also the most well-known LMS for both Dr. Holladay and me.

The course also included a timeline for topics, readings, and assignments.

Day	Week	Topic	Chapters	Pages	In-Class Activities	Assignments
9/3	1	Intro			Intro to the class, syllabus, etc.	
9/5	1	Design	Hello,1	17	Initial game pitch, Discussion	
9/10	2	Experience	2,3	25	Discussion	Attendance Week 1, Weekly Assignment 1
9/12	2	Game Elements	4,5,6	35	Game Elements Activity, Discussion	
9/17	3	Generating Ideas	7	20	Generating Ideas Activity, Discussion	Attendance Week 2, Weekly Assignment 2
9/19	3	Iteration	8	26	Iteration Activity, Discussion	
9/24	4	Understanding the Audience	9,10,11	42	Discussion	Attendance Week 3, Weekly Assignment 3
9/26	4	Understanding the Audience			Audience Activity, Discussion	
10/1	5	Game Mechanics	12	44	Mechanics Activity, Discussion	Attendance Week 4, Weekly Assignment 4
10/3	5	Balance / Puzzles	13,14	52	Discussion, Work time	
10/8	6	Story / Aesthetics	17,18,19	50	Discussion, Work time	Attendance Week 5, Weekly Assignment 5
10/10	6	Story / Aesthetics	20,21,22	48	Discussion, Work time	
10/15	7	Putting it Together - Content				Attendance Week 6, Weekly Assignment 6
10/17	7	Putting it Together - Process				
10/22	8	Teams & Documents	25,26	20	Design doc intro, Discussion	Attendance Week 7, Weekly Assignment 7
10/24	8	Prototyping / Playtesting	27	16	Discussion, Work time	
10/29	9				In-class Playtest	Attendance Week 8, Weekly Assignment 8
10/31	9				Work time	
11/5	10				Work time	Attendance Week 9, Weekly Assignment 9
11/7	10				Work time	
11/12	11				Work time	Attendance Week 10, Weekly Assignment 10, Design Document Draft
11/14	11				Work time	
11/19	12	Pitching an Idea	29,30	21	Pitching Activity, Pitch intro	Attendance Week 11, Design Document Peer Review
11/21	12				Work time	
11/26	13				**NO CLASS -- THANKSGIVING**	Attendance Week 12
11/28	13				**NO CLASS -- THANKSGIVING**	
12/3	14				Pitch Presentations, Discussion	Attendance Week 13, Pitch Draft
12/5	14				Work time	
12/10	15				Work time	Attendance Week 14
12/12	15	The Power of Games	32,33,34	29	Discussion, Work time	Attendance Week 15, Design Document Final, Extra Credit

Figure 2.8. The course schedule. To view this full size, click here.

2.11 Design Representations/Prototypes

2.11.1 Projects

Game Overview

Introduction

Introduce the game as if you were pitching it to potential players. This should be very intriguing. Present information on why this game will be fun, the purpose of the game, what the player does or has to overcome, and so on. This is meant to be a quick summary of the game and what you can expect from it. Shouldn't be more than 1-2 paragraphs.

Genre

List or describe the game's genre(s).

Platform(s)

List or describe the platform(s) the game will be made for.

Target Audience

Provide information on the audience the game is targeted to. Add details and information on the intended audience such as their habits, behaviors, likes, and dislikes. Are you targeting your game to a specific age group or perhaps people that enjoy certain genres? Give enough detail (images, profiles, etc) so that your reader will know who you're wanting to attract to your game and what those people would want from a game.

Core Experience

Present a compelling core experience based on your research of your target audience. Identify how your proposed game will create that experience for your target audience. This section should be brief, no more than 1-2 paragraphs.

4

Figure 2.9. A screenshot of the game overview page in the game design document template. For the full game design document template, click here.

My initial prototypes of the game design document came from a series of game design document templates that I found online and in the domain knowledge sources analyzed (see section 2.6.1). To see some of the templates analyzed, click [here](#).

This prototype was a synthesis of the documents analyzed. There were some key differences, however, based on the purposes of the design document and the sequence of topics included. I chose to align the topics in the template based on the relevance to potential readers. For example, game mechanics was taught in the course before story and aesthetics, but the story section came first in the game design document because of its importance in communicating the core of the game.

This sequence of topics was ultimately not very impactful because students were able to organize their design documents in whatever way they found most useful. The template was one way, but not the only way.

I have not created any formal instructions for the game pitch assignment since the pitches were likely to be derived from the game design document template. There were no specifications for how the pitch should be presented (PowerPoint, live demo, etc.), and was left to the students to decide individually.

2.11.2 Weekly Assignments

Weekly Assignments

Reflection

Reflect on what you've learned up to this point in the class. Some questions to consider are:
- What is new? What have you learned?
- How does this week's topic(s) relate to game design as a whole?
- How are you developing as a game designer?
- Where are you strong/weak?
- What questions do you still have?

Write a 1-page reflection and turn it in via LearningSuite.

Game Critique

Choose a game you have played or watched and critique it based on a topic we discussed this week.

OR

Choose a lens from the Art of Game Design book (from a chapter we've discussed together) and critique a game you have played or watched through that lens.

Write a 1-page critique of the game you chose and turn it in via LearningSuite. Discuss the strengths and weaknesses of the game, as well as how you would recommend improving that game. Be sure to include sufficient specific details to support your ideas.

Figure 2.10. A screenshot of an example weekly assignment. To view it full size, click here.

Weekly reflections and game critiques were two one-page documents turned in to the Learning Suite LMS. The reflection included a one-page self-assessment as well as a synthesis of topics taught in recent class periods. My assignment instructions focused on generating generic question prompts to elicit student self-reflection and content analysis and synthesis.

The game critique was a one-page critique of an existing game based on the topics taught in that week's class or lenses from The Art of Game Design book. The purpose of this assignment was to help students improve their analytical skills and become comfortable giving feedback on games in preparation of receiving feedback on their own game designs.

These weekly reflections and game critiques were discussed in class along with other in-class resources and activities.

2.11.3 In-class Activities

Week 1, Day 2 (9/5)

Topic
Intro

Purpose
See how difficult/detailed design can/should be. Intro experience/game/audience/designer overview.

Resources
What is design: https://www.youtube.com/watch?v=MS8p-CgTJlg
So you wanna be a game designer (extra credits):
https://www.youtube.com/watch?v=zQvWMdWhFCc

Activities
Do an initial game pitch (1 minute per student). Give a bit of time to put it together for anyone that wasn't in class the first day or who needs just a little more time to put it together. Discuss the work that went behind building the initial pitch, and what students thought was the most important step to create an appealing or compelling game.

Watch "What is Design". Discuss fundamentals of design. Talk about how the word "design" comes from the same root as the word "designate" (latin: designare). Talk about the difference between science and design (general/contextual).

Watch "So you wanna be a game designer". Overview the experience/game/audience/designer graphic. Discuss potential prototyping tools (give examples?).

Define the "problem" that game designers are tasked with solving. This "problem" will be the basis for the work in the rest of the semester.

Discuss why listening is the most important skill.

Assignments
Weekly Assignment 1.
Reading (chapter 2,3).

Figure 2.11. A screenshot of an example in-class activity. To see it full size, click here.

In-class activities were centered on core concepts and skills involved in game design. Instructions and materials were provided to the instructor. The instructions included general phases of the activities, along with brief descriptions of each phase. The major challenge with these activities was to fit them into an hour-and-a-half class period.

2.12 Assessment

Project-based learning theory states that assessment tools should be based on authentic performance and reflection (see section 2.8.2). For this reason, the primary sources of assessment data in the game design class were the two main projects and the weekly assignments. There was also a final exam administered in order to gauge success in the class.

First, I will describe the learning objectives defined for this course, and then consider each of the assignments and how they aided in the assessment of students' progress and growth.

2.12.1 Learning Objectives
This course was offered for the first time this year, so there was no true baseline for assessing student success. I could, however, compare student performance to a set expectation or rubric. Because of this, projects and weekly assignments were accompanied by rubrics designed to target success in each core competency. The core competencies are defined as follows, based on the criteria for good game design found through the literature review (see section 2.6.1) and content/task analyses (see section 2.7):

1. Students can identify and design a core experience
2. Students can identify and design for a target audience
3. Students can communicate justification for their design decisions

In order to more deeply understand what success looked like when completing this course, I wrote down a series of general learning objectives, along with specific learning objectives within each general objective. I used Bloom's Taxonomy as a guide for structuring these learning objectives so that they would target specific levels of cognitive ability. The objectives are listed below.

Upon completing this introductory game design class, students will be able to...
1. Understand important terms, concepts and principles
    a. Recall the steps in the game design process
    b. Explain the core elements of games
    c. Identify examples of each game element from game examples
    d. Provide examples of good game design practice based on example situations
2. Apply game design theory to practical situations
    a. Identify uses for specific game elements
    b. Suggest appropriate use of game elements based on game design theory
    c. Distinguish between game elements
3. Evaluate the design of existing games
    a. Compare existing games based on game elements
    b. Analyze the pros and cons of specific elements as used in existing games
    c. Suggest potential improvements for existing games based on specific criteria

Identifying specific criteria for success helped me to better structure all of the activities used in this course so that they target these objectives. Though these objectives were used as the

backbone of the assessments created in this course, the final structure of each rubric took a form that more closely resembled the content of the course for better student understanding. Having the detailed objectives made grading more consistent and fair, allowing me to provide more concrete feedback on assignments and projects.

2.12.1 Projects

Criteria	0	10-14	15-24	25-30
Core Experience	No design document was turned in or the design document does not have a defined core experience.	The core experience is unclear or contradictory to the design decisions.	The core experience is weakly defined or only moderately supported by the design decisions.	The design is based on a clear core experience, and the connection to that experience is clear and justified.
Target Audience	No design document was turned in or the design document does not have a defined target audience.	The target audience is unclear or contradictory to the design decisions.	The target audience is weakly defined or only moderately supported by the design decisions.	The design is based on a clear target audience, and the connection to that audience is clear and justified.
Mechanics	No design document was turned in or the design document does not have a Mechanics section.	The mechanics are unclear or contradictory to the design decisions.	The mechanics are weakly defined or only moderately supported by the design decisions.	The design includes clearly-defined mechanics, and the mechanics are rooted and justified.
Aesthetics	No design document was turned in or the design document does not have an Aesthetics section.	The aesthetics are unclear or contradictory to the design decisions.	The aesthetics are weakly defined or only moderately supported by the design decisions.	The design includes clearly-defined aesthetics, and the aesthetics are rooted and justified.

Criteria	0	5-9	10-14	15-20
Organization	No design document was turned in.	The document is missing important sections or otherwise incomplete.	Some organizational issues or missing details.	The document is organized and professional.
Clarity	No design document was turned in.	The writing is unclear, overly wordy, or includes many grammatical errors.	The writing is fairly clear, with only a few issues of clarity or brevity.	The document is written clearly and succinctly.

Figure 2.12. A screenshot of the final game design document rubric. To view full size, click here.

Each project—the game design document and pitch—was graded using this rubric. The point values were slightly modified based on the total number of points available for each project, but the general rubric was maintained consistent across projects, both drafts and final submissions. These projects ultimately demonstrated to me if students had successfully learned game design or not, and therefore constituted a large portion of a student's grade in the class.

The rubric includes six criteria: core experience, target audience, mechanics, aesthetics, organization, and clarity. These represent the four core elements of games as defined previously (see section 2.7.1.4) and two additional professional writing/presentation criteria. I will briefly describe each of these criteria and how they were graded, and provide examples of successful and less-successful execution by students in the course.

2.12.1.1 Core Experience
Core experience was one of the hardest criteria to grade, but it was also potentially the most important to measure in order to ensure an authentic game experience. This element forms the base of the game, and any game that lacks a solid core experience is likely to struggle in the other areas as well.

The first core competency of this course is that students will be able to identify and design around a core experience. This is due to its foundational nature. If there is no cohesive core experience, there is no cohesive end product.

When grading core experience, I looked for a foundational human element to the experience. This is a very philosophical, subjective thing to look for, so I grounded myself by focusing on the existence of experiential elements more than the perceived quality of those experiences. My breakdown of what constitutes an experience (see section 2.7.1.2) helped me to guide students toward cohesive experiences. Students who clearly explained the actions, emotions, and context of their target experience showed that they understood what it was they were trying to create for their players. Successfully identifying a non-game parallel experience often helped students to more clearly communicate the core experience of their game design.

The following is an example of a student who scored well in this area.

"Destruction is the core of this game, and it should feel liberating and incredibly satisfying. You should want to destroy, break things you can't as a human person, break boundaries… there should be a large degree of freedom in where you go, how you collect energy, and how you release it—this is *your* destruction, discovery, and decision. Ultimately, success comes from that release of energy and adrenaline powering you through the rapid-fire platforming."

This student clearly captured the idea of their game in the word "destruction." The game is about releasing energy, both as a character and as a player. Compare that to the following example from a student who did not score as well in this area.

"Playing [this game] is about finding a balance between tactical thought and physical execution. The player will have to fill the role of both commander as well as soldier in order to challenge them both mentally and physically, and help them to think of a battle from all aspects and angles."

While this student still scored moderately well in this area, there is a clear lack of depth of experience. This experience does not describe *what the role of a commander or soldier is like*. It simply says that the experience is like that. This vague experience does not give a development team a sufficient amount of detail to know whether they have hit the mark or not.

2.12.1.2 Target Audience
One of the greatest challenges for a game designer is player empathy. Many designers struggle to design a product based on the needs and desires of another person, projecting their own needs or desires onto the project instead. This was identified as a major point of potential improvement while in discussion with Dr. Holladay (see section 2.4.2.3). This was also identified as the second core competency of this course because it is foundational to good design, including game design.

Throughout the course, I asked students to consider player attributes as found in section 2.7.1.3 and to categorize them into one of three groups.

1. Must have
2. Could have
3. Must not have

These groups helped students to identify whether a particular player attribute was required for enjoyment of their game, was an attribute that some players would likely have, or was an attribute that would negatively impact enjoyment of their game. I then asked students to create simple player profiles to showcase examples of what their players would be like, along with particular background characteristics that would impact the players' enjoyment of the game. The purpose of this is to create design constraints so that students could scaffold for themselves.

The following is an example of a student who scored highly in this area.

"[Game title] is aimed at boys and girls anywhere from elementary school to high school who enjoy fun and casual yet competitive games and like to play with their friends. This game is for those who enjoy turn-based strategy gameplay. While a love for competition and fellowship in games may not be traits everyone in the audience shares, they are traits many will have as they are core aspects of the game."

The successful part of this audience section is not the specificity, but the generality. This student had previously restricted their audience section to include a much more narrow audience. But, through discussion and playtesting, found that many more players of more diverse backgrounds would enjoy this game. Many students create an audience group that is far too broad or far too narrow. This student struck a good balance of key characteristics that supported their ability to design specifically for this audience without being overly restrictive and exclusive of certain players. Compare this to the following example from a student who did not score as well in this area.

"Age: 15+
People who like games like: Hollow Knight, Cuphead, Ori and the Blind Forest, Dead Cells
People who like a good challenge.
People who don't necessarily have enough time to play for hours at a time."

This student still identified a target audience, but their audience selection was vague and overly restrictive. Specifically, it is important to identify *why* players might like the example games, a good challenge, or shorter play times. This rationale provides the designer and development team guardrails to keep the design from frustrating or confusing the target audience. It also helps the designer to hit the root causes of enjoyment, rather than simply making a clone of an existing game or mindlessly using mechanics from existing games out of sheer precedence.

2.12.1.3 Mechanics
Game mechanics is the first of the two categories of tangible game elements. Core experience and audience form the goal, and game mechanics and aesthetics form the means of achieving that goal. This is why game mechanics were not included in the core competencies of this class, but are included in the rubric for this project. It is important to align the game's mechanics to the core experience and target audience selected for the game. Otherwise, the choice of mechanics is arbitrary and impossible to grade objectively.

My focus in this section was on the alignment of the game's mechanics with the overall core game experience and target audience.

One student chose to design an audio-based horror game. This game was intended to give players the experience of wanting to scream, but being unable to because of the negative consequences of doing so. Each player is required to use a microphone to advance in this game, but the monsters they are attempting to avoid are bat-like creatures who cannot see but can hear. This pits the player against themselves as they try to navigate when to speak and when to remain silent. This also enhances the horror genre by taking one of the most common activities of horror games—screaming—and requiring players to avoid it at all costs. This mechanic choice was well-aligned with the core experience of the game, and thus was scored highly.

Compare that to another student who did not score as well in this area. This student designed a first-person arena battle game that takes place in the sky. Players are falling toward the Earth, surrounded by other falling objects, some small and others very large. The goal of the game is to be the last player remaining in the air. Players will jump, dash, and grapple to the top while attempting to push their competitors to the ground.

This game design suffered from a lack of alignment of mechanics to core experience. For example, players were expected to move quickly enough that they would almost perpetually be focused on their own survival, with little time to focus on impeding their competitor players. This contradicted the high-competition focus of the experience. A change in mechanics could help this game to achieve that goal much better.

2.12.1.4 Aesthetics
It is difficult to describe successful aesthetic choices without including artwork or sound, so I will focus on story and character in this report as an example of how aesthetic choices should align with the game's core experience and target audience. Most students who succeeded in story choices also succeeded in visual and audio design as well.

One student designed a cooking competition-turned-brawler game where ordinary people are willing to do whatever it takes to be the best chef. The following is a character description of one of the characters in this game.

"A punk rocker who packs a lot of heat! Watch out for Paprika's homegrown chilies that explode in a fiery flair of flavor! Her chili bombs allow her to attack opponents from a distance, and when the temperature gets hot enough, her super secret "Nuke Sauce" will obliterate opponents who fall within its range."

This character description uses great details to show the core of this character's personality as well as to demonstrate how the character's personality affects their gameplay abilities. This also aligns well with the "whatever it takes" attitude to a cooking show. An important thing to remember is that this description is short and not overly prescriptive. The designer should inspire without telling the development team how every detail should be implemented.

Compare that to a student whose story overview included an entire historical background of the game world without clearly giving a sense of how this impacts gameplay. The goal of game aesthetics is to make the game's mechanics—and therefore the game's experience—more tangible and real (see section 2.7.1.4). More story does not mean better story. In fact, it is often better to only include the minimum necessary story description in order to give the development team a clear idea of what the game is supposed to feel like and why it feels that way.

2.12.1.5 Organization and Clarity
The final two categories on the rubric are meant to grade the quality of communication and presentation of information. These are typical for a university class and are important qualities of a good game designer.

Organization primarily meant the structure of information. Were the sections ordered appropriately? Was the information grouped into meaningful sections at all? Was there a natural flow from one section to the next without confusion?

Clarity primarily focused on the simplicity of understanding. Were there grammatical errors that impacted comprehension? Was the word choice specific and ellicitive of appropriate emotional reactions? Did the design document need to be read multiple times for comprehension?

These two categories were worth fewer points so that the focus was on game design rather than base writing ability. However, without at least a decent score in each of these categories, students were unlikely to earn an A on the project.

2.12.2 Weekly Assignments

Weekly assignments were graded using a simple rubric to measure completion. Grades were given based on thoroughness of response and connection to game design concepts discussed that week in class. These assignments were used as a formative assessment and evaluation tool for the course by providing weekly feedback on what was being learned as well as students' perceived improvement in design skills.

This reflection data was vital in determining the success of the course by providing me with student perceptions of their own improvement in design ability. This data was used to adjust the pacing, sequencing, and content chosen for the course.

2.12.3 Final Exam

This final exam was not worth a major portion of a student's grade. In fact, it was offered as extra credit. This is both because the primary form of assessment was the final projects and because I wanted to encourage students to take the final exam without cramming study time before taking it.

The purpose of the final exam was to assess cognitive retention of the key concepts taught during the course. The 15-question exam was administered online through BYU's LearningSuite system. Students were not allowed to use their notes, textbook, or any other resource when taking the exam.

To read the full exam questions, click [here](#).

2.13 Implementation

I taught the first iteration of this course, with Dr. Holladay acting as a mentor and expert reviewer. Dr. Holladay was available to teach, mentor, or participate in any other manner necessary for the class. As such, he and I were both very familiar with the materials and activities used in the class. We met often throughout the semester to discuss the topics to be taught to ensure proper pacing and sequencing based on ongoing assessment. We also discussed the strengths and weaknesses of each class period to identify areas for improvement.

Before each class, I prepared any resources and spaces for that class period. This setup was very minimal, but it was possible that the whiteboard needed to be erased or that a presentation needed to be set up. Some class periods, if they included extensive in-class activities or technology, may have required more setup, but I ensured that any games or other activities were set up for the class before it began.

All materials developed for this class were delivered to Dr. Holladay along with the final course. We piloted the course by offering a "special projects" class (a class type at BYU for professors to offer non-accredited elective courses in subjects not normally offered). Special projects classes were offered for variable credit amounts, as determined by the professor teaching the class. Students who took this class were asked to register for 2 credits of special projects with Dr. Holladay. They were informed of the class time and location, and were given the same add/drop options as any other BYU class. Because of this implementation, we expected to have between 10-15 students for the first semester, and we expected that all—or nearly all—of the students in the class will come from the Animation or Computer Science: Animation Emphasis majors. We ended up with a class size of 12 students, 8 of whom came from the Animation or Computer Science majors.

Grading in a pilot class can be complicated because the level of implementation success is unknown and not well projected. For this reason, we graded leniently by giving allowance to students who were struggling due to complications from the implementation of the class. That being said, very few complaints were received regarding the grading of assignments.

The only major area of complaint came from the grading of the game design document draft assignment. Because grades were given based on a 1000-point total, but there were an additional 85 points of extra credit available, I used that assignment as an opportunity to give grade-based feedback to students. Many were surprised by their grade on a draft of a paper, stating that drafts are typically graded very leniently or based primarily on completion. This issue ended up being primarily caused by miscommunication. Had I explained before the assignment was due that grades would be based on in-development quality and not simply completion or effort, students would not have been caught off guard by their grades on this assignment. Ultimately, this experience served as a good formative assessment of each student's design ability at that point of the semester.

2.14 Evaluation

The goal of this curriculum development was to improve student game design skills. Because of that, there were two primary sources of evaluation data. The first was expert review from Dr. Holladay. He attended class frequently and observed the effectiveness of the teaching methods. He and I discussed ways to improve the teaching, whether for the current iteration or future iterations.

The second was feedback from students in the class, both from impromptu opportunities to provide feedback as well as from a final post-mortem meeting. This post-mortem meeting was a final opportunity for students to discuss the strengths and weaknesses of the class with the instructors. They had the opportunity to provide feedback at any point in the semester, but this

provided a more formal, summative evaluation of the class as observed by the students. I facilitated the discussion and attempted to have students contribute the most to the discussion without imposing my opinions on them. The goal of the post-mortem was to collect as much evaluative data as possible from students, but it was also an opportunity for students to synthesize what they've learned throughout the semester.

2.14.1 Expert Review

After much discussion with Dr. Holladay, we found a few ways in which the class succeeded and some areas of potential improvement.

Successes
1. There were many opportunities for student involvement in the design process. Students were able to design their own games and pitch their ideas various times throughout the semester.
2. Good balance of theoretical and applied. Much of the first half of the semester focused on the theoretical aspects of game design: learning the process and game elements, reviewing examples of games that succeed or don't succeed, and discussing potential causes of failed design choices. The second half of the semester focused on the application of what was learned by allowing students to design their own projects from nothing.
3. The course schedule and deadlines were well-organized and easy for students to follow. The structure of the class was simple, which allowed students to focus on their work rather than the administrative work of managing deadlines and fulfilling restrictive requirements.
4. The projects, assignments, and final exam were all well-designed to target the intended learning objectives.
5. Classroom discussions were well-organized and provided for deep contemplation on game content and process.
6. Classroom lectures and discussions were engaging and maintained student attention. Examples were relevant and meaningful.
7. Classroom work days were excellent opportunities for students to get one-on-one assistance with their designs. This helped students to see how the design process applied in context.

Potential areas of improvement
1. There was a long time gap between some of the initial concepts being learned theoretically and then being applied. Mixing the theoretical with the applied could assist students to concretize learning as they encounter it, rather than requiring them to wait for the second half of the semester before they really begin diving into designing their first game.
2. There were no assignments related to writing specific sections of the design document. Adding these assignments would provide an opportunity for students to receive feedback on one part of the design document before attempting to write the whole thing.
3. There could be even more work time than was offered in this iteration. The work time was highly valuable for students, especially when they received feedback from peers and the instructor.

4. The animation theater was not the optimal classroom because of a lack of collaborative work spaces. Moving the class to a different classroom, such as a computer lab or another space with more collaborative areas would improve the likelihood of students collaborating on their final projects, increasing the quality of projects and improving students' ability to critique and be critiqued.

2.14.2 Student Feedback

Throughout the semester, students had the opportunity to provide informal feedback on the course. They also provided summative feedback through student ratings of the instructor. I noted major concerns expressed in order to adjust the current iteration of the class as well as to prepare recommendations for future iterations.

In general, students enjoyed this course. Specific feedback, both positive and negative, is summarized in the list below.

1. The simple course outline and collaborative gamified environment helped students feel safe to experiment and play with their designs, and gave students the confidence to ask questions and be critical of their own work.
2. Many students expressed that they actually enjoyed working on assignments for this class because the purpose of all of the assignments was clear and the feedback they received was important to their growth.
3. Students generally felt as though the instructor truly cared about their growth and development, and that they could trust the feedback they received. They also expressed that they felt personally close with their instructor, which added to the collaborative, safe-to-fail environment of this class.
4. Some students struggled to keep up with the reading schedule. Almost all of the 15 reading assignments were due in the first half of the semester, which was not enough time for some students to complete all of the reading and internalize the concepts. Larger spacing between readings could help students succeed in this area. This additional space would allow students an opportunity to practice what they're learning earlier in the process.
5. Other students expressed that they wanted more time to work on their designs and potentially develop higher-fidelity prototypes of their games. Though this course was not intended to teach any development skills, many students came with those skills already, and they wanted the opportunity to test their games in a more realistic way. By starting the final projects sooner, students could have a greater chance of developing higher-quality prototypes and artwork for their games throughout the semester.

Overall, students found this to be one of their favorite classes. This may have been due to the subject matter and the inherent interest students had in the class, but part of it, I believe, was due to the clear expectations and process of the course. Students rarely had questions about due dates or other administrative items because it was all communicated very simply and clearly from the beginning. Students also rarely questioned the grades they received on projects because there was ample extra credit available to improve their grades despite struggling on a project draft or other assignment. The average final grade in the class was 94.6%, which I attribute to both the general leniency of grading and abundance of extra credit offered. Students experienced a high amount of freedom in selecting how to achieve the final grades they wanted.

They felt more in control of their grade than in other classes, which I believe to be a positive aspect of this course.

2.14.3 Recommendations
In order to improve this course in future iterations, I propose the following changes.

1. Move the class to another classroom or other more collaborative space. There is a lot of dedicated work time in this course, and a stadium-style theater is not the best environment for peer-to-peer collaboration.
2. Intersperse short assignments that ask students to submit sections of a design document. This will solve multiple issues. It will give students a chance to apply what they're learning as they learn it rather than waiting until the second half of the semester, and it will also naturally create more space between readings. It will give students an opportunity to receive feedback on specific portions of their design documents, and it will potentially allow the class to have more work time and deeper discussions without increasing the length of the class.
3. Lengthen the class time to 2 hours if possible. One and a half hours worked well enough for a first iteration, but students always wanted more time to work on the material and receive meaningful feedback on their designs. In-class work time was the most effective use of student time in this course, and the one-on-one instructor workshop time was extremely valuable for students.
4. Provide more resources for deeper learning. Many students wanted more resources for increasing their understanding of a particular aspect of game design and were self-motivated to learn. Providing these resources would allow students to deepen their learning without the additional work of sourcing the materials.

2.14.4 Conclusion
There were many successes from this first iteration of the introductory game design course. There are some clear areas for potential improvement, and the continual iterations will uncover further areas of improvement.

In the longer term, a meaningful way to evaluate the success of this course in improving student game design skills will be to evaluate the resulting games developed in the capstone game class. If students improve their game design skills, they will inevitably create better games as a result.

An important consideration going forward is the long-term vision of the video game track as a part of the Animation program at BYU. Projects could become more closely combined with the final capstone project; design and development classes could be taught in tandem; production classes could improve student organization and effectiveness, both individually and in teams.

BYU has a world-class animation program, and this course demonstrates the potential for BYU to take their program, and therefore the quality of video games produced throughout the world, to the next level.