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# Coming out to play: academia's role in game design education

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## ABSTRACT

Many universities have added game design courses or even full study programs focused on game design to their catalogue. Most if not all of these courses and programs have been heavily influenced by traditional academic subjects such as computer science, psychology, art or dramaturgy. Game design can definitely benefit from inspiration from such diverse areas, but as the field matures game design must find its own academic identity.

There are many challenges that must be met as academia enters the game design field, relating to research, practice and education. In this paper we focus on education by tackling two fundamental questions that a university needs to ask as when planning and implementing a game design study program:

- How do we best teach game design?
- What should the core courses of our game design curriculum be?

We aim to share our experience with game design education and answer the questions above from University of Skövde's perspective.

Author keywords: game design, teaching, game education, game design curriculum

## INTRODUCTION

In recent years, many universities – in Sweden and worldwide – have started computer game design courses or even full study programs. The academic interest for computer games and what has become known as "game studies" (Aarseth, 2001) has steadily increased since the late 1990's. The computer game industry has also steadily increased its economical turnover over the years, even if 2009 saw a slight setback due to the worldwide recession. But in times

of recession the interest for academic studies tends to increase, and to our knowledge the interest for studying digital game design has not decreased in 2009-2010.

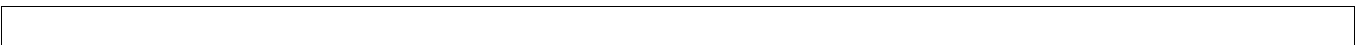
University of Skövde provides four different study programs for digital game development, specializing in programming, design, sound and graphics. While the programs have distinct goals and contain mostly courses related to their respective fields, having a critical mass of students in each of these disciplines yields symbiotic benefits. For example, programming exercises become more engaging and stimulating if it is possible to work with graphics created by actual artists. Translating a game design to a finished product is also possible by forming interdisciplinary student teams.

The computer game design study program at University of Skövde, Sweden was started in 2002. Since its inception, more than 100 students have graduated from the program. Over the years, several new game design courses have been created and many existing courses in other subjects have been adapted to fit in a game design curriculum. The curriculum itself has also changed multiple times – in response to student feedback and as a result of our own increased understanding and experience.

However, creating a successful and meaningful game design study program is challenging, especially since it is a new academic field with little previous experience to build upon. This paper identifies challenges inherent in teaching game design and constructing a curriculum for a game design study program. Throughout the paper, we discuss how we have approached these challenges at University of Skövde.

## CHALLENGES

Academic institutions tend to be slow and inert, and



when it comes to interdisciplinary subjects such as game design there are many obstacles to overcome when creating a study program and writing a curriculum. Traditional academic subjects, such as computer science, film theory and fine arts (to mention just a few with connections to game design), are rooted in traditions that may be detrimental to interdisciplinary curriculums. For example, research methodology, examination formats and course organization may differ significantly between disciplines. Also, such diverse subjects often belong to different faculties, leading to a separation (physically and academically) between faculty members in these disciplines.

Game design is also a new and unfamiliar subject that is not established enough to have formed its own academic traditions. There are thus few existing courses relating to core game design topics (such as rule systems) to build upon and draw experience from. All of these obstacles must be overcome in order to successfully organize an interdisciplinary structure for teaching game design.

In spite of these challenges, there are many courses or study programs that aim to teach and study game design, and there is also an increasing amount of books on game design available as course literature, such as Adams & Rollings (2007); Brathwaite (2009); Co (2006); Salen & Zimmerman (2005); Schell (2008) among others.

#### **BUILDING THE FACULTY**

A university is not the buildings making up the campus, nor the campus infrastructure. The university is the faculties, the professors and the students that meet within the infrastructure. As mentioned earlier, the campus or faculties might be more or less friendly to interdisciplinary study programs.

Before starting a game design program, it must be ensured that the circumstances are right and that the resources exist to follow through with the work required to design courses and a good curriculum. Sheer opportunism should be avoided at all costs: digital games are popular, and it may be tempting to start game design programs simply to reverse a trend of declining interest in existing computer science or art programs. Attempting to run a game design education using existing courses with unengaged faculty members will lead to disappointed students and disgruntled staff. In the long term, this will likely decrease application numbers by giving the university

a bad reputation.

A good program is based on several core structures. To ensure the academic significance of the program, active research on games is necessary; preferably performed by a dedicated game studies research group. Good connections with professional game developers must also be established before launching the program. Furthermore, an interdisciplinary faculty with members who all have a personal interest in games is crucial. To allow a good game design education to gestate, there must be members on staff who are passionate about games and trained in computer science, cognitive science, mathematics, film theory, art, music, literature and other relevant subjects. University infrastructure must also allow these scholars to collaborate on research projects and course development as a team. In particular, it must be possible to co-locate staff from different disciplines.

#### **EDUCATIONAL GOALS**

What specific role can academia play in game design *apart* from educating students in theories on game design, teaching well structured courses and designing a relevant curriculum? One very important goal is to promote a critical attitude towards games in general and digital games in particular; what they are, how they work and what consequences design decisions have in a larger perspective. It is important to force the students to ask and reflect on important questions about games and their nature, such as

- Why are violent games popular?
- What mechanisms in the human brain are triggered by a specific game concept, and what are the long term consequences?
- How large is the carbon footprint of game development?
- How do digital games affect worldwide energy consumption?
- Under what conditions are consoles and other game hardware manufactured?
- Do today's most influential game franchises promote certain philosophies or political agendas? Can and should games have a political message?
- How does the gender bias in the games industry affect the games being developed and their perception by the general public?

It is crucial that academia promotes a critical approach to the field of digital games and their content to

students. This means that subjects from the area of humanities have a large role to play. It is very easy to be absorbed in the possibilities of new technology and stop thinking critically about its consequences. As tomorrow's industry workers and leaders, students must be encouraged to reflect on ethical, social, political and environmental questions related to games and the games industry during their education.

### **TEACHING TECHNIQUES**

As previously mentioned, game design students tend to start their studies full of enthusiasm for the subject, and also with a large amount of knowledge about digital games and related fields such as technology. In most cases students can be expected to be very proficient in internet and computer usage, and also good at searching for information from multiple sources when trying to solve a particular problem.

However, while students are often comfortable with searching for information on the internet, they are often less inclined to critically reflect on any information they find, or to systematically apply the scientific method to a problem. Many students need help to transfer their knowledge base and methods to this new way of thinking and working. This might seem easy but in our experience it usually takes a semester or two before students are able to reliably apply their existing skills to the academic method.

Furthermore, many beginning game design students have not reflected on the fact that they are taking an academic education. It is extremely important to start discussing academic traditions and methods early on in the program, and to make clear the differences between an academic education and a vocational education and training program in the first weeks. This will most likely clash with some students' expectations, and thus be met with some resistance. It is important to understand that this resistance is natural and not dismiss it as immaturity. Most students will eventually see the benefit of academic traditions, and appreciate how an academic degree helps distinguish them from other game designers and also opens up the possibility of an academic career.

### **Lectures**

Traditional, academic lectures are important tools when teaching complex theoretical parts of any game design program, and lectures are therefore a natural constituent in many game design courses. Somewhat surprisingly, this can be problematic: many students

are unprepared for being confronted with large amounts of theory in a game design education. While it is true that game design is a craft, and that any game design program should have an emphasis on practice and learning-by-doing, theory has an important part to play.

Particularly, we have found that students are suspicious of subjects that are not obviously related to game design, such as project management, cognitive science and mathematics. No matter how relevant these subjects may seem when creating the curriculum, it is important to – at least for courses given in the first year – help students make the connection by using game related examples in theory-heavy courses. For example, a course in user interface design may discuss the user interface evolutions in *World of Warcraft* and a mathematics course could use combat examples from the *Civilization* series to explain probabilities. As students mature, they will become more inclined to make such connections themselves.

This is especially important when adding existing courses in non game-specific subjects to a game design curriculum. Lecturers in these courses may not be as familiar with games or game design as games-focused faculty members. It is thus crucial to meet with these lecturers and discuss how such courses can be made more appetizing to game design students. This does *not* necessarily mean that large changes should be made to the existing courses, especially if these courses are also given to students in other disciplines. The best way might be to ensure that knowledge from the more “peripheral” courses is well integrated in the games-focused courses. For example, students may be required to discuss their game's interface from a cognitive perspective at a game project seminar, or to make a mathematical model of aggro management in a game mechanics course.

### **Seminars**

A good alternative (or complement) to lectures when teaching heavily theoretical subjects is to arrange seminars. To encourage and help students digest the – often extensive – course literature, books or papers can be subdivided into suitable chunks which can then be presented and discussed by the students in a series of seminars. While not all students are enthusiastic readers, almost all design students that we have met like to discuss games – especially their favourite games. Seminars are a good way of using this

enthusiasm pedagogically, but beware that seminars – for this very reason – need to be moderated. Unless a staff member is present to guide discussions, most seminars have a tendency to end up discussing variations on a theme (in later years this theme has been class bias in *World of Warcraft*; our prognosis for the upcoming year is *Starcraft II* strategy). Seminars may also be good way for the faculty to brush up on their knowledge of contemporary games by engaging in discussions with the students.

If it is impossible to have a staff member present at all seminars, assign one of the students in each seminar group as moderator. It is also a good idea to require each student to turn in a seminar report within one day of the seminar. This forces students to stay alert and take notes during the discussions.

#### **Guest lectures, workshops and panel discussions**

Inviting professional game designers to give talks, lectures or hold workshops is encouraging for the students. No matter how many tenures you have with a background in the industry, students tend to be more willing to listen to guests lecturers. Inviting and discussing your curriculum with guest lecturers is also a good way to ensure that your program stays relevant and up to date, and may be inspirational to staff as well as students.

#### **Assignments and presentations**

We have previously stated our belief that game design should be treated as a craft, and that practical experience is a crucial component in a good game design education. A natural way of introducing game design practice in a course is through regular assignments. Preferably, assignments should be focused on designing full games. A good aim is that students should create 10-20 (ranging in scope from quick one-hour designs to full projects) game designs each year as part of their studies. To make the most out of these assignments, students should also be required reflect on their work in oral presentations or written reports. The ability to clearly communicate ideas and concepts is arguably the most important skill for a game designer, and it is therefore important that a game design education focuses on communication.

At University of Skövde we up the stakes in the project courses by broadcasting the final presentations live on the internet. These presentations are open to the public (who are allowed to ask questions in real time) and are also archived on the university web site.

This creates an opportunity for students to make the project presentations part of their portfolio, but also puts some pressure on students to create good presentations, since these videos are available to both fellow students and prospective employers.

If asked, students will generally state that they want as much freedom as possible when it comes to choosing a topic or scope for a game design assignment, especially in project courses. However, we have found that restricting assignments or projects may be beneficial. For example, in a project course this year, students were limited to making non-violent games. Apart from encouraging a vivid discussion on what it is that makes a game violent (is there really a fundamental difference between butt-stomping in the *Mario* universe and curb-stomping in *Gears of War*?) this was creatively interesting since it forced students to think about and plan their game designs in a different way. It is too early to reflect on whether this restriction on game theme was a complete success – the course is still in progress at the time of writing – but even though several dissenting voices were raised when the restriction was announced most students seem to have appreciated the challenge. After all, restrictions breed creativity and complete creative freedom for game designers is rare in most large-scale game development companies.

#### **Literature**

High-quality game design literature is starting to appear on the market, such as Salen & Zimmerman (2003), Co (2006), Adams & Rollings (2007) and Schell (2008), but compared to traditional academic subjects the selection is still small. This does not mean that there is a lack of good writing on game design. However, some of the best treatises on game design do not meet traditional academic quality requirements – few papers are peer reviewed or published in a way that is acceptable by strict scientific standards. Scientific papers that are relevant for game designers exist but are often too abstract or hard to penetrate for students in an undergraduate education. It may therefore be necessary to loosen the requirements for course literature and accept that – at least for the time being – some of the best literature on game design is available on hobbyist websites or published by commercial game companies. At the very least, independent and established industry websites such as Gamasutra ([www.gamasutra.com](http://www.gamasutra.com)) need to be considered acceptable sources of course literature.

### Competitions

Several competitions for game designers and game developers exist, such as Swedish Game Awards, Dare to be Digital, Game Concept Challenge, Imagine Cup, and the prestigious Independent Games Festival. Participation in these is highly motivating for students, and the university should therefore encourage and support student entries. Furthermore, competitions are a great chance for students (and their home university!) to get noticed by industry professionals and prospective students. By participating in competitions, students will learn to finish, polish and promote their game projects. They will also learn how to prepare presentations, follow detailed instructions and handle feedback and critique from an observer outside the university. These very worthwhile experiences are a good reason to create a curriculum that supports or even incorporates participation in competitions. At University of Skövde, many of the games developed in the second project course are later submitted to Swedish Game Awards, a large national game development competition, often with good results.

### Entrepreneurship

Having graduated from a game design education, the next step is not as natural as it would seem. The number of game design positions is limited, even for students who are open to moving abroad, and many companies are hesitant to recruit game designers without proven experience. An extensive portfolio from a game design program is obviously an advantage, but without a “real” game development project on their résumé students will have to work hard to get a position at a large game company. This means that graduates who want to pursue their game design career and realize their own ideas may need to consider joining or forming a startup company. It is good if the university somehow provides a natural way of doing this.

At University of Skövde, we have formed a successful partnership with Gothia Science Park, an incubator company which is co-located with the university’s main research facilities. Gothia serves as a platform for joint ventures between academy and industry, and this configuration has allowed a large number of game studios to become established in Skövde, providing a new branch of business life that was previously nonexistent in the region.

### CURRICULUM ORGANIZATION

When planning a digital games design program it is crucial to identify both core and secondary competencies for a professional designer. Depending on the game and the company, a game designer could have many different roles to play in a game development project, and a three-year academic program is limited in what it can provide in terms of specialized professionalism versus general academic competence and knowledge. As an academic program culminating in a bachelor’s degree, the goal is to prepare students for studies on an advanced level by developing their critical thinking skills, research methods and ability to communicate. As an academic program focusing on the games industry, other competences are also needed such as teamwork, project management, game balancing, level design etc. It is important that the curriculum balances these requirements while avoiding the conflicts that may occur due to the tension between them.

At University of Skövde we have chosen to provide courses that cover a broad spectrum of relevant topics, while allowing the students to specialize in order to give them a professional and academic identity. In our experience, the students that apply to a game design program are extremely goal oriented. This is for good and bad. Students are often highly motivated to produce games, but they may also be biased to reject or criticize anything that is not – in their opinion – focused on digital game design. Not addressing this conflict of interest is devastating for both students and faculty: the students will feel that they have made a bad career choice and the faculty will feel that the students are lazy and unwilling to see the benefits of academic traditions and methods.

The tables below show the curriculum for the Game Design study program at University of Skövde. Courses are grouped by year and semester. The numbers in parentheses are the number of credits awarded on completing the course (roughly 1.5 credits per week of full-time studies).

<b>Year 1, Fall</b>
Computer Game Analysis I (7.5)
Computer Graphics (7.5)
Introduction to Game Design (7.5)
Procedural Programming (7.5)

<b>Year 1, Spring</b>
Project in Game Development I (15) Dramaturgy (7.5) Digital Cultures (7.5)

<b>Year 2, Fall</b>
Cognition and Psychology (7.5) Scriptwriting and Storyboard: Design (7.5) Interaction, Design and Usability (7.5) Experimental Game Mechanics (7.5)

<b>Year 2, Spring</b>
Computer Game Analysis II (7.5) Intellectual Property (7.5) Project in Game Development II (15)

<b>Year 3, Fall</b>
Rule Systems and Game Theory (15) Elective courses (15)

<b>Year 3, Spring</b>
Final Year Project in Computer Science with specialization in Computer Game Design (30)

There are three important progression tracks in the curriculum, internally (and informally) referred to as *narratology*, *ludology* and *projects*. Some courses can be seen as part of multiple tracks, but individual course segments are often relatively easy to classify. Courses in the narratology track are concerned with topics such as storytelling, world building and character design. Ludology courses explore games as formal systems of rules and mechanisms. Project courses allow students to use knowledge and experience gained in other courses to develop games in an environment that aims to emulate the constraints and resources of a “real” industry game development project. The project courses also cover theory that relates to project management and software development. The three tracks and their constituent courses are described in more detail below.

### **Narratology**

An important aspect of many modern games is the storyline and/or background story for the game. Courses in the narratology track cover topics related to

creating a compelling world, populating it with interesting characters and using them to tell a satisfying story (Ryan, 2001; 2006, Wilhelmsson, 2001; 2007; 2008). Courses in this track are Computer Game Analysis I, Computer Game Analysis II, Dramaturgy, and Scriptwriting and Storyboard: Design. These courses allow students to analyze narrative material from a variety of media and genres. You can almost take for granted that an average game design student has a solid knowledge about games and genres, but it is rare that they have a functional terminology or knowledge base when it comes to other media or even game genres outside their comfort zone. A course in dramaturgy that provides key terminology and functional methods for narrative analysis is therefore an absolute necessity for a game design curriculum.

### **Ludology**

A defining aspect of a game is its rules, goals and formal structure, since the presence of a rule system and clear goals is what distinguishes a game from other types of activities or media. (Aarseth, 2004; Eskelinen, 2001; Frasca, 1999; Juul, 2005). The ability to create, analyze and understand formal rule systems is thus very important for a game designer. In particular, a game designer must develop an understanding for how changes to a game’s formal structure manifest themselves in game play and players’ perception of a game. In our game design curriculum, this *ludological* aspect of game design is represented by the courses Introduction to Game Design, Computer Game Analysis I, Computer Game Analysis II, Experimental Game Mechanics and Rule Systems and Game Theory. In particular, the last two courses focus almost entirely on game mechanics, rules and formal systems. Students are also encouraged to continue exploring this aspect of games in their final year projects.

Ludology is an extremely important part of a game design, but is unfortunately often neglected in game design curricula. One reason for this may be that it is difficult to reuse existing courses or other resources to implement ludological courses – they need to be created specifically for the game design program. At university of Skövde, the ludological courses have over time been given more room, to the extent that they now dominate the curriculum. This is partly because of our conviction that ludology lies at the core of all game design, but also because of our need – as a

small university – to specialize and distinguish ourselves from the game design programs given at the larger universities.

### **Projects**

Developing a high-profile, “triple-A” game requires large teams of professionals from different backgrounds and disciplines. Even less complex games are often built by teams consisting of game designers, programmers, graphics artists and musicians/sound designers. Since their inception, the game development programs at University of Skövde have focused on encouraging collaboration between students in the different computer game development programs – design, programming, graphics and sound. Students from all of these programs meet in several courses during their three years of study – primarily in the two game development project courses, but also in other courses such as Computer Graphics (all disciplines) and Computer Game Analysis (graphics & design).

In order to start developing professional skills the students need to engage in a larger project early on in their studies. To make projects realistic and relevant, groups should consist of students from all game development disciplines. Furthermore the number of students from each discipline needs to be balanced; partly in order to mirror how a professional game is developed, but also to ensure that students from each discipline are not starved for interesting tasks or overloaded with work. This creates challenges not only in course organization (course goals must be carefully crafted to provide interesting challenges for all disciplines) but also on a program level – the number of students admitted to each discipline should be selected carefully to allow for balanced projects. In our experience, it is crucial that there are several programmers in each project group. It is also important that the number of designers is not excessive. In smaller projects it is easy for designers to run out of interesting tasks some time into the project. The ideal number of graphics and sound artists depends on the specific requirements of the project, but it is generally harder for artists to run out of work – when they are finished with their main tasks they can always touch up the graphics on level three.

When starting the first project, the students from the four disciplines have studied enough basic courses to successfully develop a two-dimensional game. For the design students the focus has up to this point been on

understanding what constitutes a game and what distinguishes digital games from other kinds of games. They have also been introduced to a basic toolset and terminology for game design. They know how to write a short game design document, they are able to communicate the underlying ideas of a game and they have basic insights in programming and computer graphics that should allow them to understand the tasks of all participants in the project. The role of the designer in the first project is to plan the project from the idea stage to the delivery of a finished product. They will typically lead the project and they are also responsible for the core mechanics and the overall gameplay design.

While the ambition should always be to help the students create good games in their projects (games are excellent marketing tools and successfully completing an entertaining game is very satisfying to the students) the main goal of the first project is to teach the participants the fundamentals of project management and to provide an experience to which students can relate theory and practice from other courses. It is perfectly fine for students to make mistakes and even fail to finish major parts of their game in the first project. This hopefully makes them more open to new knowledge that might have helped them meet their goals. The “if only we had known this before the project” feeling might be slightly frustrating but motivates students to take new insights to heart, ensuring that they remember to consider them in their next project.

The second project, at the end of the second year, is more focused on the final product – the game. Most students choose to create a three-dimensional game with higher ambitions and more complex mechanics than the games produced in the first project. Many students see this course as the high point of their studies and an opportunity to create a valuable addition to their portfolio. Pedagogically, the second project is an important course that allows the students to make another attempt at managing a project while reflecting back on their previous project experience and use the knowledge they have gained during their second year.

### **Other courses**

Not all courses in the curriculum slots neatly into these distinctive progression tracks. There are several individual courses that we have deemed necessary for game design students. For example, two important

roles for a designer are those of visionary and negotiator. In a large project, it is crucial for everyone to – as far as this is possible – share the same view of the eventual product. The designer must be able to clearly communicate this vision to all members of a project. To do this, the designer must be comfortable with central concepts in both programming and art. Furthermore, a designer must understand the restrictions created by digital games' dependencies on these fields. For example, it is crucial to understand the cost (in programmer work hours or processor load) of implementing particular AI algorithms, or the implications of latency compensation mechanisms on the design of a networked game.

For this reason, the game design curriculum contains introductory courses from the other disciplines. Computer Graphics introduces central concepts in computer graphics – both artistic and technological – while Procedural Programming is a typical introductory programming course. Besides giving designers an understanding of basic programming concepts – such as memory, data and control structures – this course serves as a preparation for later courses where the students create their own prototypes. Basic programming knowledge allows students to create more advanced prototypes in shorter time. Cognitive Science: Cognition and Psychology serves as an introduction to cognitive science and is followed up with Interaction, Design and Usability. The latter course covers the crucial topic of user interfaces and how humans perceive them.

## **CONCLUSIONS**

In this paper we have focused on two primary questions:

- How do we best teach game design?
- What should the core courses of a game design curriculum be?

Our answer to the first question is complex. Teaching game design is hard, but building an interdisciplinary faculty where the members are doing research on games is a necessary start. Most traditional teaching techniques can be used also in game design courses, but it is crucial to find good, game design-oriented problems for examples and assignments. Simply changing the name of an existing course is not enough. New courses that discuss relevant theories from a variety of research fields need to be developed. Inviting professional game designers to hold guest

lectures or course segments is also recommended. Allowing literature based on the praxis of game development in addition to traditional academic literature is necessary until the field of game studies has matured. Competitions are a good motivator that can also encourage students to become entrepreneurs during or after their studies.

Designing a curriculum is also complex. At University of Skövde there are three main tracks in the design program: ludology, naratology and project-oriented courses. The project courses are in our opinion and experience crucial for the development of a knowledge base among the students. Good game design is not simply design of elegant and balanced game mechanics; neither is it the writing of a compelling storyline or the result of good teamwork. All three of these parts are required to create an excellent game.

## **The way forward**

The future holds many possibilities. Starting a game design education at a university is hard, but if successful it is also very rewarding. Developing and refining courses in a new and relatively unexplored field is exciting and engaging. We have also found game design students to be immensely fun to work with, due to their creative spirit, brilliant ideas and seemingly unlimited passion for games.

Theory and practice in game development is changing at a rapid pace, and it is therefore important to never stop evaluating and refining courses. Academia's task is to make whatever changes are necessary to make game design education relevant, develop game design as a fruitful research topic, and ensure that our game design students become independent, critically aware and successful practitioners in this most exciting field.

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