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Building A Game Education

From 0 to Finland’s biggest Game Education

Helsinki Metropolia University of Applied Sciences

Bachelor of Engineering

Building a Game Education

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This thesis describes building a game education for Finland's biggest University of Applied Sciences Metropolia. This study is created for Neogames, the Finnish Game Industry HUB.

This thesis is exceptional in its approach as the work described here is based on experience gained in work life instead of theoretical background or theories except for a few project management methods. The practical experience and approach used has worked exceptionally well in building the game education.

The thesis describes the activity before starting the building of the education including initial courses and activities, and the goals set when starting. In addition, it describes the challenges and problems faced during achieving the goals and the solutions and end results applied. The infrastructure related to the education is also described.

As a result, Metropolia now has Finland's biggest game education with over a hundred major students, another hundred via Open UAS and dozens via capital region co-operation with other game education facilities. The education consists of over ten game courses and several game projects and the education it yet expected to expand and to make a significant impact in Finnish game industry.

This thesis is created for

neogames
HUB OF THE FINNISH GAME INDUSTRY

Keywords	Game education, Metropolia, Helsinki, Game programming, Game design, Game art, Game Business, Game Studio, Game events, Bit1, Game incubator, Game industry, Capital region co-operation, Game project

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Tämän lopputyön tilaaja on Neogames.

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Avainsanat	Pelikoulutus, Metropolia, Pelisuunnittelu, Peli, Peligrafiikka, Pelituotanto, Pelistudio, Pelikiihdyttämö, Peliprojekti

Contents

1 Introduction

Finland is one of the top game development countries in the world. The total turnover of the Finnish game industry was € 2.5 billion in 2016. Finland has a total of 250 active game studios and the game industry employs around 2,750 people. [1]. As Finland is one of the top game development countries in the world, its game education should also be one of the best in the world.

This thesis describes how the author of this thesis, Juha Huhtakallio, has been building the game education for Metropolia during 2012 – 2018. The thesis includes the goals set while building the education, how those were reached, if they were reached, methods used and problems that were overcome when building the game education program for Finland's biggest University of Applied Sciences. Metropolia now has a game education program with 140 major students, supported by over 100 other gaming students from Metropolia and dozens of students from other capital region schools taking part in Metropolia's game courses. One can easily now say, that Metropolia has the biggest game education in Finland.

When the education building started, there was a long checklist of what to do. This thesis shows this list divided by its headings and what has happened to each part. In picture 1 is the first logo created and used to create awareness of games in Metropolia. If you are looking to build any part of a game education, this thesis is meant to be useful for you.

Picture 1. First game logo for Metropolia created. Image Juha Huhtakallio.

2 The author's background

This thesis is highly centered on the many years of work carried out by the author and thus needs an introduction to the author's background.

The author's first touch with computer games was through a VIC20 which his father bought him when he was 12. After the traditional "Hello World" application, the next created thing was a game.

The author graduated from Espoo Business School as a Datanomi as university was not an enjoyable option. The author was the only one of the graduates with a working application which also had a graphical and animated user interface in 1992.

After graduation, the author worked as a software developer and production manager in two software companies. In 2000 the author heard that one could get more than a McDonalds salary from a game company and applied to Housemarque where he worked as a Game Programmer, Project Manager and later Script Writer, and was involved in creating Transworld Snowboarding for GameCube, PS2, Dreamcast and Xbox. The Xbox title was published and Housemarque held a publishing party with the most attendant ever in Finland.

In 2002 everyone from Housemarque was laid off and the author started studying creative writing at Oriveden Opisto and Critical Academy, during which time he wrote a script for Housemarque.

The author worked as a hands-on game designer at Digital Chocolate from 2005-2007 completing game design from start to end for numerous games. During 2007-2010 the author worked as a Lead Game Designer creating full design, high level design and led design teams in numerous projects and also oversaw external productions' design done in Finland, Poland, Ukraine and Brazil. Digital Chocolate's external team delivered 15 games in a row that were awarded by Pocket Gamer. In total, the author has received 30 industry awards and published nearly 100 games.

The author worked at Kuuasema 2010 to 2012 as their Design Supervisor creating full or high level games design, attended customer meetings and ran the game design team.

The author is active in the start-up scene and as a mentor, international game juror and in many other activities including board member for Neogames since 2014.

The author's first contact with Metropolia (at the time Stadia) was in 2008 when he started teaching Game Design at Arabianranta Campus. During 2008 to 2012 the author started thinking it would be great to help build a whole game education. In 2012 he was asked to do this for Metropolia by Markku Karhu, Head of ICT Department, as part of the Game Cluster EU funded project.

3 Game Education at Metropolia 2008 – 2012

This section describes the Game education at Metropolia during 2008-2012 by presenting the initial structure of two courses, namely Game Design and Game Project 2010, and by overviewing the methods and goals for the courses. Most importantly, this section contains the key learnings gained in the process of developing the two courses.

3.1 Game Design Course 2008 –

The first two game courses started at Metropolia during 2008. The other was a 5 cr game design course at Metropolia's Arabianranta campus for digital media students and the other was an optional programming focused course that started at Metropolia's Bulevardi campus by another game education pioneer Miikka Mäki-Uuro at the same time. He still runs game education courses in Metropolia.

The game design course was held between 2008-2012 as an optional course until a major degree was introduced. Today the course exists for major students and also as an optional course.

3.1.1 Structure

The initial structure of the Game Design course would consist of these parts

- Theory
- Exercises
- Innovation from pictures
- Team work exercises
- Reverse engineer a game
- Concept one-on-one feedback
- *Favourite game* presentation by students
- Industry information
- Industry visitors
- Concept document (end result)

Every student would present their favorite game in 10 minutes. This would end up with students showing very different kind of games which in return would help students realize how different games can be and even how differently the same game can be approached. An interesting discovery was that no matter what kind of a game was presented, they all have one thing in common students would praise: atmosphere.

Each lesson would be divided to different themes like Game design basics, brainstorming, storytelling, monetization, production, industry and tips.

The topics would include an exercise. Most exercises would be based on real life cases and were found challenging by the students, but also extremely educational. All results from exercises would be shared during the class and made available for comments and discussion.

The course would have visitors from the industry, such as CEO Ilari Kuittinen from Housemarque.

The end result and requirement for passing the course is still the concept document. For this a concept template, a concept sample and how-not-to sample are provided.

The game design course is still well liked and has worked as a stepping stone for some to the industry.

While running this course, as it was the first times, feedback would be gathered about the course. At the end of each course there was a Post Mortem, where the teacher and students would go through what was good, not good or what to improve in the course, just as was done at Digital Chocolate after every game project.

One of the most liked days has been the one where students first create their Pong. The catch is it needs to have 6 hours of meaningful content. After this they are placed to teams and they need to select and create one pong from all the Pongs. After this they get a publisher and divide their game to features. Next the publisher wants various changes to the game. You can find more on this from in chapter 5, Innovation project. This teaches the students to work on their game, how to share their ideas, how to work in a team and to understand what is important to the game and where to focus. After each round they vote on the games and see what kind of changes help.

3.1.2 Changes

During the years, it was noticed that students would do well in the theory part and provide correct answers, but when doing exercises and actual game design, they would fail completely.

Due to this the amount of theory has been radically reduced. As exercises and practice are found more useful for them and more clearly makes them understand how to make the games, the course now more heavily focuses on practical exercises.

Initially the game design course also included plenty of statistical information about the industry, but these would get old the minute one would show them.

Concept one-on-one feedback would change to pitching because of huge group sizes.

A concept workshop was introduced. During the workshop the students would be given various methods on how to improve and work on their game before sending their final concept to the teacher.

During the years, the students were more introduced to think of their game as a product.

During the course and after many of the team assignments, the students would vote on the game they like. This would demonstrate for them what kind of games and ideas work in the group.

The current structure of the course is:

- Theory
- Exercises
- Innovation from pictures
- Team work exercises
- Concept pitches
- Concept workshop
- Concept document (end result)
- Favourite game –presentation by students

3.1.3 Methods

The game design course was built on practical material used and learned in daily work at Digital Chocolate.

The main goal of the course was to produce a game design concept. The students would be provided with a template. The template (modified during the years) and structure is still in use. Today there is the chance of making those concepts into actual game demos.

These same 3 criteria are still used when evaluating the concepts:

1. Unique selling point
   Does the game contain something new and exciting?

2. Focus
   Has the student been able to keep the focus on the game and has the student made a solid game concept which is not all over the place or does not fall apart with the smallest of suggestion or question?

3. Full game
   Has the game idea been taken forward and does it contain features that create a complete game and not over excess material which only confuses the concept?

3.1.4 Key takeaways

Even today the key takeaways for students from the game design course are:

- Understand to who you are making your game – it is most likely not you.
- Work with your game – do not get stuck with your initial theme but try others.
- Work with your features – try adding and removing features to find the best possible combination.
- It is team work – you need to be able to work with others and to communicate your game to others.

- Think and look for unique – your game needs to stand out and have something unique to it.
- Focus on understandability and keeping your player in the game – do not make things too complex.
- Reward the players – you cannot do too much of this.

3.1.5 Results

From the Game Design course, the maximum grade 5 has been given rarely, usually 0 to 2 times in a group of 40 students. Today most of these persons with a 5 now work as game designers in the industry in well-known Finnish game companies such as Remedy, Wargaming, Small Giant and Armada Interactive. So far, there is only 1 person who got a 4 that works as a game designer at the industry.

3.1.6 Learnings

- Keep theory minimal and do practical exercises.
- Make the students vote on the games created to make them understand what works.
- Have students present their favorite game to others to show the variety in games.
- Do not underestimate the importance of atmosphere in any game.
- The 3 criteria for evaluating a game concept are still valid.
- Reduce the theory part and prefer practical real life based analysis.
- Use team work.
- Make the students understand they need to work a lot and iterate their game concept.

3.2 Game Project 2010

Already during the game design course, the students and the teachers wanted to make the great concepts into games. The problem was having only a handful of somewhat skillful programmers, but the ideas were turned into games at any rate with the limited skills the students would have.

3.2.1 Structure

The course consisted of one day a week. The course had one intermediate deadline called “First Playable” and deadline for the last time.

During the course, every time at the start of the day, the teacher would give a brief presentation about the news, have team meetings and discuss with each team separately how the team is doing and what is going to be done on that day, if it was anything specific. This structure has later been used in Metropolia’s game projects.

The team meetings led by the teacher would follow the “Daily Meeting” structure taken from Scrum and Digital Chocolate where the team would go through the 3 basic Scrum questions:

- What have you done?
- What will you do?
- What is blocking you?

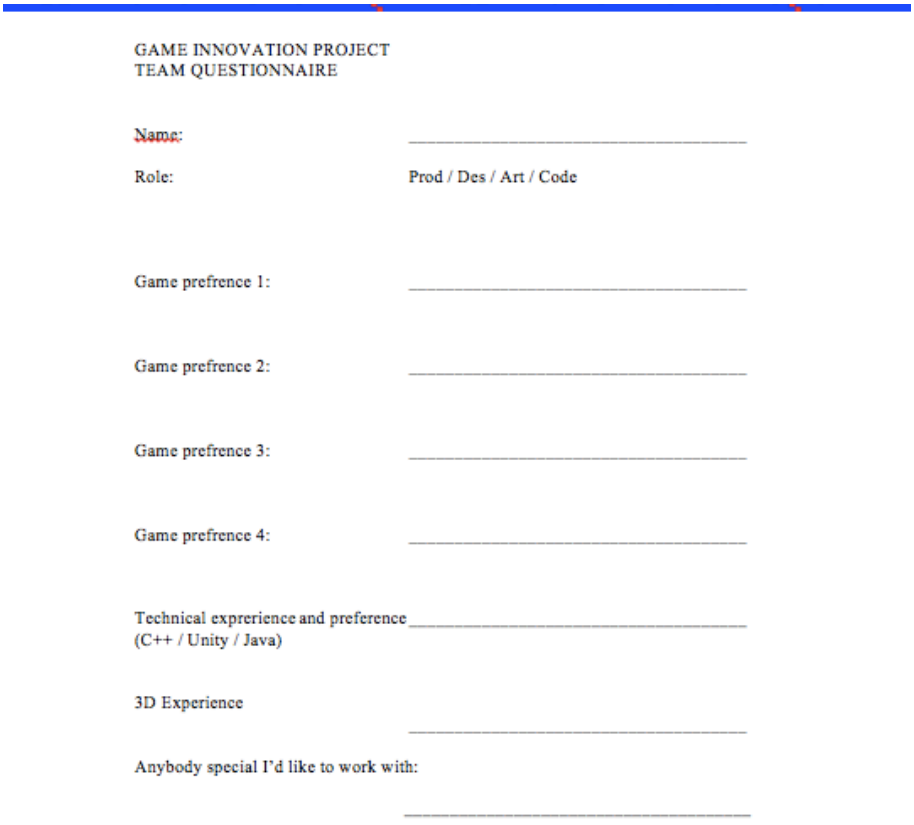
Scrum is a software development method created by 1986 Takeuchi and Nonaka and described in “Agile software development with Scrum” by Ken Schwaber. With scrum the project is divided into sprints which usually are like one or four weeks long. Each sprint starts with a definition phase where the next features to do are agreed on. The features required for the production are collected to a backlog. During the sprint a daily meeting is held every day. A scrum team consists of a product owner, scrummaster and the development team. Product owner owns the product and is responsible for the max quality of the product. Scrum master makes sure scrum is used and understood. Development team produces the actual product. Each sprint ends with a retrospective where the previous sprint is evaluated. [2; 3; 4].

Agile software development is an approach to software development in which the requirements and solutions evolve through the collaborative effort of self-organizing teams. It advocates adaptive planning, evolutionary development, early delivery, and continuous improvement, and it encourages rapid and flexible response to change [5].
In game development a game project can change often during production, therefore agile method is considered to work especially well in game production.

3.2.2 Methods

Initially the concepts were picked by the teacher with a few game industry people. This method was used for 2 years, until it came obvious that the results were the same with or without the game industry people.

The same 3 criteria which we used during the game design course (see 3.1.3) were also used for concepts, i.e. Unique selling point, Focus and Full game. Commercial potential has become much more important during the years and could be considered the 4th criteria. Gathering game industry people was also time consuming and was therefore it was dropped.
When the game course started, the 4 concepts which would be done during the course, were picked already beforehand and presented at the start of the course. At this point, the others would get to vote on which game they wanted to work. They would indicate this by putting the games in order of preference using the form shown in picture 2.



GAME INNOVATION PROJECT
TEAM QUESTIONNAIRE

Name: _____

Role: Prod / Des / Art / Code

Game prefrence 1: _____

Game prefrence 2: _____

Game prefrence 3: _____

Game prefrence 4: _____

Technical exprerience and preference _____
(C++ / Unity / Java)

3D Experience
_____

Anybody special I'd like to work with:
_____

Picture 2. Form for filling your game preferences. Form and image Juha Huhtakallio.

Mainly the students would get their first or second priority. Producers might have to settle for in a 4th preference – but this has happened only once ever. This method has been used successfully ever since and is still in use.
During the course the students were given deadlines. Also all material one team would produce and found useful, would be shared to other teams.

3.2.3 Results

Every member from one of the projects, Ghost Hotel, was hired within a week to the game industry. This can be considered a success. Three of the four members still work in the game industry.

Other projects more or less suffered due to lack of skilled programmers and did not really accomplish working games as Ghost Hotel did. The games logo is shown in Picture 3.

Picture 3. Logo of one of the first games created in a game project. Logo Senja Heikkinen.

3.2.4 Learnings

- Method where the students vote for their preference works well. It also gives them great motivation as they get to work a game they are excited about.
- The concern was that the teams would not split equally, but this has never been a problem. Students select enough different games when the concepts are strong enough from the beginning.
- Student teams need a structure and deadlines for the course to get going.
- Working demos will help the students get to the game industry.

4 Buidling the Game Education 2012 – 2014

This section describes building the Game education for Metropolia during 2012-2014, presenting the initial goals, methods used, problems and results.

4.1 Goals & challenges

Goals: To build a game education for Finland's biggest UAS.

Challenges: Where to find the students?
How would methods from the industry work with students?
What module should we have?

4.2 The to do list for building a game education

This is the initial list of ideas and content for building the game education. The checkmarks mark the goals completed while the empty boxes indicate work in process or failure.

- ✓ Create the structure for the studies.
- ✓ Create the content for the studies.
- ✓ Find the teachers.
- ✓ Find the students.
- ✓ Find the right contacts.
- ✓ Get a space for game development.
- ✓ Inform students, teachers and industry about the education.
- ✓ Create project courses where we make games.
- ✓ Select the game concepts before making them.
- ✓ Have a major degree available.
- ✓ Get industry people involved.
- ✓ Get games published.
- ✓ Get business people involved.
- ✓ Create Game Jam event.
- ✓ Create game event to show games.
- ✓ Get to game events like Nordic Game and GameXpo.
- ✓ Start a lecturing series with speakers from the industry.

- ✓ Work together with industry and educators to define what game education should be.
- ✓ Close the gap, help students get jobs (Game Studio).
- Gain publicity and raise awareness
- Create internship culture (getting better and better!)
- Find external funding (working on)
- Get investors and publishers involved (working on)

4.3 Structure of Education

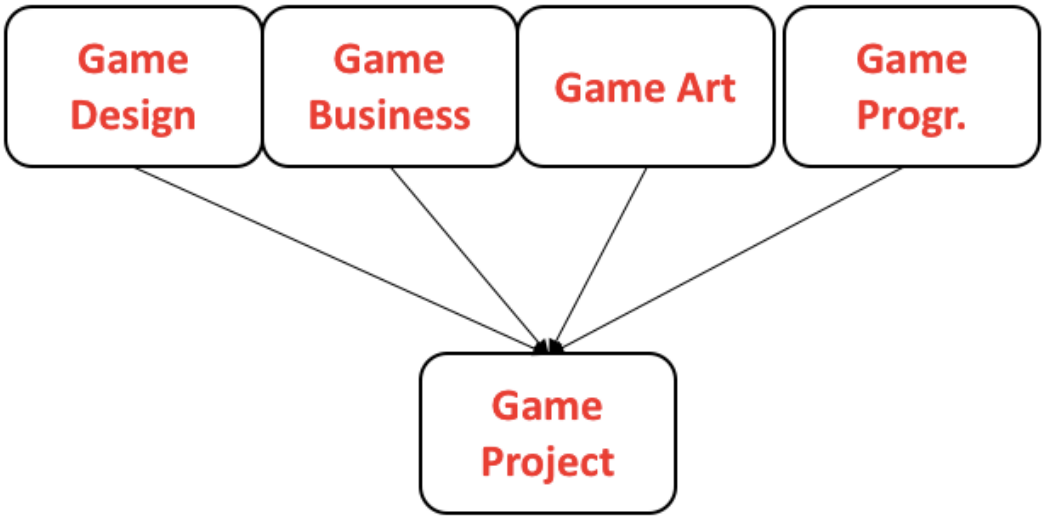
The initial thing in building the education was to decide what the structure would be. Game development has four basic roles: game producer, designer, programmer and artist. The first question was where to find the talent for each discipline. Programmers were easy to find from the same campus where the author was based. The first artists would come from Media Technology (now discontinued) in Leppävaara and also from Tikkurila's campus where there are the 2D Graphical Design Artists and the 3D Animation and Visualisation students. Producers were found from Industrial Engineering and Management and from Culture managers. Designers could come from any of these or elsewhere.

It soon became clear that the students need preliminary studies including topics like.

- Scaling
- Graphics programming
- Interpolation
- Physics programming
- Rendering pipeline
- Game engine development
- Graphics assets sizes
- Animation structures

Issues like scaling would need to be taught to the students before they join a game project. Therefore, preliminary 5 cr game courses for game programming and game art were started in addition to the existing Game Design course.

Teachers for these courses would be hired from the industry. For a game production course there was no need at the time as each game project course would need max 4 producers for every 20+ programmers and artists. The structure is shown in Picture 4.



Picture 4. Initial structure of education. This structure is used even today when selling education to China. Picture Juha Huhtakallio.

When the game innovation project would start, students who had been on these preliminary game courses would have priority in gaining access to the course over students who had not taken any game course. This structure has later been used in the curriculum for the Game Applications major students.

4.4 “Bureaucrazy”

One of the biggest challenges in Metropolia’s game education has been finding the students, matching the timetables, enabling students to move and find the game education. The first game courses were based at Leppävaara, Espoo Campus, and this was an issue with Metropolia’s art students based in Tikkurila at the time. Now the information has spread and students are now moving more between campuses to gain access to game studies.

4.5 Finding students

“I didn’t know we have this in Metropolia! Why haven’t we been told?” is something one could hear a lot related to game education at Metropolia in the beginning. Metropolia is huge and has around **20000 students,** and at the time 19 different campuses in Helsinki, Espoo and Vantaa and numerous degree programs. Finding the right students was actually quite a task itself in this huge organisation. Below are some of the methods used.

1) Facebook group

A Facebook group called “Metropolia Games” shown in picture 5 was founded in 2012. which to date has 450 members. Some of the members are not Metropolia game students but majority is.

Picture 5. Cover photo from Facebook group Metropolia Games. Picture Juha Huhtakallio.

The group is meant for

- Distributing information about game education. This works quite well and it reaches Metropolia’s game students, but it is not the main channel.
- Student groups post here that they are looking for group members to help them complete their game. This has started working better during the years for teams would find new members.
- Posting about game events or any other useful links.

2) Games.metropolia.fi

The web site has several purposes

1) Non-students: Information for anyone looking to apply.
2) Students: Help students find team members.
3) Industry: Find games done by students for anyone interested in recruiting them.
4) Customers: Find information about subcontracting work with the Game Studio

Currently the pages are being updated and a new version is released 11/2017 and will be completed during early 2018.

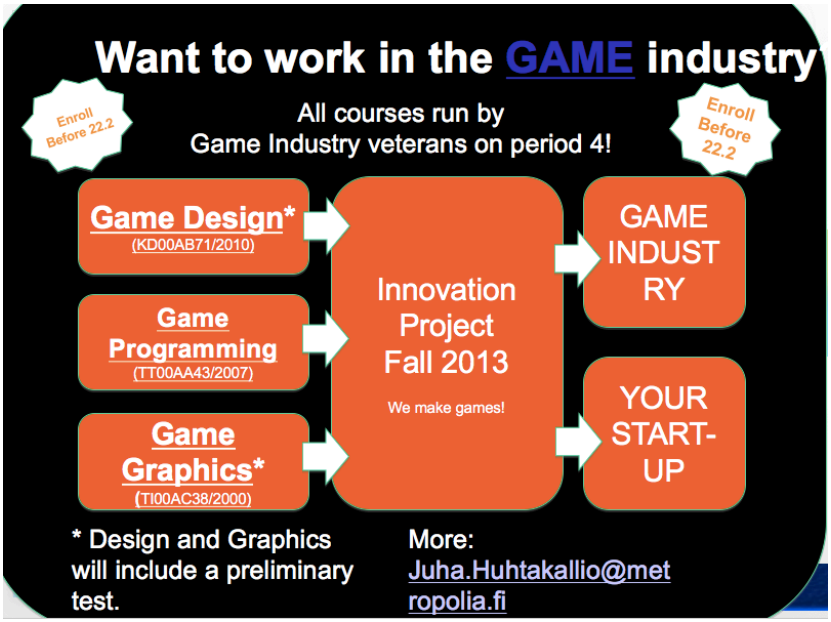
3) Workspaces

In Metropolia's intranet OMA (previously Tuubi), there are "Workspaces" which are like a combination of forums, posts and file sharing which have been a somewhat powerful method also for distributing information.

The problem remained that there was not a single one group to reach all students, but this group has now been created in 2018 as it already has worked powerfully.

4) Wall posters

Wall posters were posted to several campuses describing game courses available in Leppävaara, Espoo, Campus. Picture 6 shows a sample of a wall poster.



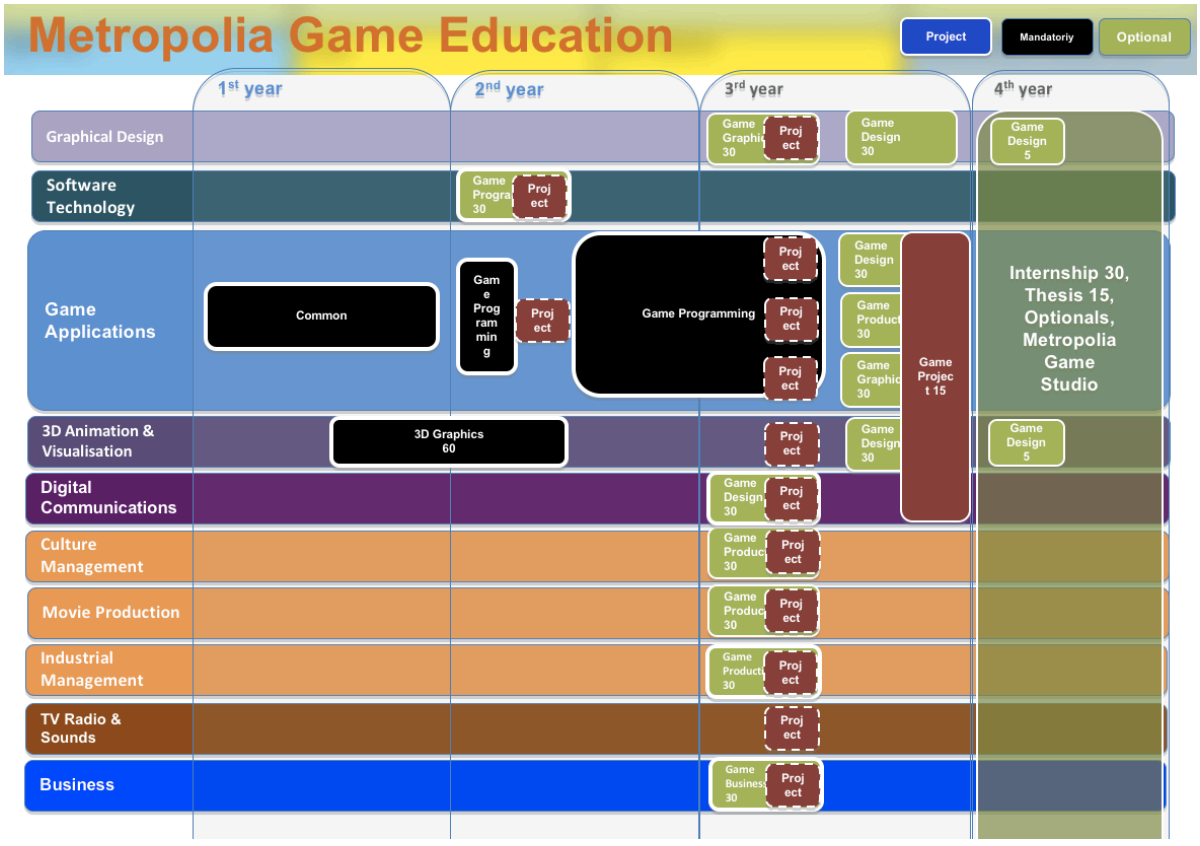
Picture 6. One of the wall posters used. Picture and poster Juha Huhtakallio.

5) The right contacts

As all names of degrees are not totally descriptive, many staff members were contacted to find the right students. This would lead to a discovery that some would be very helpful and are still close partners whereas others would not be helpful and they could act almost in a protective way to keep their students, which is always a shame if considering how much the students have enjoyed their game studies.

6) Visualizing it

Finding the students, teachers and disciplines was a huge job. To clarify this further, picture 7 was created to make it widely understandable internally that Metropolia can do successful multidiscipline projects, which had been a goal inside Metropolia for some time already. Picture 7 demonstrates all the disciplines involved in game education 2011 and what was available for each group.



Picture 7. Disciplines involved in game education 2011 and what was available for each group. First drafts for Game Applications are created. Diagram Juha Huhtakallio.

4.6 Results

The building of the education had started and the initial game education structure was in place and ready for the first multidiscipline game projects. After using various methods one could finally reach the students and raise the awareness to a level that the game courses were full.

4.7 Learnings

- Before a game project, arrange preliminary courses for each discipline.
- Find the right people who understand what you aim to do and who are willing to work with you and for the best interest of the students.
- A website would work very well for informing students and non-students, but not for the game industry.
- Wall posters work very well and maybe the main reason why now in several campuses students and staff are more aware of game education at Metropolia.
- In a very big organisation this big, use many methods to reach the game students and to spread the word.
- Visualising the structure of the current situation or any problems is a very useful and powerful tool.

5 The Innovation Project 2012 – 2016

This section describes the Innovation project course which has been the basis for future game projects. Innovation project was the first form of a game project course in Metropolia with students for each discipline programming, art, design and production.

5.1 Goals & Challenges

Goals: Create games during a game project course.

Challenges: How to structure the game project course?
How to make sure games get completed to demo phase?
Where to find the students?
How to get students from different disciplines to the same course.
How would a multidiscipline course run?
How to complete game in limited number of weeks?
How much guidance, visitors, lectures vs actual project work?
What should the students know before joining the course?

5.2 Structure

The innovation project course would utilize methods from the first game project in 2010:

1) Game concepts are decided before the course.
2) Game concepts are presented when the course starts.
3) Students vote on which game they want to work.
4) Start days with daily briefing from the teacher.
5) Have daily meeting run by the teacher and later by the student producer with teacher providing guidance when needed.
6) Create milestones.
7) Use the Core-Ext-Wish -method.

Later in the course would be included:

8) Specific lecturers and guidance on graphics and programming.
9) Deadlines for
   - Design freeze
   - Marketing materials

10) Industry visitors
11) Playtesting of other team's games
12) Open day – for the last time to present the games to other students not on the course, teachers and industry visitors.

5.3 Methods

1) Classroom

One important thing was to secure a class dedicated to games. The overall policy of Metropolia was not to assign classes to specific study areas. This changed in 2014.

Now Metropolia has designated game classrooms. The designated game classes are to create a game-like environment in which students would feel they are really going somewhere with what they do and that they are truly finally doing games which is the passion for each one of them.

Currently there are 2 designated game classrooms in Metropolia Leppävaara Campus in Espoo, the other one is shown in picture 8.

Picture 8. Classroom B202 Leppävaara Campus, originally called Delta, renamed to Portal. The classroom needs to feel, look, smell by all means like a place where games happen! Picture Juha Huhtakallio.

2) Others

Every time an innovation project started, the first question asked by the teacher has been: “Who wants to work in the game industry?”

As everyone would raise their hand, they would see and realize that they were surrounded by likely minded students and that everyone was serious about doing a game. This was important as students did not know each other previously, but they would see that the strangers shared their passion.

3) Group forming

Before ever forming any teams, team forming was considered to be a huge challenge due to the fact that students did not know each other. But getting everyone to vote on the game they wanted to work on helped a lot. One might think this kind of voting would lead to trouble, but it has worked extremely well every time, as the teams formed had indicated a preference for the same game which means they had something in common already to start with.

4) Roles

Clearly stating what the four main roles are and what their responsibilities are has been very helpful when teams have had numerous voices on how things should be done.

The roles are:

- Designer: Creator of the game idea, holds the vision of the game and last word on design. Main responsibility content.
- Producer: Responsibility of time management. Last word on what can be done during the project.
- Programmer(s): Decides the tools to use and programming language. When required, one programmer would be assigned Lead to make the decisions.
- Artist(s): Decides the visuals. When required, one artist would be assigned as lead to make the decisions.

In addition, teams have been completed with sound designers, business developers, marketing people and script writers when needed.

What has been surprising is that the programmers could sometimes ask “What do artists do?”. The most common question has been “What does a producer do?”. Often when a

production runs smoothly, it is due to well managed production and producers do not need to do so much.

5) Timeline

Provide the project with a clear timeline and set the goals and tasks to get students going. The most common deadlines have been:

- First playable with industry visitor(s) to give feedback.
- Alpha industry visitor(s) to give feedback.
- Design freeze.
- Marketing material.
- Game name.
- Weekly meetings with course manager.

6) CORE-EXT-WISH method

A very vital part of the production has been the dividing of the features to Core-Ext-Wish categories. This method was learned at Digital Chocolate by the author and has yet been developed further. Below in picture 9 is a sample of a Core-Ext-Wish division.

Picture 9. Sample of a game divided to Core-Ext-Wish categories. Picture Juha Huhtakallio.

This is how a game's features are divided to Core-Ext-Wish categories:

1) The concept is pitched.
2) After pitch, the teams are formed.
3) After open discussion and everyone understanding the game and giving new ideas, they start to identify the features.
4) Each feature is written on a post-it.
5) The post-it is then placed either to:
    a. Core – these we will absolute have in the game and will not let go.
    b. Extended – We need these to make a game that would be reviewed as a 10, but can let some go.
    c. Wishlist – we will do these if we have time.
6) This is done in co-operation and anyone in the team can add a note, but all notes are placed together. This results in:
    a. Understanding for all what the game is.
    b. Clear vision of what we look to accomplish during the course.
    c. Priority of features – otherwise this could come up gradually and even cause conflicts – now it is set right in the beginning.
    d. Ownership – This way the full team feels ownership to the game.
    e. It helps to form the team.
7) Product plan and estimates. Once we have the scope of the game and have identified the features, we can create a time estimate and divide the tasks.

7) Scrum & Lean Methods

Both Scrum and Lean project management methods are used during the game productions. Lean is a business methodology that aims to provide a new way to think about how to organize human activities [6]. Within software development lean has been used in evaluation the current product as soon as possible. The sooner the end product is delivered without major defects, the sooner feedback can be received, and incorporated into the next iteration. The shorter the iterations, the better the learning and communication within the team. [7].

Scrum has been used as a downscaled version with weekly meetings and agile approach towards deadlines without a scrum master. Lean has been used to create first playable quickly for testing and for evaluation. Games have been modified accordingly.

5.4 Problems

1) Technical issues

The game projects would run out of devices, not have the latest required software or hardware. For many of these Metropolia's helpdesk was crucial in getting things forward.

5.5 Failures

1) Pitching competition

For one of the innovation projects, an open pitching competition was held for Metropolia students where students would pitch and get to vote on the games they would want to create.

Two projects were selected. The other game project worked out quite fine, but the other project was a disaster. The concept appealed to the students, but the team lacked vision of what was missing from the concept. During making of the game, it became obvious that the concept was only an idea and not a complete game to work on. During production, the game changed greatly and in the end, did not complete to a playable demo.
It was the only time ever a game design competition was arranged.

2) Changes to teams

After starting a game project, students would fanatically stick to their teams even after the course and would be reluctant to change teams during or after the course even if they noticed there was a need.

Also, bringing students into a team in the middle of the course would never work so well as they would not fit in so well after the start of the project.
Only once ever has adding a person later backfired so that the person added had to be taken away from the team.

5.6 Results & samples

Metropolia was looking to create multidiscipline projects with its students. Picture 10 shows one Innovation project group which had students from 10 disciplines. The Inno-

vation project broke all records by far including at max students from 16 different locations. Not only was gathering them challenging, but very satisfactory as the teachers could see how much they really enjoyed the course.

Picture 10. One of the groups with art tutor Nick Sweetman and code tutor Teemu Saukonoja sitting in the front left to right with Huhtakallio between them in the green hoodie.

Later this innovation project was awarded with the “Konsta” award on the Inventors Day, which is an event that aims to award exceptional innovation activity.

The innovation project produced many of the key methods later used in the game education and the future game projects:

- CORE-EXT-WISH method.
- Team forming structure using the pitching of games and then voting and forming the teams.
- Project structure with milestones.
- Number of visitors to be minimized (only on milestones, no speakers).
- Intermediate playtest sessions with other teams and visitors.

The innovation project proved that the voting structure worked for forming the teams and to reach a demo version of their game.

It was discovered that the middle of a project is the hardest part. This is as the projects start easily and something playable is produced quickly, but in the middle of the course, it can take a long time before something visible is produced and the problems might seem too much to overcome. During this period students might feel that the game will not complete. This is also the point where the team might lose their faith and have the hardest time. This is the point when they need most of the support.

Surprising has been that just about every team has completed a playable demo version of the game. Some teams have even completed a full game.

During a visit from Rovio, they would ask one of the artists to visit them on Monday. The artist started working there.

Below in pictures 11 and 12 are some samples of the games delivered from the course.

Picture 11. Initial poster for Last Planets made during innovation project. Last Planets formed into a company which has raised six-figure capital. They got Apple featuring for their games launch in Europe. Picture Vulpine Games.

Picture 12. Image from a game made during innovation project. The Game Designer from the project shown in picture 12 has worked in numerous companies and is now a game designer at Armada Interactive. Picture Ina Pylkkö.

5.7 Learnings

- Multidiscipline works and creates great teams. One might think it will cause problems but it is totally the opposite.
- Atmosphere and surrounding make a big difference. Provide an environment dedicated to games.
- Show that everyone around the students is motivated and into games as much as they are.
- Create groups with members looking to do the game you assign them to.
- Group pressure works and helps completing the games.
- Clearly identify the responsibilities of each roles.
- Game students need deadlines to have intermediate goals and to keep the game advancing.
- Core-Ext-Wish –method is a very simple, clear and powerful method for all kind of game development.

- Core-Ext-Wish –method works especially well for students. Often student teams when making their first games have big trouble in defining the scope or core.
- Often people do not speak up that they did not get the game, this method has worked just about 100% in sharing the vision to every team member when it is done.
- The outcome from Core-Ext-Wish –method is motivated students who feel they have ownership to their games.
- Core-Ext-Wish –method shows clearly the priority inside the project and helps everyone focus on the right things.
- Even the boldest ideas should be evaluated by the tutors and not by the students as often they might underestimate what might be done. In many cases ambitious projects were started which managed to become great demos enabling the participants to get hired to the game industry.
- The team building methods used work very well and students will stick to their teams.
- Teams will complete a playable demo version, only very seldom they fail.
- The middle part of the project is when the teams need the most support and guidance.

6 Game Applications Major 2014-

This section describes how the game Applications Major has been developed and problems related to running the game projects and what solutions have been created.

6.1 Goals & challenges

Goals: Create a curriculum for game students which is programming focused.
Start creating games with commercial potential.

Challenges: How to find the artists?
How to run the game projects?
How to get teachers?
How to organise co-operation with other schools?
What should be included in the curriculum to match the game industry?

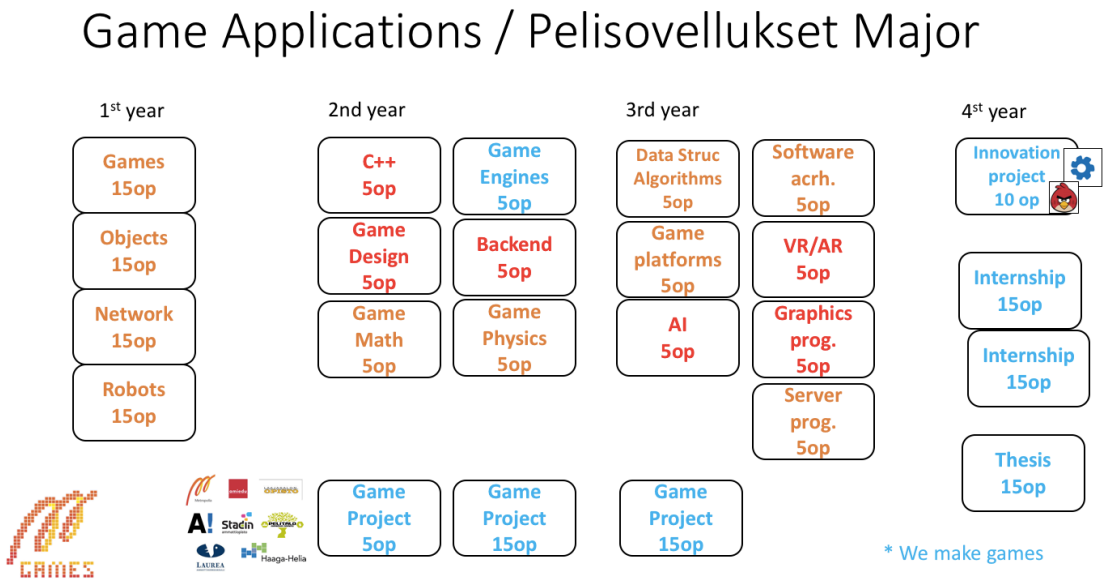
6.2 Background

To create a significant game education program, it needs a major degree. The curriculum was created by the author and lectures Miikka Mäki-Uuro, Antti Laiho and Heini Puuska and was later completed and modified by the author after he returned from 14 months of paternity leave. The creation of the curriculum was started already during 2013 in the ICT department. The goal was to have all game development disciplines (programming, art, design, production) included under ICT, but creating engineers from artists is not a viable approach, and therefore it only focused on programming.

Already in the beginning making games in projects was a vital part of the education. Making games is what the game industry expects and how the students learn the most.

6.3 Structure

Metropolia now has a curriculum with a great variety for game developers ranging from graphics programming and AI to VR and backend. Picture 13 shows the curriculum in 2018 with some key point highlighted with red.



Picture 13. Curriculum of Game Applications 2017. Picture Juha Huhtakallio.

The curriculum includes several game project courses during which games are developed. The goal is that a student would have 3 to 7 games in their portfolio when they graduate and that they could also clearly point which parts they have done in each game. These projects greatly utilize the methods proven to work already in the innovation projects. Using the CORE-EXT-WISH method (explained previously in 4.1.4) the structure in the very beginning helps all the team members visualise at once what their game will be like helping them work on a shared goal. The goal was to start all game projects with concepts that had been selected beforehand from the game design course or otherwise, but this has been skipped often due to lack of time.

It was made sure C++ was included in a big role in their studies. This has later been accepted well with the game industry. It was also taken into consideration that Unity might not be the tool in a few years as these tend to change.

All teachers hired are from the game industry and have significant game industry experience. Some teachers are Metropolia's current or previous students.

6.4 Methods

The Game Applications curriculum provides a wide range of topics within game development in addition to providing the basic skills. Various game development areas and technologies are covered with the curriculum.

Plenty of actual game development and project work is included in the curriculum. This is due to the fact that game development is learned best by doing it.

The goal of the education is to provide students with ready and working games when they graduate for their portfolio as the game industry focuses on games more than grades.

6.5 Problems

Problems encountered had to do with group sizes, lack of devices and space.

Group sizes are big and with a group of 40 students in a group individual support gets difficult. With a group size of 25 one can still track the students individually.

A constant problem is that there are teams without devices in the game education in Metropolia and the campus lacks space where students can work outside the classes.

6.6 Learnings

6.6.1 Enforce publishing a game

One of the goals for the education is to help students form teams to create companies. Currently teams and companies formed in Metropolia by the students might have not been able to publish a game. Therefore it be will enforced for students to publish a game during their studies.

6.6.2 Enforce creation of games out of students comfort zone

The majority of Metropolia's game students love to make PC Role Playing Games. When they all look to do the same kind of games, the variation will be low. In addition 80% of Finnish game developers develop for mobile and mainly casual games. The question for game applications has been whether to push the students to casual mobile as the game industry needs or should they be able to do what they wish, like those PC RPG titles.

For one game course the students were required to make a mobile game and to use GameRefinery. GameRefinery is a tool used to evaluate a game's commercial potential. The students were required to score over 80 with GameRefinery for their game in order to be allowed to do it. The students were allowed to make the choice between mobile and pc, but very few of them selected mobile. Creating a mobile game as part of their studies will be enforced in the future. In addition to making first their favourite game, it will be also enforced for them to make a casual game.

6.6.3 "Where can I find a game job?"

Surprisingly, after numerous lectures, visitors and events, still many of the students did not know how to apply to the game industry. They were totally unaware of sites like Gamesjobs.fi and many of the even very successful Finnish companies are unknown to them. Therefore the teachers need to constantly post info about the opportunities.

In the future a manual on how to get to the game industry will be created.

6.6.4 "Not good enough"

Surprisingly often one can hear from the students that they feel they are not good enough. The students need to understand how good they actually are and believe in themselves. Bit1 event is to help in this. In addition to education, the students need help in building their confidence.

6.7 Results

There are not yet results available on how the game application or other students are doing employment or graduation wise, as not yet a single group has graduated. Regarding employment, they have been employed very well, even though many of them work outside of the game industry.

All encounters with the game industry have resulted in big wow’s from game industry people who have been positively surprised about the talent and skill level of Metropolia’s game students.

7 Game Studio 2015 -

This section describes how the Game Studio was built from scratch to solve the problem of outsourced projects for students.

7.1 Goals & challenges

Goals: Create a structure for outsourced customer projects.

Challenges: How to find customers?

How to run projects so that they would:

Complete the given project

Be of good quality

Create income

Provide meaningful environment for students to learn how to work like in a game company

7.2 Background

For a long time already, Metropolia had seeked for methods how to subcontract work via students. Previous structures and attempts had failed in delivery or were never completed or had not delivered the required quality or all of this. Students had quit in the middle of the project, taken another job or just not accomplished it making accomplishing projects problematic and in some cases the teachers had to complete the project. The Game Studio solved this problem.

7.3 Start

Metropolia Game Studio was first founded “unofficially” in 2014 by the author. With a few students, the first customer projects were started. During these projects the model for the Game Studio was built.

To prevent students from quitting the project, they were hired and would get credits. Students could complete their internship or thesis or replace some of their studies (with the approval of their guiding teacher) while working at the studio. With the customers, the Game Studio would sign a very simple contract which would not resemble a deal with an actual software company. Instead, customers would have the chance to evaluate the project in the end in case the quality or content would not match what they ordered. If the customers were unhappy with the project, they would not have to pay for it, but neither would they get the software, assets or any rights to it.

This same structure is still the basis for the Game Studio.

To date, only one customer has decided not to accept the delivery, but this was not that the end product would not match what was ordered, timetable or quality.

The Game Studio works almost entirely on serious games, which are somewhat quite different from the entertainment games the students develop during the game projects or what the game students usually play.

7.4 Growth

The first attempt to gain customers for the Game Studio was from game companies, but without any track record, this was not viable.

The Game Studio’s main customer base has been organisations, unions and start-ups.

The Game Studio has created all product development for one of its start-up customers.

At the start, the Game Studio created 1-2 projects simultaneously, during spring 2017 the Game Studio had 5 simultaneous development tracks running. During spring 2017, the Game Studio sold all of its 16 seats to its customers. The plan for the studio is to start serving game companies in the future.

7.5 Publicity

Building awareness of the Game Studio has been a key task also. At the beginning, there was a link to the Game Studio from Metropolia's website, but even the Head of Studio did not know where it went so he sent a contact request through it to contact those who could direct it to the right location.

Currently the Game Studio has its own webpage at metropolia.fi website and flyers.
The plan for 2018 is to create a sales-package to be distributed for bigger customers and to attend various events to sell the Games Studio more heavily.

7.6 Google Drive

The Game Studio uses a Google Drive shared among studio employees containing all previous and current projects and all the work files, art assets and builds.

7.7 Game Studio Manual

As things would pile up, the Head of Studio created a game studio manual, which has been handed out to any new student employees. This manual contains a collection of all useful information that the student needs.

The manual contains information about:

- All salary & employment related issues.
- All holiday related issues.
- All health care related issues.
- Technical information related to tools used.
- Version control tools information.
- XCode usage information.

This manual has been found more useful by the studio employees than Metropolia's employee site, which is found complicated and hard to find anything by student employees.

7.8 Hiring principles

To work in the game studio, there are two options:

1) Full time contract with minimum wages. This is usually with 2 month's evaluation period, but can be reduced if the student has actual work history, and is reduced if this history is with Metropolia.
2) Part time contract with minimum hour wages with max 16 hours a week (this needs to be limited, otherwise full-time contract would make more sense).

The hiring process would always consists of:

1) Head of Studio meeting the candidate.
2) The candidate meeting with the studio employees. If a producer candidate would not be able to create a "connection" with the studio's game developers or could not speak up when asked, the candidate would have trouble working with the studio's game developers.
3) Depending on role, there could also be a test, like a designer test to evaluate their understanding of work with customers. Also in some cases, like artists, the customer might want to preview the possible artist first.

7.9 Roles

The Game Studio would work like an actual game studio with equivalent roles. The roles and areas of responsibility inside the game studio are:

1) Head of Studio
    - Customer acquisition.
    - Negotiating the contracts.
    - Doing the recruiting.
    - Production tracking and monitoring.
    - Creating the processes.
    - Product owner for all production and would often contribute to games design.
    - Solving all major customer related problems.

2) Producer
    - Running the daily process for each production.

- Keeping contact with customers.
- Arranging the meetings.
- Main points of learning: communication with customers, game studio employees, how to handle multiple projects, not to stress, to work with different kind of people.
- Main responsibility: keeping projects on track.
- Answers directly to Head of Studio.

3) Designer
   - Creating the design and vision of the game.
   - Needs to be able to communicate the vision of the game to others and customer.
   - Needs to understand how Serious games are different from Entertainment games which Metropolia's students mainly work on.
   - Main points of learning: communication, sharing and creating the vision.
   - Main responsibility: content of the game.
   - Answers to Head of Studio and producer.

4) Programmers
   - Creating the technical implementation of the game.
   - Would create all the version for different platforms.
   - Main points of learning to communicate the problems they encounter so that producer can identify bottlenecks and others and teachers can help.
   - Would usually use Unity or Javascript.
   - Answers answer to Head of Studio and producer.

5) Artists
   - Main points of learning to communicate the problems they encounter so that producer can identify bottlenecks and others and teachers can help. Also, to learn to share their work.
   - Answers to Head of Studio and producer.

6) Other roles
   - Backend developer for all backend related development.
   - Sound designer for sound effects and music when required.
   - Script writer when required.
   - All answer to Head of Studio and producer.

All employees are hired students expect Head of Studio. Employment periods would vary from some weeks to periods lasting over a year. Every part-time worker would present hour lists at the end of each month which would be accepted by the Head of Studio.

Members of game studio shown in picture 14. On far right is the Kanban style whiteboard to track progress of the productions. Kanban is a scheduling system used for lean manufacturing or lean software development [8]. Kanban is widely used in game companies. Often as the Kanban board a whiteboard with post-its is used.

Picture 14. Game Studio employees at beginning of 2018. The picture includes Huhtakallio as head of studio far left, studio producer, game designers, game & backend programmers, game artists & animators and sound designer. Picture Tero Pänkäläinen.

7.10 Game Project Lifecycle

Below is described a typical project lifecycle from beginning to completion.

1. Meeting with the customer and identifying their need.

2. Solution proposal(s) and customer would select the one they want.
3. Preproduction when designer creates the actual design and presents it to the team and it is estimated. Bottlenecks and risks are identified.
4. Production. Project is started and monitored by the producer.
5. Focus Group Testing.
    a. Even before production we use test the game with the target group.
    b. Then also once with first playable.
    c. Before end of production also once if possible.

    All feedback is taken in and game modified accordingly.
6. Mandatory Daily meetings.
    a. What Have I Done?
    b. What Will I Do Next?
    c. What is Missing or Blocking me?

The purpose of the daily meetings is to make people talk with each other about their project, which would not happen well enough without a daily meeting as people tend to try to avoid this kind of meetings or talking about the project. Daily meetings have been found crucial to any production already at Digital Chocolate by the author.

The meeting is always held standing as this reduces the time for the meeting. Any topics that take longer and require only a few people, are identified and postponed to be continued after the daily meeting.

7. Sprints. Each project is divided into sprints which are followed by the producer. Each sprints timeline is evaluated when it starts.
8. Project Handover. Once the game is ready, the game is presented to the customer. If the customer accepts it, they sign a paper stating they have accepted the project as stated in the contract.
9. Billing. Once the customer has accepted the Handover, the customer would be billed.

7.11 Privacy, Confidentiality and Security and Ownership

Metropolia Game Studio signs a contract with the customer which states the privacy- and security issues. Usually the statements from the template are enough but upon request these can be modified for an individual customer.

Game Studio employees sign an employment contract with Metropolia which creates the required privacy, confidentiality and security statements without having to separately create these between each customer or employee in contracts between the Game Studio and the customer.
By default, all ownership to all material the Game Studio creates will be customers. Metropolia reserves the right to use the material in its own portfolio to gain new customers in the contract template.

7.12 Problems

1) Growth

Keeping up with the growth of the Game Studio especially in the beginning before the infrastructure, guidelines and everything else was in place made it really hectic for the Head of Studio. Helpdesk alone could take almost half of the daily time of the Head of Studio for some weeks.

After establishing the infrastructure running the Game Studio has been much easier.

2) Evaluation students experience

Students can be hard to evaluate based on employment as most of them do not have any previous experience or any previous reference. In this their performance in school or a preliminary test would be used.

3) Finding students

Finding students has been and is still a problem for the Game Studio. Head of Studio has had to spend numerous hours finding especially artists, producers and designers. One reason also is that the number of the students available is not very high after all.

In 2018 after running a few years, the Game Studio now receives enough applications on regular bases removing the need to look for talent.

4) Burnout / stress

Many students would stress a lot and find themselves in a situation where they are close or are already in a state of burnout.

In these situations, Head of Studio would always go “people first” and tell them to do what is best for them, either take a break, cut down hours or quit. In all cases a break and cutting down hours has worked.

5) Mental issues

Not often, but when these would occur, they would often be related to a burnout situation. At the Game Studio there occurred one of the most serious incidents ever in the history of Metropolia. This was handled with Head of Studio and the help of the other staff of Metropolia by direct “people first” talks with the student in question, which once again eased the situation.

6) Extra features

During the production, some customers would continue to add features to the game which were not initially agreed on. Often the student employees would promise to include the features to the game. In many cases the student employees would also promise features not in the scope.

Due to this it was crucial to have Head of Studio present in the meetings reminding both the students and the customer of the project scope.

7) Incorrect billing

Billing inside Metropolia would work in a false way. Money would either be not billed or accounted to another department. Also, costs that did not belong to the Game Studio would be charged from the Game Studio.

8) Servers

As the Game Studio worked with government institutes which have high security requirements and outdated browsers like IE11, the Game Studio encountered problems with compability and in getting permissions for the applications to run. Even the process for

getting the “no” could take weeks, if not months. Therefore the Game Studio always instructed their customers in the beginning of a project to start solving the server related requirements from the start of the project.

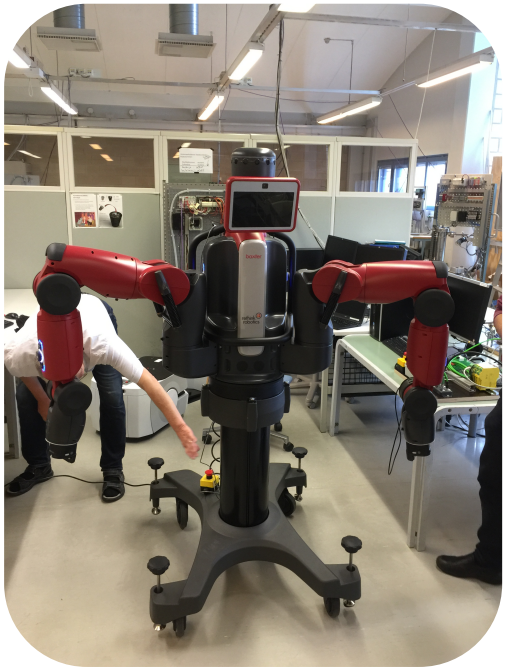
In most cases a separate new service had to be opened at a third party server like Amazon Web Services.

9) iOS

Creating an iOS built either goes right the first time or can end up in a battle. Often the problems are related to bugs in XCode which luckily in an update seem to be somewhat removed. Often the problems relate to previous certificates which have expired which XCode tends to try to use instead of the later and valid certificates.

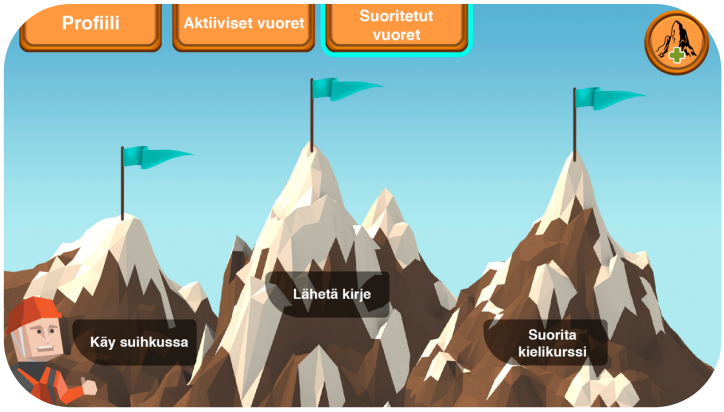
7.13 Results

The Game Studio model works. The Game Studio has produced high quality products and the students enjoy working in the Game Studio. Images 15 to 19 show games made in the Game Studio.



Picture 15. Game Studio designs games and software for various hardware and new innovative technologies. Picture of a robot the Game Studio would design software for. Picture Juha Huhtakallio.

Picture 16. Picture from Soludus game funded by an EU project. Picture Metropolia Game Studio.



Picture 17. Picture from a game made for a startup. The project was funded with Tekes Innovaationbill. Picture Metropolia Game Studio.

Picture 18. Picture from game made for HUS to help children who have been diagnosed with Diabetes. The game helps them learn which foods to eat. Picture Metropolia Game Studio.

Picture 19. Picture from game made for Fimea to help children understand how to use medication and also to understand it is not always needed. Picture Metropolia Game Studio.

Many students have moved to the game industry from the Game Studio and customers are happy with their end products.

7.14 Summary

The Game Studio model is found to be working as it is a Win-Win-Win situation for all. Customers get cost efficient and high quality products, students get the expertise, salary and credits and Metropolia gets credits for students and some income.

The Game Studio has been expanded from just games to all software production and during spring 2017 was already running on maximum capacity.

7.15 Learnings

- A game studio like structure with agile methods work.
- To ensure completion of projects, hire the students.
- Use a light contract model to avoid problems if the project fails due to students.
- Clear roles and structure, and again openness on what is being done, works well.
- Look to create an atmosphere, an environment where game students enjoy being.
- Keep an eye on possible burnouts.
- The head of studio needs to be present as much as possible especially in the beginning of the project to ensure the correct direction and scope.
- Students are eager to promise new extra features.
- Create a manual that contains as much as possible essential information and guidelines.
- The Game Studio clearly helps raising awareness of Metropolia’s game education within the game industry.
- The Game Studio helps students getting hired to the game industry.

8 Building the Game Education 2015 – 2018

This section describes how the game education within Metropolia has expanded. It describes events created and how the game education development has taken a more national level.

8.1 Goals & challenge

Goals: Build an internationally high quality game education.
Produce teams with commercial potential.
Have games sign publishing deals.
Help students get to the game industry.
Close the “gap” between education and industry.

Challenges: How to help students form companies?
How to raise awareness among the industry?
How to get art and business students?
What additional studies should we have?
What events should we have or take part in?
How to get the game industry to value the game education?

8.2 Capital Region Co-operation

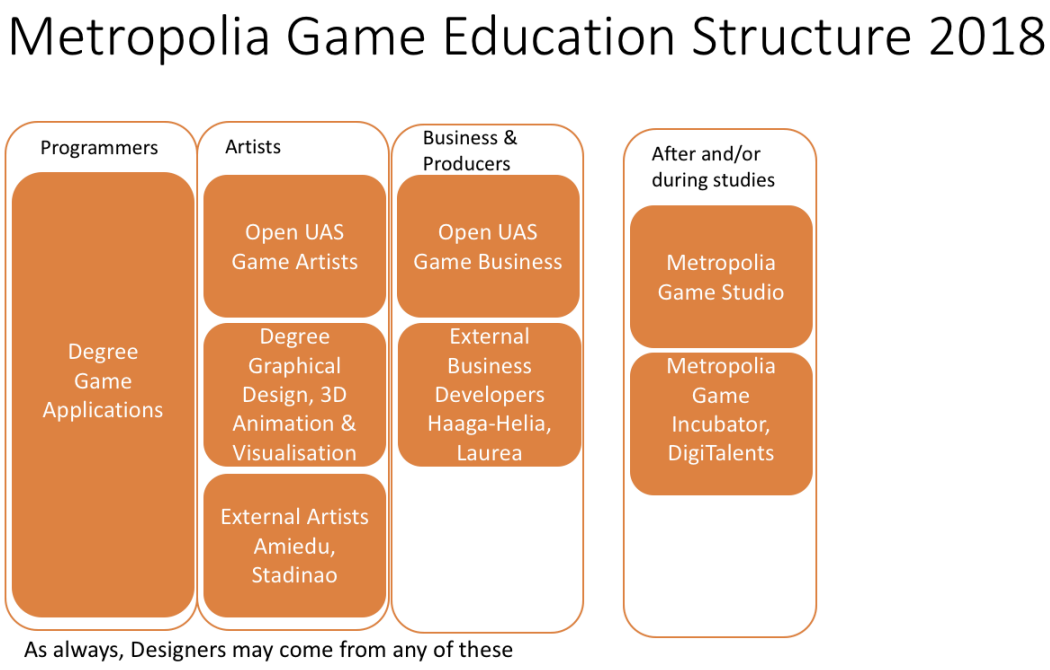
Metropolia has students from just about all areas needed for game education. Yet it has been hard to get a sufficient amount of artists or business talent.

In 2016 this was a huge problem for students in the Game Applications as they had no artists. The author realized he had visited all capital region game schools and knew everyone involved, so he invited representatives from all capital region schools to a meeting which started the co-operation. For Stadinao and Amiedu the situation was the opposite, they had art students, but no programmers, and they also wanted game project experience for their students. The co-operation was started as shown in picture 20 including Metropolia, Stadinao, Amiedu and also Laajasalon Opisto but also with Omnia, Haaga-Helia and Laurea in the talks already, but their students would join later.

Picture 20. Co-operation schools at 2016 and with Haaga-Helia and Laurea joining 2018.

In this, the Open UAS was found to be excellent as it would allow students from other schools to join Metropolia game projects and the students could use these credits in the future if they would start studies at Metropolia.

How the game education is now structured at Metropolia is shown in picture 21.



Picture 21. Current structure of Game Education studies within Metropolia at 2018. Programmers can come also from Stadinao, Amiedu and Omnia to the game projects in the future. Also students from Laajasalon Opisto can join any role.

This has been a win-win-win for all participants. Students would get to make actual games with full teams, get material for their portfolio and the game industry would get more mature graduates.

8.3 Additional study modules

Here is described the additional study modules created mainly for artist and business students.

8.3.1 Game Art studies

As mentioned earlier, getting art students from Metropolia was hard due to curriculum differences – when students in Game Applications had a project, the art students did not, and when the art students did have a game project, it was the one time Game Applications did not have a game project. Therefore, also the co-operation with other capital region schools who had artists, but not developers, was started.

In fall 2017 the Metropolia ICT department where the Game Applications major ran, took in their own 30 game artists via Open UAS. These students have taken part in the game projects with Game Applications students, innovation projects and strengthened the companies that have been formed already. All 30 students were taken very quickly and therefore another set of 30 art students started in the beginning of 2018.

8.3.2 Business & marketing studies

As part of their studies, the Game Application students have game courses focusing on game business, production and marketing. These courses have been run by game industry veterans with strong background from companies like Rovio, Digital Chocolate and Secret Exit and have been praised by the game students.

These courses have provided detailed info about the game business itself with information like market sizes, customer types, regional differences, life time values, retention,

conversion rate and many other practical approaches to creating, publishing and selling games.

In the beginning of 2018, the ICT department has taken in the first 25 game business, marketing and production oriented students via Open UAS. The goal is yet to strengthen the student teams formed by Game Applications students with valuable business, marketing, branding and production oriented students.
It has been seen many times how talented and even very motivated teams fall apart without a business person to create the vision and goal for the group.

In addition, Metropolia has also started co-op with Laurea and Haaga-Helia to get business students from them also. Metropolia has its own business students, but only on average one to three students look to join game projects per year.

8.3.3 NY Startup

NY Startup is a concept that has been already around for some years. It was also incorporated to the studies of Metropolia's game application students to even further strengthen their basic business understanding. Teaching for this has been carried out by persons with start-up experience and topics have covered the very basics related to starting and running a company.

8.3.4 "How to make business out of games"

As part of Metropolia's game education a game business education called "How to make business out of game" was arranged for the unemployed.

The course consisted of 50 students from very different backgrounds and experiences looking to work in the game industry. The group contained programmers who had Nokia background, artists from media & advertising, producers from Nokia and various other backgrounds.

Some of these students have been integrated to other studies and game projects, but the main challenge here is that many of the students would study only in the evening time.

One team from this course won the game competition held at the 2nd "Game Demo Day" arranged in Metropolia Leppävaara Campus December 2017.

8.3.5 Game Activities course

During fall 2017 a course called "Game Activities" was started which is open for all game students. The purpose of this course is to support any kind of game activity within the game industry. Students can get 1-2 credits per topic to a maximum of 5 credits.

The activity can be:

- Publishing a game.
- Being a volunteer in a game event (GameXpo, PocketGamer).
- Taking part in Igda events.
- Taking part in Gameplay Test Session.
- Game Jams.
- Lecture Series (Metropolia's own or GamesNow).
- Participating in a game test session for a game company.
- Participating in a game contest.
- Igda demo corner – show your game at Igda demo corner.
- Game studio visits.

One reason for this is that students who are more visible seem to get hired more often.

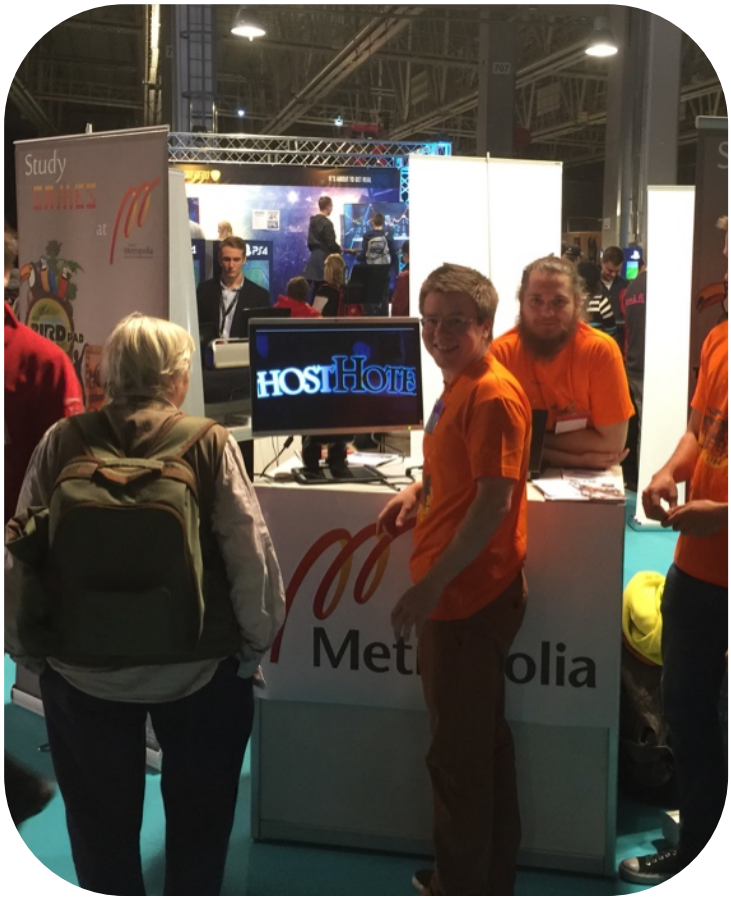
8.4 Events

Here are described the events participated by the game students or created for the game students.

8.4.1 DigiExpo / GameXpo

Already for years Metropolia has had a stand at DigiExpo, now called GameXpo, as shown in picture 22. This has proven to be a valuable event for:

- Contacting possible future students, mainly their parents.
- To find projects for the Game Studio.
- For students to present their games.



Picture 22. Image of the Metropolia stand at DigiExpo in 2015. Picture Juha Huhtakallio.

8.4.2 Game Industry Experts Lecture Series (GIELS)

Game Industry Experts Lecture Series was started in 2015 and continued for more than a year. Speakers included from former students to long-term industry veterans up to CEOs. Speakers would come from Neogames, Gamesjobs, DoDreams, Rovio, Housemarque, Mindfield Games, Stupid Stupid Games, Mäkitalo Rantanen Lawfirm and many others.

After the talks students, speakers and teachers would gather to a nearby restaurant to network. On average the lectures would contain from 30 to 60 students from Metropolia and other capital region schools. The series will be restarted during 2018 in co-operation with Haaga-Helia and Laurea.

8.4.3 Game Jam

The only Game Jam so far was arranged simultaneously with the Metropolia Lan Party event. With around 15 participants, the event was considered a success by those who took part in it, but it did not attract students from other schools around the capital region and has not therefore been arranged again, even though now the number of students available is much higher. In addition, there are many Game Jam events already available.

8.4.4 Metropolia’s Igda Night

International Game Developers Association (IGDA) arranges once a month an open game evening event. At the event people are present from the game industry and the event has a sponsor for each event. Also, the event has sometimes a demo corner for the students to present their games. Many times, students who have attended the event have made connections to the industry which have led to employment.

Metropolia booked and held an Igda night in January 2015 where the author held a presentation. The purpose of the evening was to present that not only game companies could arrange the event and also to make awareness of Metropolia’s and other schools game education. The purpose was also to make this information available to students

and to get them participate to the event more often. Currently, Igda has student(s) from Metropolia in the board.

8.4.5 Nordic Game Conference

With the help of Neogames, since 2012 every year one teacher and 3 to 4 Metropolia game students have visited Nordic Game Conference in Mälmö, Sweden. The purpose has been to help the most talented students to get insight to the game industry, visibility and a chance for them to present their games.

8.4.6 Game Demo Day Event

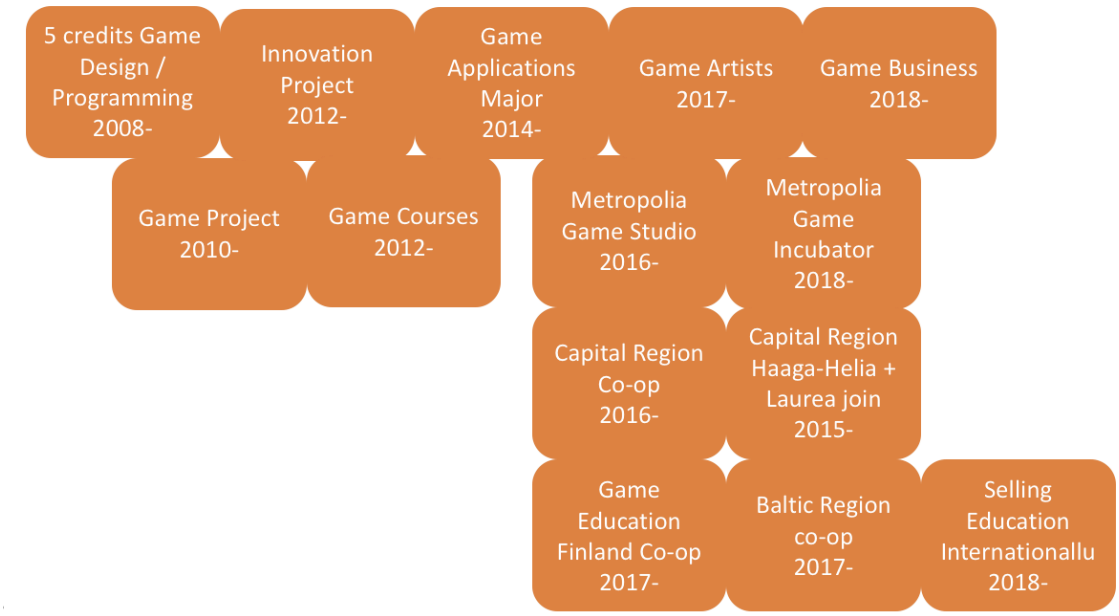
At the end of a game project course Metropolia game teachers have arranged a Game Demo Day twice that has been open to all. The main lobby of Metropolia Leppävaara Campus has been filled with 30 to 50 games. The Game industry people have visited the event. Also at the event there was a Meet & Match event arranged with a few teams looking for team members. The invitation is shown in picture 23.

This event is the basis for the upcoming BIT1 event.

Picture 23. Invitation for the second Demo Day. Picture Juha Huhtakallio & Veera Schneider.

8.5 Game Education Development Timeline

Initially from the individual's courses, it has taken 5 years to create the complete game education structure for Metropolia. This has further led the author to get involved in projects involving entire Finland's game education and Baltic Region and lately to international game education sales. Picture 25 shows the main focus areas and results in development of the game education in Metropolia since 2008.



Picture 25. Development of the game education within Metropolia. Picture Juha Huhtakallio.

8.6 Amounts of Students

Tables 1 and 2 show rough estimates of students that have taken part in game education in Metropolia. These amounts exclude the 3D Animation and Graphical design students. One can see the amount of students increasing every year.

Table 1: Amount of students per year:

Year	Amount of Metropolia students on courses; (major + others)	Amount of students for co-operation schools	Total amount of credits available (major + others)	
2008	0+25	-	5	
2009	0 + 0	-	5	
2010	0+20	-	10	
2011	0 + 10	-	5	
2012	0 + 60	-	25	
2013	0 + 180	-	25	
2014	0 + 230	-	80	
2015	70 + 135	-	240 + 60	
2016	110 + 85	30	240 + 15	
2017	150 + 60	30	240 + 45	
2018	160 + 55	45	240 + 55	

Table 2: Amount of students at Metropolia in Game studies at January 2018:

Name	Degree	Intake 2018	Intake 2017	Intake 2016	Intake 2015	
Game Applications	Major	40	40	40	60	
Game Artists	Open UAS	30	30	-	-	
Game Business	Open UAS	25	-	-	-	
Peleistä Yrittäjyyttä	For unem-ployed		60	-	-	
3D & Animation	Major	18	18	18	18	
Graphical Design	Major	18	18	18	18	

Artists co-operation		TBA	30	30	-	
Business co-operation		TBA	-	-	-	

8.7 Results

The results in full are yet to be seen, but already we can see that the co-operation between other schools has produced many working teams and new game companies. Also, the amount the students has grown every year. Many have been hired to the game industry already to companies like shown in picture 24.

Picture 24. Former students from Metropolia work in just about every Finnish gaming company from any development or managerial positions up to CEO.

The picture includes the workplaces of all known students ever since 2008, but is missing studios like 3rd Eye Studious, Motorious and Dazzle Rocks to name a few.

At the beginning of 2018 the situation in Metropolia is that the game education is in place and is producing high quality game talent.

8.8 Learnings

- Co-operation and openness helps.
- Creating an activity course guides, instructs and motivates students.
- All activity and support is good and can create surprising opportunities. If nothing else, people network, which can create surprising results.

- If you support your students by all means possible, once in a company they can come back to you as visitors, mentors or speakers or even teachers.
- Try things, as failure contributes to the next success.

9 Infrastructure

This section describes other organisations involved in the game education at Metropolia.

9.1 Goals & challenges

Goals: Raise awareness of our game students being great talent.

Challenges: How to get game industry to realize this is where the future talent comes from?

What after studies as many students are without place where or means on how to continue on their game?

9.2 Neogames & Pelinkehittäjät Ry

Neogames is the hub of the Finnish game industry. The author was asked in 2014 to join the board of Neogames as their game education representative. During 2017 Metropolia got 3 different project fundings which enable the arrangement of even wider co-operation between educational facilities in Finland.

The main goals are to

1) Unify the game education in Finland via the Open Badge System.
2) Start deep co-operation between the industry and the teachers
3) Clarify the educational path to the game industry and create a study-path starting from the age of 12.

Metropolia has mainly operated with Pelinkehittäjät via Neogames as the two organisations are close.

9.3 Finnish Parliament

The author gave a speech at the Finnish Parliament 2015 stating the problems the graduates have. One proposed solution was that there should be a small grant of about 5.000

to 10.000 euros to help the teams. Stepdemo was launched in 2017 from which emerging game teams and game companies could apply for a 10.000 euros grant.

9.4 Student Game Event

During spring 2018 “Chips for Game Skills” project will arrange the first national event for game students only.
The event will consist of demo areas, speakers, competitions and publishers from Finland and abroad. The main goal is to raise the awareness of student team’s quality and their games. See Bit1 for more information.

9.5 DigiTalents

Together with people from City of Helsinki, the author and Stadinao’s Mikko Sallinen, they would invent a structure for an application for City of Helsinki’s Innovation Fund which was accepted very well. This materialized as DigiTalents at Maria 01 which takes in talented teams and provides them with space and mentoring, but also with missing team members. These team members are unemployed talent and are placed to complete the teams.

All teams in DigiTalents in spring 2018 batch are Metropolia teams enforced with art students from Stadinao and Amiedu as a result of the capital region co-operation.

9.6 Baltic Sea Region & Metropolia Game Incubator

Metropolia has received EU project funding for creating an incubator inside it. This will be a pre-incubator and focus on Metropolia game student’s teams late in their studies or after graduation. The teams can be with or without a company. These teams can also be enforced with students from other schools. The development for this will start in April 2018 by the author.

9.7 Games Factory

Games Factory is a game community to be opened in Helsinki during 2018. The goal is that Metropolia Game Incubator and DigiTalents work in co-operation with Games Factory.

9.8 FIVR & Nordic VR Startups Incubator

Co-operation with the Finnish Virtual Reality Association and the Nordic VR Startups incubator have not yet started but is to be started during 2018. Many of the teams from Metropolia have the potential to join the incubator and are applying to the incubator in March 2018.

9.9 PlayStation Academy

Metropolia has been accepted as a partner to Sony's PlayStation First Academy enabling Metropolia to teach game development for PlayStation and also to develop games for PlayStation.

9.10 Igda

Students have been guided to participate in Igda (International Game Developers Association) events which are arranged once a month. Voluntary Igda work can also help a student to get employed to the game industry.

Teams from Metropolia have been able to present their games in Igda's demo corner which is a great way to present the games and themselves.

Bit1 event is looking to hold the Igda event if possible at the event in May 2018.

10 Discovered problems in Game Education

This section describes the problems discovered while building the game education for Metropolia.

10.1 “The Gap”

One of the biggest problems identified during building the education was the fact that there is no clear path to the game industry after education. This has been referred to as “the gap”, which was also stated in the short speech to some Finnish Parliament members by the author. In addition to the Game Studio and raising awareness of the capital region co-op, below are some of the approaches created to close the gap and more can also be found in the previous chapter “Infrastructure” and in chapter 12 describing the future.

This “Gap” is characteristic to capital region whereas in other areas in Finland the companies which have originated from the schools are much more closely tied to the local education infrastructure.

10.2 Internship and Thesis

A structure has not yet been established where companies would order a thesis from Metropolia students even though this is the goal. Currently students’ thesis are not serving the industry and they have hard time finding an institute to who to assign their thesis.

Also the game education does not have established companies where to ask regularly for internship possibilities so students might find it hard to find an internship position.

The idea is that companies would order a Thesis from Metropolia students to create the companies’ demos, prototypes, research or any other required material to support the company.

One of the Game Studio's main purposes has been to help students get game industry experience. A high number of students have already been hired by numerous game companies.

10.3 Co-operation with the game industry

This has not yet formed any permanent strong co-operation, but more of random occasions. Metropolia is yet to seek a more active co-operation during 2018 or 2019.

Below are some partners Metropolia has worked with and look to work with in the future.

1) Tigerhat Games

Tigerhat Games is the first company to establish co-operation with Metropolia's game teams. Their goal is to help the teams that emerge from Metropolia either financially, by mentoring or by providing connection or projects.

2) Rovio

Metropolia has done plenty of co-operation with Rovio, but all on separate cases. This can hopefully be an opportunity for Metropolia to create long-term co-operation.

During fall 2017 Metropolia created Rovio game prototypes from their ideas during an innovation project. Rovio was connected and it was suggested that Metropolia game students would create them game demos from the ideas they do not have time to prototype or test.

3) Housemarque

As Rovio focuses on mobile gaming, and the majority of Metropolia's game students want to create console and pc games, Metropolia's game teachers have also looked to starting long-term co-operation with Housemarque. The first step was to create game prototypes for them during an innovation project.

4) Others

The first external game test session was arranged for a game company during 2017. The plan is to provide more of these for the game industry in the future.

We have also made co-operation with operators like Legal Hub for legal assistance.

10.4 No game industry experience

This is somewhat an issue in Metropolia but also in many other game educational facilities in Finland as the game teachers might have never published a game. Educators with industry experience often tend to approach things in a very opposite way than a teacher without the experience might do.

10.5 Publicity

Publicity is hard to get. So far the approach has been not to make too much noise until there is enough great quality material to show. A few pieces of news from time to time have been published.

To get people to notice Metropolia’s game education has been difficult, at least in the start. During 2018 this will be addressed more heavily and already more news have been distributed.

11 Failures

As always, anything with this magnitude contains also failures. This section describes those.

11.1 Project funding

At the start of building game education, there were attempts to gain project funding. None of these would work out as EU funding does not directly look to support the capital region and Tekes looks more for research based projects targeted more for the universities.

11.2 Game Industry Company / Funding Partner

After talks with numerous game companies and attempts to create co-operation with some of Finland's biggest funds or angel investors, it is considered to be a failure as no partner was found to financially support the game education. At one point a well-known bigger game company was ready to sponsor a full classroom with computers, but regression would hit them before this happened.

The main reason for not finding partners has had two reasons:

1) Companies do not see a reason to support game students. Students might in the end even be employed by other companies.This may have changed now as Metropolia's game education has matured and expanded.
2) Faith for student's abilities remains limited. Yet again one should remember how games like Minecraft started and that all people in the game industry come from somewhere.

11.3 Game Industry Expert Lecture Series

This is considered a failure, as on average the lectures would have 15-20 Metropolia students present of the maximum 200 Metropolia students. Compared to some other capital region schools, which had 15 students, they would have all 15 students present.

Therefore, even though the contents were varied and providing useful insights from various areas of game development and there were requests to continue it, it did not gain a much bigger status. One main reason for this was the lack of time.

11.4 Game Jam

Metropolia's one and only Game Jam had just under 15 participants which was a low number considering the maximum possible number. In percentage, it might have been a huge amount, but to make it sustainable it was too low.

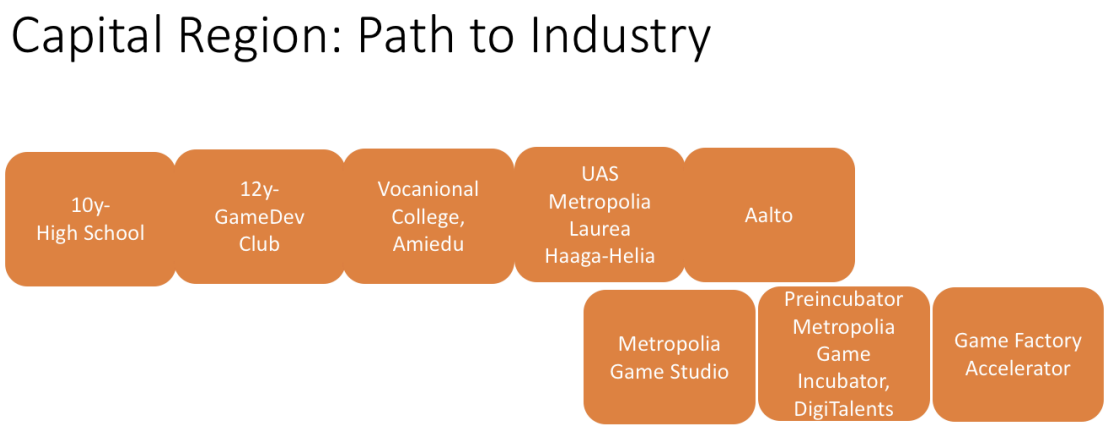
Therefore, for now at least it has been discontinued. Now with students in several year-courses, this could get many more students and more visibility.

12 Building the Game Education future 2018-

This section describes the next steps for building the game education in Metropolia.

12.1 Capital Region: Path to Industry

In the beginning of 2018 the structure of the capital region game education is somewhat as shown in picture 25. A new more detailed picture is created together with Neogames during spring 2018.



Picture 25. Study path image in the capital region created by Huhtakallio. Picture Juha Huhtakallio.

One may start at 10 years already at High School and join GameDevClub run by Helsinki Youth Centre. From there or simultaneously you can start your studies in a Vocational School or UAS from which you can advance to University (Aalto). While studying in Metropolia you can join the Game Studio.

As pointed out the gap from game studies to game industry is huge now, but one can now join pre-incubators (Metropolia Game Incubator or DigiTalents) after the game studies with one's game development team which can hold students from any capital region school. After these one can join a game accelerator.

12.2 Funded Projects for co-operation in Capital region, Finland and Baltics

During 2017 Metropolia's 3 project funding applications related to games have been approved. The three projects are:

1) Baltic Game Industry [9].
2) Chips for Game Skills [10].
3) Game Industry Structures [11].

Each of these will help structuring the capital region and national game education, and improve co-operation in the Baltics, enable the start of game event Bit1 and help train more game educators.

The goals for the projects are:

a. The projects aim to improve and unify the game education in Finland. Finland is a small country, so co-operation is required and absolutely needed.
b. The projects also aim to share information, improve methods and to start co-operation with the game industry to create a nationwide education that matches what Finland's game education needs.
c. The projects look to provide a clear path for any student even as young as 11 years old and starting or changing from another area to find their path in becoming a game developer. With the badges, the project "Chips for Game Skills" can create the path and show the criteria required for each badge and show where you can get each badge.
d. The project "Chips for Game Skills" will validate Metropolia's current curriculum thoroughly with the game industry.

12.3 Capital region getting bigger

As Stadinao and Amiedu have taken in programmers and Haaga-Helia and Laurea are now in the co-operation, and also Omnia, the plan is to run huge game projects together in fall 2018 at Metropolia and the other schools. Aalto and Helsinki University are missing from the co-operation.

12.4 Student teams

From the very beginning, Metropolia has assisted its students to create their own companies. It is often referred that founding and failing a company would be the best way to the game industry.

Metropolia will support their students looking to start a game company by all means.

12.5 Student Team Game Awards

The plan was to introduce this new category in spring 2018 as part of the Finnish Game Industry Awards (FGA). The goal was to make student teams' work more visible and show that they can make great games also. This has now been more moved to the Bit1 event.

12.6 BIT1 - Game Event

Picture 26. Preliminary logo for the event Bit1.

This game event is part of the "Chips for Game Skills" project. The event will be aimed for game students to show their games. During 2018 will take place for the first time BIT1

which is a game event aimed directly for education based teams to present their games, to connect with the game industry and others to compete. The purpose of this event is to promote the talent the students have, enable them to get connected and at best to find publishers or even investment.

The event will consist of demo booths, speakers, competition, speed dating with publishers, speed dating with new possible team members and much more. The first names signed to the event are extremely well known influencers from the Finnish game industry scene. The first event is to take place in Helsinki 2018 and second in Tampere 2019. The event will be two days.

The goal is to make it more visible how good the game students in Finland are and how high the quality of teaching actually is in Finland which often seems to amaze the game industry people.

12.7 Publishers & Investors

Metropolia believes it can produce the next Rovio or a similar company. Mindcraft started as a student project. Metropolia game education now has everything needed to help this happen. Therefore, in the past years a vast network among investors and publishers has been built. In the near future, there will be publishers and investors invited to review the game teams and their games, most likely in the Game Demo Event and Bit1.

The goal is to have multiple, if not investment deals, at least publishing deals signed in the future years for the game teams formed in the capital region and with Bit1 event, nationwide.

12.8 Internship & Thesis “Factory”

As the number of students graduating will be around 40 every year and they all need to write their thesis, they have already started to ask organisation like Neogames if they need a thesis on a particular subject. So far the game students are providing a thesis for Assembly, FinnPro, Neogames and other similar organisations.

This is something Metropolia's game education needs to emphasize more to provide help to the organisations and companies in the game industry by providing them with thesis work.

12.9 Survey

During 2018 there will be a survey among students and their current employment, thesis and internship status. The current understanding is that almost all students are employed even though not all are employed by the game industry.

12.10 Game Events & Competitions

In the next few years Metropolia game students should attend more strongly events and competitions both in Finland and internationally. The goal is to win a competition and gain further visibility and recognition for their work and the school.
Some of the major local events are Pocket Gamer, Slush, Nordic Game Conference and upcoming Bit1.

Many events offer affordable students tickets which the school should look to provide.
Plan is to create a list of competitions and events for the students to which they can apply.

12.11 Game Incubator

The next step for building the game education is to start a Game Incubator within Metropolia. This is part of closing the gap after studies in addition to the Game Studio and incubator DigiTalents and before entering the game industry. The incubator is also to support the teams coming from the other schools as a result of the capital region co-operation.

These game teams from the capital region need a place where to work and to continue to take their game forward with guidance and help and connections.

13 Game Education Prediction

As Metropolia's Game Education is already the biggest in Finland and Finland is a significant game development country delivering top AAA games, it is only a question of time when the first top notch student teams graduate from Metropolia and create hit games. This has previously happened from several other game schools in Finland, and now it is Metropolia's turn.

Metropolia's game students have already gathered attention and been noticed, especially the first 4th year students who are to graduate in spring 2018.

The prediction is that Metropolia's Game Education will be the most desired location to study in the coming years, and this has been the goal; to create an internationally strong and valued game education for Metropolia. It is also predicted that Metropolia's game students will be followed carefully and recruited in the future early on in their studies.

In late 2017, the game employment market for games in Finland is stronger than ever. Therefore, it is predicted that Metropolia will be one of the top places in future to look for future talent and that many successful teams will emerge from Metropolia.

Also, it is expected that Metropolia will continue to have a major influence not only in the capital region game education but also in the national game education. Connections and co-operation has been started with Russia, China and Baltic region countries to further strengthen the game education in Metropolia and Finland.

14 Conclusion

Building the game education has been a huge task. It has been enabled with great creative, open minded people understanding what it takes to make this happen and enabling to work easily on the direction set, people such as Markku Karhu, former Head of ICT Department in the start of building the game education and later Janne Salonen, Head of ICT department. Also giving quite open hands for a game industry veteran for the creation of the education on where to go and what to do has been very helpful. Co-operation with the other schools made Metropolia's game education from big to much bigger. The model with teams containing students from different schools is clearly working and thriving.

While writing this thesis, the author has come to realise that he has managed to build the education without any exact sample or theory.

If you are building or planning to build game education below are some guidelines and tips:

- Co-operate and find the right people.
- Be open towards others and anything.
- Innovate various ways for things to happen or just try new things – or old.
- Support any kind of game activity.
- Use methods the game industry uses.
- Provide opportunities for the students to network with other year groups and schools and game industry.
- Look for enthusiasm – that takes people far.

Biggest learnings have been:

- Have a dedicated and motivated game industry person to create the education.
- Find the right people.
- Co-operation is vital.
- Support any kind of game activity – it may lead even to surprising results later.
- Game Studio model works for subcontracting student work.
- Provide roadmaps and detailed info for students.
- Include C++ in the curriculum.
- Create events and a course like "Game Activities".

- Include game industry people in the education as much as possible.
- Core-Ext-Wish method works.
- Students pitching and then voting for their desired teams works.
- Enthusiastic students create strong teams and might not want to change teams.
- Force students to publish a game during their studies

The long list that existed in the beginning of building the game education is closing to its end. Only the last pieces of the puzzle need to materialize to make it complete, which are introducing the publishers and investors to the structure. This is to take place initially with Bit1 event. After this the structure may continue on its own without the need to further construction as the pipeline is in place.

Building the game education for Metropolia has expanded to affect the whole game education in Finland. This has been something not predicted in the beginning.

Also as the Baltic Region EU project has started and co-operation towards St. Petersburg, Metropolia's game education is becoming more and more significant.

Why national and international co-operation? Finland may be successful, but we are still small globally in people numbers. To continue the growth, Finland has to co-operate nationwide in education and even wider. The game industry in Finland is known for co-operation, openness and helpful attitude and the same approach needs to be applied to Finnish game education. The need for talent in Finland at the moment of writing this thesis is bigger than ever and Finnish game industry is already facing a shortage talented people.

Being open, ready to get things done, having a vision, identifying the problems and considering all activity as positive has enabled this growth not to mention the wonderful, enthusiastic and innovative students and fellow teachers.

As an end result, Metropolia has a running and thriving game education in Metropolia, great capital region co-operation exists and the first signs of closing the gap between education and industry are present.

The results will be seen in the forthcoming years or months as new success stories will emerge from Metropolia and the capital region.

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7 Mary Poppendieck; Tom Poppendieck (2003). Lean Software Development: An Agile Toolkit. Addison-Wesley Professional.

8 Lu, David John; Kyōkai, Nihon Nōritsu (1986). Kanban Just-in Time at Toyota: Management Begins at the Workplace. Productivity Press, pp. 87-92.

9 Baltic Game Industry. http://baltic-games.eu/171/.

10 Chips for Game Skills. https://6aika.fi/osaamisen-pelimerkit/.

11 Game Industry Structures. https://valtionavustukset.oph.fi/paatos/avustushaku/61/hakemus/668eacaae4368052825641f62cd62be09a06a4c493321dd91c4a3c08b38edfb

Links to Metropolia game education

These links contain information about Metropolia game education.

Metropolia. Metropolia Game Studio. http://www.metropolia.fi/palvelut/game-studio/.

Huhtakallio, Juha. Metropolia Games Web Site. http://games.metropolia.fi.

Huhtakallio, Juha. Games developed by Game Studio. http://games.metropolia.fi/game-studio/.

Huhtakallio, Juha. Metropolia Games Facebook group. Facebook. https://www.facebook.com/groups/321319304671498/.

Metropolia game education in the media and news

These links are to news about Metropolia game education.

Steel Media. Juha speaking in Pocket Gamer Helsinki 2016. Youtube. https://www.youtube.com/watch?v=fOqwL7h0AFo.

Steel Media. Juha speaking in Pocket Gamer Helsinki 2016. Youtube. https://www.youtube.com/watch?v=3W5V4u_KYW4.

Metropolia. Winning the Minno award. http://www.metropolia.fi/ajankohtaista/uu-ti-set/?tx_ttnews%5Btt_news%5D=4851&cHash=212308c94d9e00e0faa99edd3789eb72

Svahn, Nina. Yle. https://yle.fi/uutiset/3-6991974.

Metropolia. http://www.metropolia.fi/ajankohtaista/uuti-set/?tx_ttnews%5Btt_news%5D=4175&cHash=7d64e996706127a2d31a9c08d032fe3f.

Metropolia. Metropolia & Rovio co-operation http://www.metropolia.fi/ajankohtaista/uuti-set/?tx_ttnews%5Btt_news%5D=5963&cHash=25f34daa0e6c23e888bf3649ec88636e.

Metropolia. Metropolia & Housemarque co-operation http://www.metropolia.fi/ajankohtaista/uuti-set/?tx_ttnews%5Btt_news%5D=6061&cHash=5dead2507bdd1cf8683c785652f8b672.

Other game industry links

Here are useful links to the game industry in Finland.

Neogames. http://www.neogames.fi.

Pelinkehittäjät. http://www.pelinkehittajat.fi.

Igda. https://www.igda.fi.

Bit1. https://www.bit1.fi.

DigiTalents. http://digitalents.munstadi.fi/en/.

Games Factory. http://www.gamesfactory.fi.

Nordic VR Startups. http://nordicvrstartups.com.

GameXpo. https://gamexpo.messukeskus.com.