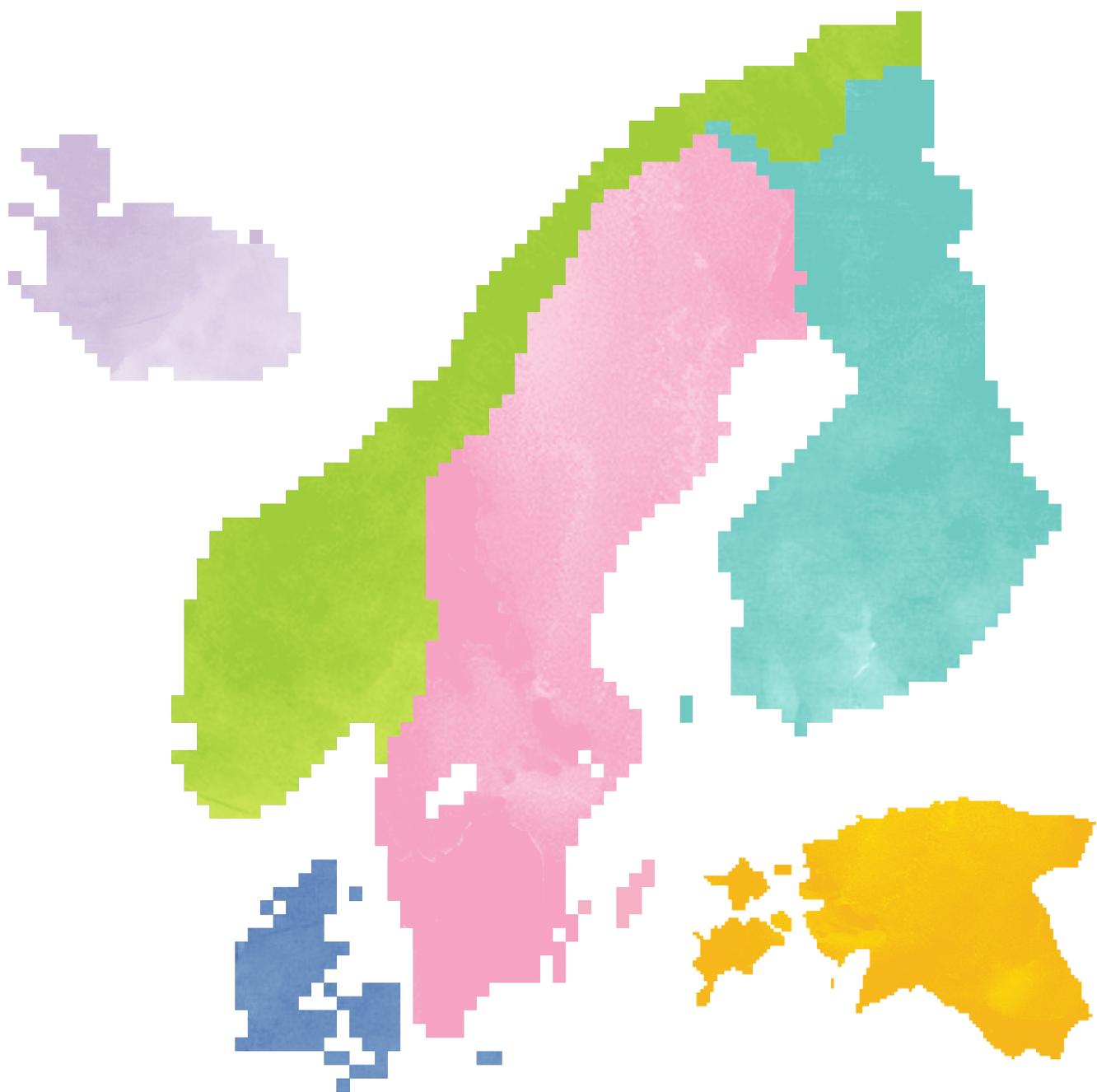


NORDIC GAME EDUCATION INDEX



norden

Nordic Council

Game Education Index

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2016 - 2017

Introduction

The Nordic games industry have plenty of success stories; exponential increases in turnover, company revenues in billions, and thousands of people are added to its work force. But how can an industry sustain this? When a single Nordic company needs to hire 400 additional staff members in a year, where do they look for talent?

The games industry kicked off in the Nordics in the mid-90's multimedia boom, with games made for a local or regional audience. A decade later there had been a shift in focus, and a global market became the audience. Then the scope broadened again in the late 00's with new target groups, and games for everyone. Around this time many universities started to take notice on this young industry, and have in parallel developed courses, programs and degrees in game development. Engineering, art, innovation, entrepreneurship and scientific research.

More than ever, the education in game development, or "game education," plays an important factor in a growing ecosystem. With the objectives to educate, facilitate research and provide for society, universities have initially struggled to find their place in this, connecting and collaborating with an industry that often doesn't care about a diploma, while an important part of their objective is to graduate students. Polytechnical universities provide the industry with engineers, higher vocational education (HVE) focuses on craftsmanship and universities have dedicated institutions for game design.

This report will map out and provide a picture of how higher education provides the Nordic games industry with talent, innovation and advancements in research.

Background

The Swedish Games Industry conducted a report of the game development education institutions in Sweden in 2011, together with University of Skövde. This resulted in the report

Spelutbildarindex 2011. This report duplicates and expands on this concept, which now accounts for the entire Nordic region in 2016. Presented is a report that maps out higher education

that offer programs in game education in the Nordic region. The reader will find data on applicants, enrollment, graduating and related numbers according to availability.

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Executive Summary

Shaping Talent & Industry Innovators

The Nordic game education programs display quality and maturity with a healthy ecosystem between education, research, incubation and industry – which translates to a high standard in a global comparison. The Nordic institutions are often well respected and highly regarded in their fields. However, these institutions can be quite diverse. Some institutions focus on creating front edge talent, with interdisciplinary teams from the first weeks of school, teaching individual disciplines while developing together. Other programs let students try a range of fields, and later specialize in certain areas. The

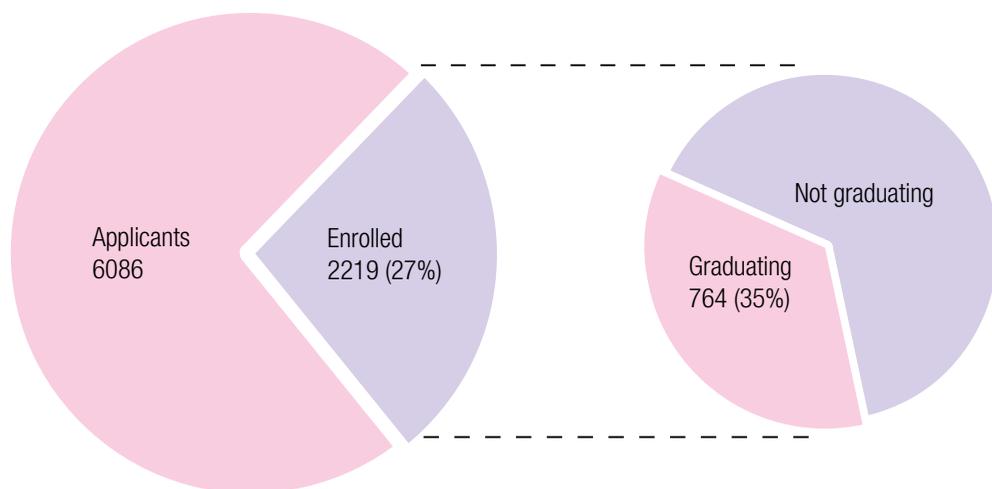
vocational education programs are usually more practically oriented, art programs are explorative and experimental, and the academic and polytechnic (applied science) programs are by nature more theoretical in their approach.

Each year about 6000 people apply to programs related to game development. Roughly 2200 of these are accepted. Depending on the program and year 30-90% graduate, with an estimated 40% percent average in the entire Nordic Region, an average similar to other higher education in USA and Europe. Strengths can be found in startup support

through business incubators, collaborations between prestigious art schools and technical universities and talent acquisition through vocational education in close collaboration with the industry.

To keep growing, the Nordic game industry needs an influx of new talent. For universities and higher education to be able to take part in this, national and regional educational systems need to allocate resources accordingly. Increased funding for research, incubation, acceleration and higher vocational education would make a big impact.

FROM APPLICATION TO GRADUATION IN THE NORDIC REGION 2016



An estimate of how many applicants, accepted students and graduates in game related education in the Nordic region each year.

Nordic Region

Schools and Universities

There are about 65 programs with a game emphasis in higher education in the Nordic region, and an additional 35 with a game track of selectable courses or minors in game development. A total of 64 institutions in higher education and universities in offer game related programs.

The Game related programs receive about 6100 applications each year. Roughly a third,

2200 students, are accepted and enrolled to these programs. The graduation rate differs greatly between schools and countries. The top performers are the universities in Finland with an estimated 60% average graduation rate, and the higher vocational education programs in Sweden with a 75% graduation rate. The regional average is estimated to be about 40%.

Line of Study

Students in the Nordic region are offered programs with emphasis in level design, game design, game writing, game animation, game programming, engine programming, 2D game art, 3D game art, animation, tech art, SFX, production management, quality assurance and business analytics.

The institutions that early put students in game development projects, usually on a specific track to become experts, are generally better appreciated by the industry – an industry that is always asking for the most talented and

employable individuals with long experience in development. It has been discussed however, that there might be a correlation between a front-edge approach and drop out among students due to exhaustion. The more academic institutions are said to provide more creative freedom, and have proven to also provide innovation and birth of new companies (Die Gute Fabrik, Coffeestain Studios to name two), but maybe to the price of a less effective manufacturing of cogs in the great machinery.

Teaching Practices

The more academic programs are naturally more focused on scientific development, where students study for tests, write theses et cetera. Most universities try to imitate the game projects and interdisciplinary settings in the industry, where programmers, artists, designers et cetera work together in project teams. This is to make students ready for the environment in the industry, but also to give them team skills and entrepreneurial experience. Some universities have taken it further, cooperating with incubators and giving these teams the opportunity to start companies. The teaching practices in these circumstances can be more different between programs than between countries or regions.

According to instruments of measuring innovation, new ideas and innovation sprawls from places and clusters that inhabit a certain amount of freedom (Ekvall, 1996). Chances of innovation might be higher if students are allowed to track their own path, build their own ideas and have freedom to explore. One may therefore encourage that the mission and vision of the program is clear on how to enable such creativity, without making students feel lost or disorientated.

Industry Connections

While the AAA scene has been told to take a lesser portion of the modern game market, the Nordic AAA studios are stronger than ever before. Some companies have unique IPs like Quantum Break (Remedy), Mirror's Edge (DICE) or Just Cause (Avalanche), or take on well-known franchises like Wolfenstein or Star Wars.

Companies who build their own tools and engines will have more desire to look for talent from universities with longer technical programs (for example polytechnic universities). These are usually bigger studios that make big AAA titles, but also some smaller studios with need for more depth in technical knowledge.

However, In later years, however, smaller studios have admitted they have less need for specialized tech, and instead more demand for generalists. (See more in anticipation report in "Future Talent" chapter).

How Many Get a Job?

The number of students who start working in the games industry is always a heated topic. Most Universities and higher level of education by tradition have several other goals apart from providing the industrial life with talent. Because of the nature of this there are measurements in many places, but not all.

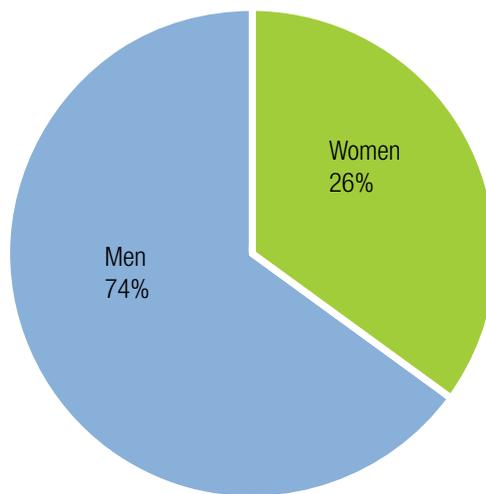
Within the field of higher vocational education, about 80% of students graduate, and a great majority of them are hired within 6 months after graduation. In Universities an estimated 40% of students graduate, an average similar to other higher education in USA and Europe

Equality and Diversity

It is difficult to make a complete breakdown of gender within disciplines, but from the sample at hand we can conclude that the most equal disciplines are related to graphics, animation and business. The least mixed disciplines are programming sound and design. The gender distribution the past decade has consistently become more and more equal in a notable degree in the entire Nordic region.

Counting the number of women/men is of course a rather blunt measure of diversity, or equal possibilities. This also pays no respect to the non-binary spectrum of genders, which is hard to accomplish statistically since most legal jurisdictions of today apply a dichotomous assignment of gender.

GENDER DISTRIBUTION IN THE NORDIC REGION



Gender distribution among students enrolled in game related programs in the Nordic Region

Iceland

Iceland is famous for a lot of things, but in the world of games they are most famous for their entry in the MMO scene, EVE Online, developed by CCP. The universities of Iceland are traditionally strong in engineering and computer science. The institution with a dedicated game development track is the School of Computer Science at Reykjavik University.

The game development track of Reykjavik's program has existed since 2011 and has as of 2015 graduated 20 students. They have two main courses within the track, computer game design and game engine architecture. Today they have 53 students enrolled in game engine architecture and 40 students in the course of computer game design.

Industry Investment in Education

In the mid 2000's CCP was looking to hire, and could see a need for more students to study computer science. They needed talent, so they decided to fund a faculty position in the computer science program at Reykjavik University, as a long term investment in the Icelandic game development community.

Iceland has been successful in international competitions related to gaming. Thrice in the past six years representatives from Reykjavik University have won The International General Game Playing Competition, which is a yearly AI competition. Icelandic studios have also been nominated and awarded in the Nordic Game Awards.

Incubation and Research

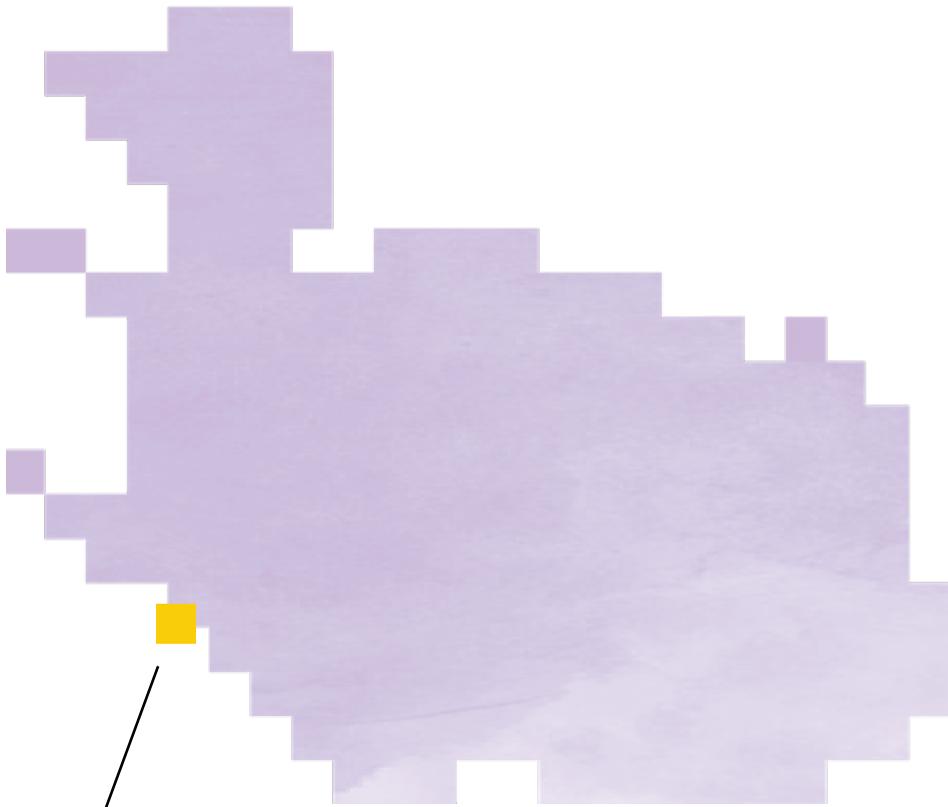
In collaboration with Reykjavik University CCP also initiated a research project in AI behavior. The first steps were taken in 2006 when the University was given a state grant to research dynamic player environments. From 2015 they are working on a "behavior dynamic engine." This engine is taught to respond to player behavior to create unique experiences composed through the previous interactions. It is AI that translates player behavior into environmental responses,

for instance an NPC that reacts in different ways.

The education in game development is organized by the School of Computer Science at Reykjavik University. Hence, the program has an emphasis on the technical aspects of game development. The students get a degree in computer science. They have selectable game oriented courses, and students who want to aim for a career in game development can choose

to make games in their project courses. Also, if they choose to apply to the Master's program they can continue to study game development by individually choosing to make games in graduation projects.

In 2016 Reykjavik University has planned to begin a cooperation with art schools in game projects. This is to more easily create multidisciplinary teams among the students to simulate the work conditions of the games industry.



School of Computer Science,
Reykjavik University

Norway

Norway's relationship between industry and academia has for half a century helped develop models to construct technical and practical industry solutions. In this process one theme has been to understand and simulate how nature works. Computer simulations have been utilized in oil production in previous years, increasing oil production and

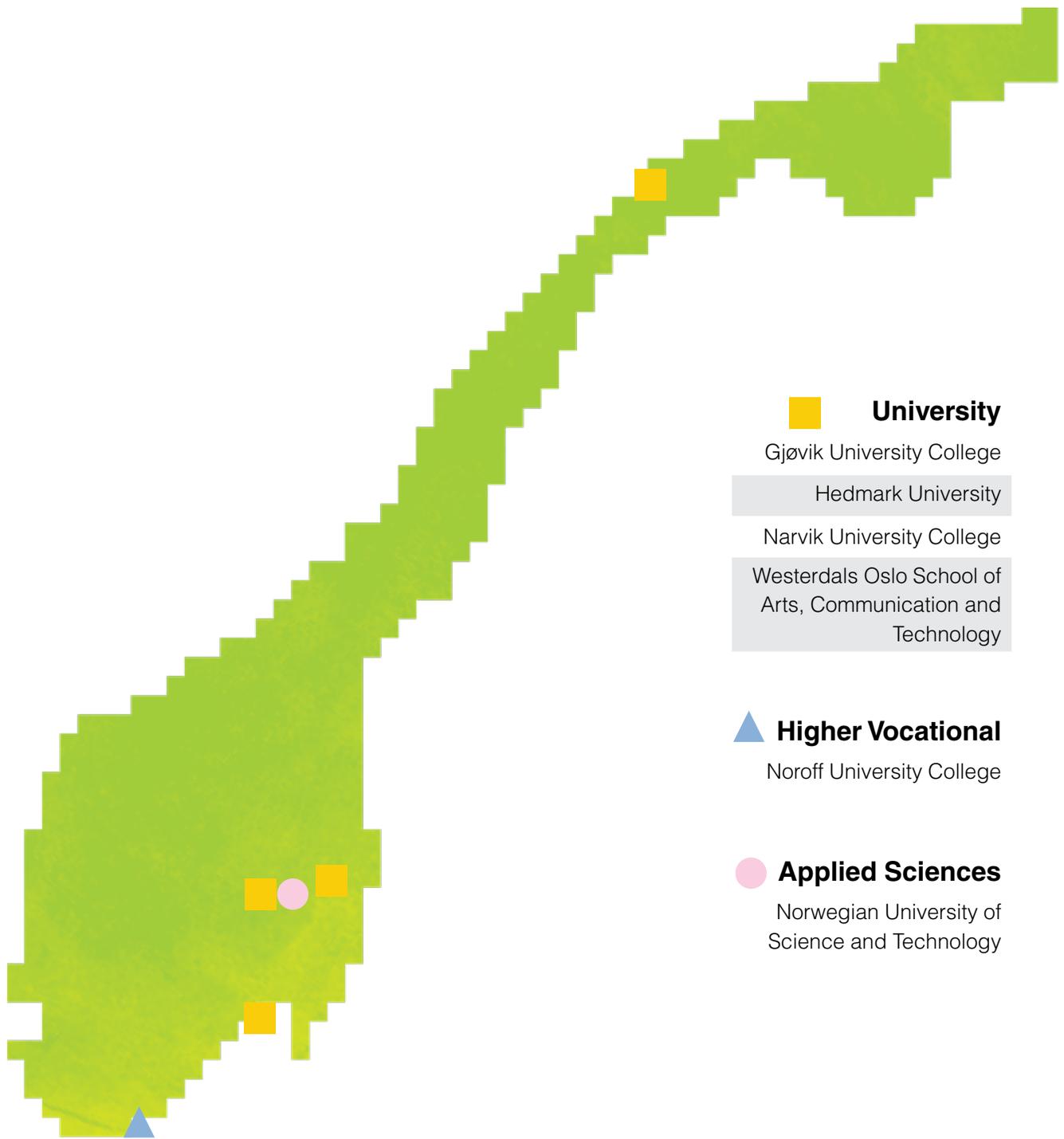
generating billions in increased income. The cornerstones of these technologies today share this with the entertainment industries, utilized in portable devices, television and video games. Because of this the education programs with emphasis in game development often share institutions with simulation and engineering.

Norway has a structure of academia comparable to Sweden, with computer engineering and humanities as university fields, and upper vocational schools that offer shorter but more practical and production based learning. Six universities offer programs with a degree in some aspect of game development, and a handful more offer courses in related fields.

1. **Gjøvik University College** offer students to graduate with an emphasis in Graphic arts, game design or programming. The program enrolls 20 students per year.
2. **Hedmark University** offer programs that include simulation technology, programming, 3D graphics and game design. 20 students are accepted every year.
3. **Westerdals**, Oslo School of Art and Communication Technology, is a professional undergraduate and graduate school, located in Oslo, Norway. The WOACT offers Bachelors and Masters in Communication, Performing Arts, IT and Technology, Film, TV and Game Design, and Management. The WOACT is recognized as one of Norway's top game development schools, and has over 60 students enrolled each academic year. Westerdals say their focus is to synthesize theoretical and applied knowledge with the intent to enable our designer and programmers to be an agent of change in society. The school offers expertise in some of the following fields: content designer, economy designer, technical designer, usability designer, system developer and engine programmer.
4. **UIT – The Arctic University of Norway, campus Narvik** has Computer Science with a degree in game technology with focus on simulation technology, VR and 3D visualization. 20 Students per year.
5. **Noroff University College**. Noroff has several schools in Norway and teaches Simulation Technology, level design, animation and 3D Visualization. Students at the vocational school are provided a two-year vocational degree, and have the option to apply for a third year abroad to receive a bachelor. Noroff enrolls approximately 40 students each year. In 2016 139 were studying the vocational program, and 34 were in the bachelor program.
6. **Norwegian University of Science and Technology (NTNU in Trondheim)**. Interaction Design & Game Technology Specialization (Master in Computer Science) Enrolls 20 students every year.

A total of 150 students are accepted each year to study game development in Norway. About 20% of current students in game development are women. A majority of female students choose to study graphics or animation 63%. Women were even a 51% majority at in the bachelor program in Animation & Digital Arts at Hedmark University in 2015.

From the Hamar campus of Hedmark University the "Hamar Game Collective" was created 2013. This collective of studios had 4 games nominated for the Nordic Game Awards in 2015.



University

Gjøvik University College

Hedmark University

Narvik University College

Westerdals Oslo School of
Arts, Communication and
Technology

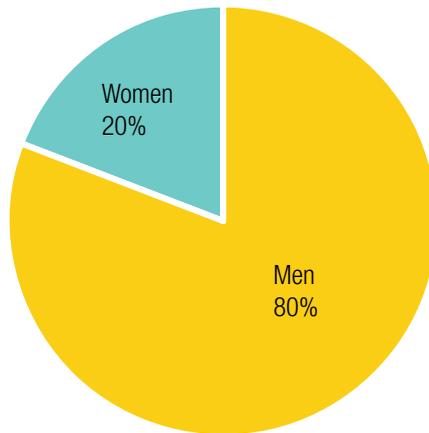
Higher Vocational

Noroff University College

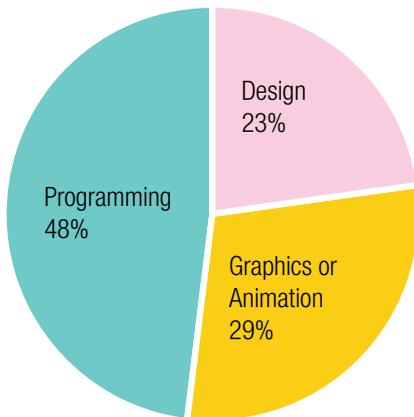
Applied Sciences

Norwegian University of
Science and Technology

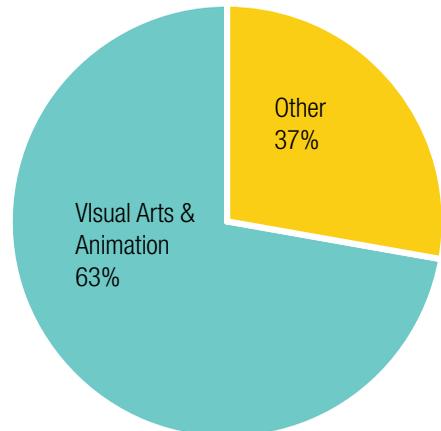
GENDER DISTRIBUTION, NORWEGIAN STUDENTS



DISCIPLINE DISTRIBUTION, NORWEGIAN STUDENTS



DISCIPLINE DISTRIBUTION AMONG FEMALE NORWEGIAN STUDENTS



Through the Woods by Antagonist Studios. Ex-students from Westerdals, Oslo School of art and communication technology are founders of this studio, and made a successful Kickstarter Campaign in 2015.



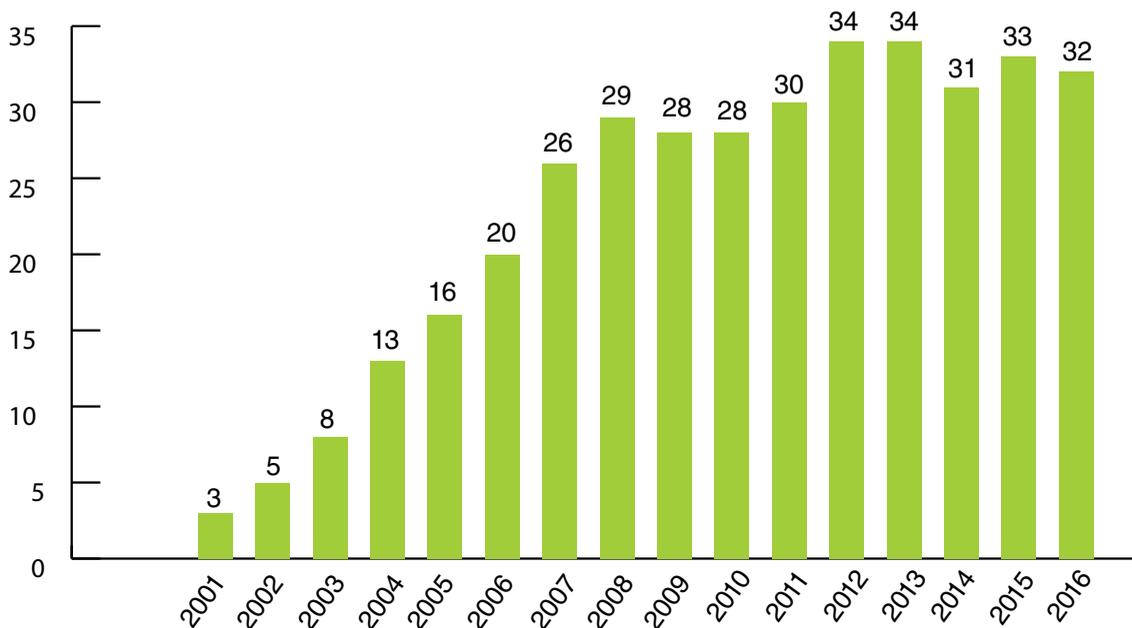
Sweden

Sweden has a long tradition of creativity, engineering and innovation. Old days of dynamite and Volvo, modern days of Spotify and Skype. In later years many innovations have been in digital media, and with that new perspectives of what games can be and what players can do; building with blocks, sharing our experiences, new platforms, new interfaces and new perspectives. In 2010 Volvo was acquired by Chinese Geely Automobile for 1.8 billion USD. Four years later Mojang was sold to Microsoft for 2.5 billion USD, and a year after that Activision acquired King for 5.9 billion USD.

With the entry of personal computers, and soon thereafter digital games, to the Swedish households, a Swedish game industry eventually took form with companies like DICE and UDS. The first education programs in game development were introduced in 2000/2001, and more and more universities have followed.

Through the early 2000s some education programs have been criticized for lacking industry relevance, and universities had challenges in attracting engagement from the industry. According to

NO. OF SWEDISH GAME EDUCATION PROGRAMS 2001-2016

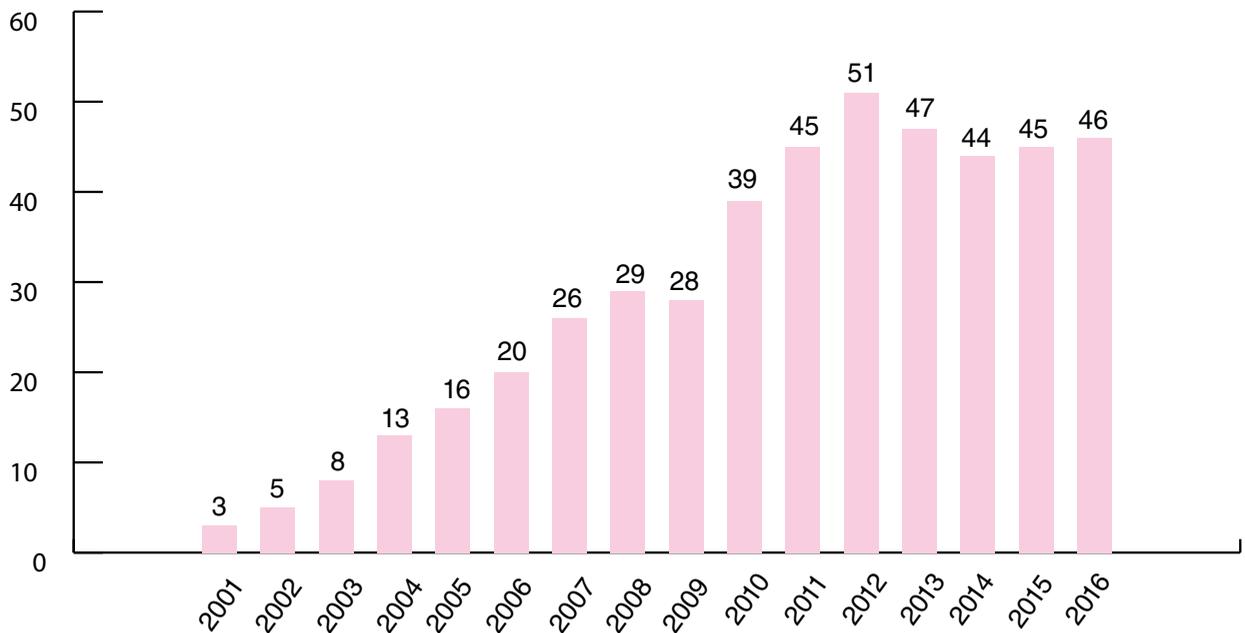


an article in the magazine Fienden of 2011, students in the mid-late 00's witnessed universities with expensive equipment they couldn't use, teachers who admitted to have little knowledge about game development, companies were less impressed with the work

of students, and it seemed as if some universities had started these programs to lure students to enroll, rather than to provide a relevant and modern education. No matter if this was the case or not, the universities seem to have listened to the feedback throughout

the years. The programs at hand have been redesigned to be less theoretical, and instead more practical, teachers more often have industry backgrounds and the development methods are rooted in industry practice

PROGRAMS RELATED TO GAME DEVELOPMENT 2001-2016



In the figure above one can read that the number of programs teaching game development has flattened from 2012 onwards. This may be interpreted as a healthy response to the education programs maturing and finding their place in the ecosystem.

However, if you look at University and higher vocational education programs related to game development, such as computer science, or digital

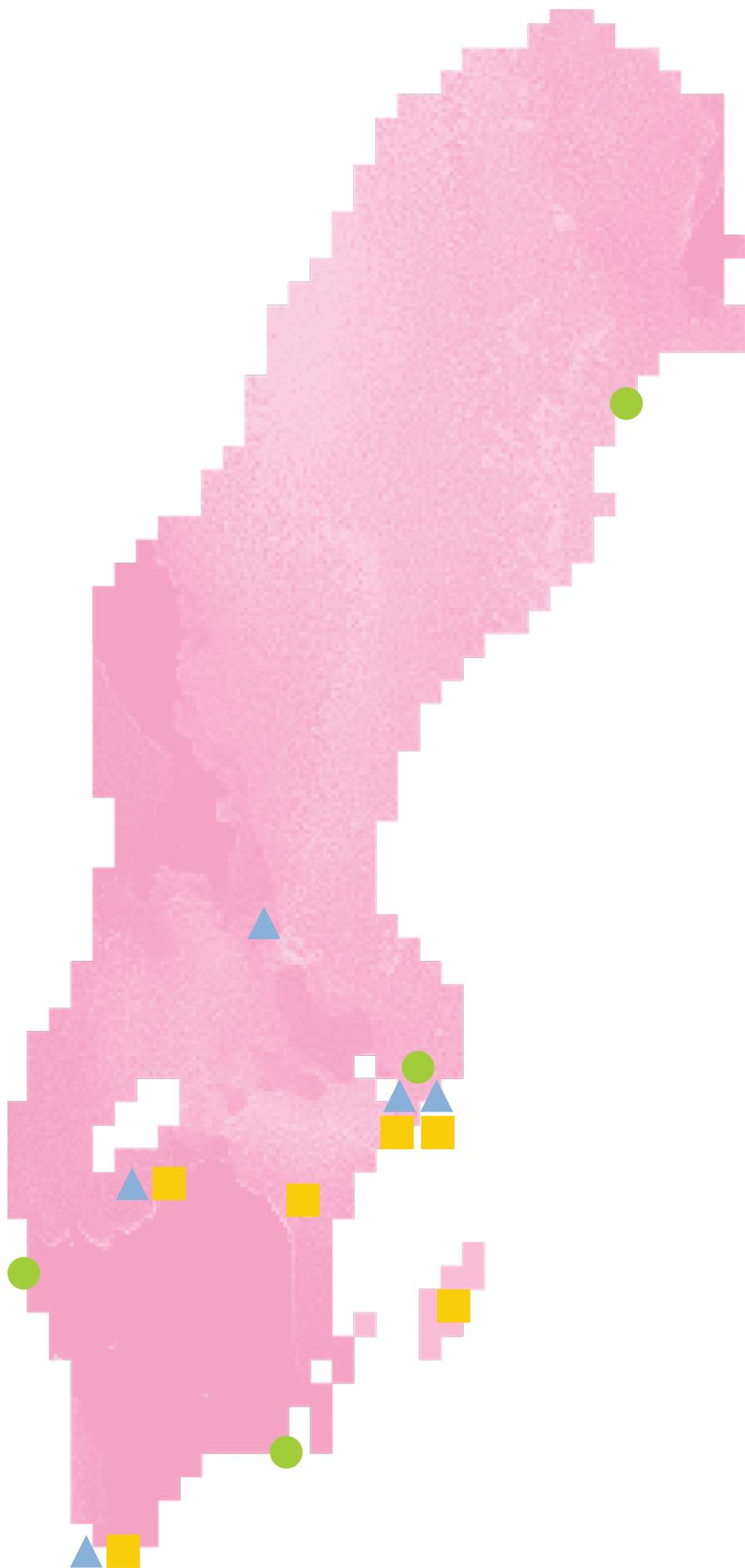
graphics degrees, one can see a more proper “peak game education” in hindsight. Again this can be seen as a healthy response, but can also be of some concern for the ICT sector if less students are enrolled in certain fields. This is however not the case with dedicated game education.

Higher Vocational Education



Through the past decade game education programs have become a very important factor for talent acquisition within the Swedish games industry, and an important part of it are the higher vocational education programs (HVE or YH for Yrkeshöskolan). These programs

came about as a response to a real labour market needs, and are delivered in close cooperation with employers and the industry. These programs are often among the most appreciated by the industry.



University

- Malmö University
- Stockholm University
- Södertörn University
- University of Skövde
- Uppsala University, Campus Gotland

Higher Vocational

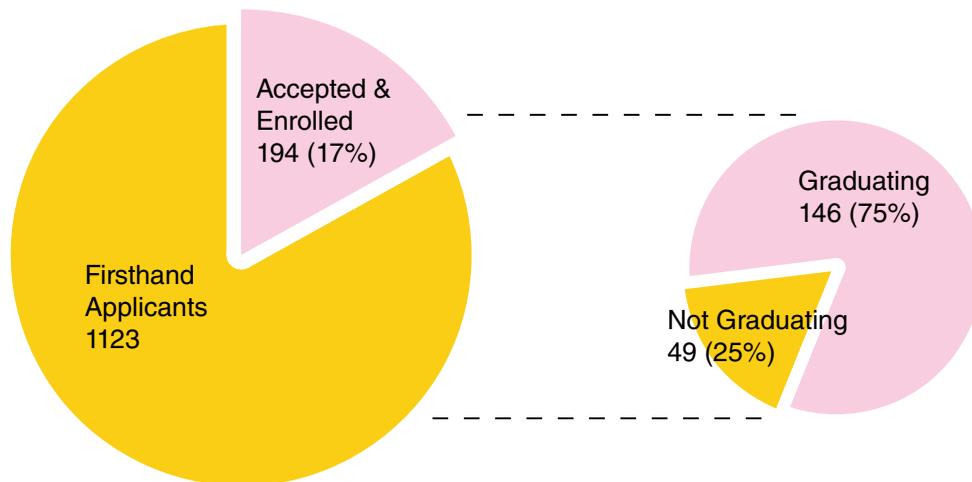
- Folkuniversitetet
Gothenburg
- Forsbergs Skola
- Futuregames
- Playground Squad
- The Game Assembly

Applied Sciences

- Blekinge Institute of Technology
- Chalmers University of Technology
- Linköping University
- Luleå University of Technology
- Royal Institute of Technology



HIGHER VOCATIONAL EDUCATION IN SWEDEN - APPLICATION TO GRADUATION, YEARLY AVERAGE



An important factor for quality is the educational setting, where the focus primarily is put on crafting and production, which means that students will be trained in an environment resembling production in professional studios. On average 75-80% of students enrolled in game education between 2010-2015 graduated with a degree, and a great majority, 85-100%, were hired in their field within 6 months after graduation.

The HVE system has had a great impact on the industry's ability to grow. From a survey conducted by The Game Assembly in Malmö it was told that 7,3% of the almost 4000 employees of the Swedish game

industry were once students at TGA. And that is just one of the prominent education programs in this area that have existed for almost a decade. It can definitely be concluded that YH has provided the industry with well-desired talent, and by that the industry's ability to grow. Also, the rate of which students are hired is astounding. One conclusion from this can be that a lot more students could graduate from HVE programs before the demand will be met. On average, 87% of graduated HVE students were hired in the games industry within 6 months after graduation. There is clear desire for more HVE programs in game development.

Risk of Instability

Within the YH system the schools have to apply every 2nd year for a continuation of funding for each program. This is to facilitate a teaching environment that is modern, up to date and can stay close to what is relevant for the industry. This does however create a risk of instability. Because of the legislation re-apply every 2nd year, to be granted right to exist as an

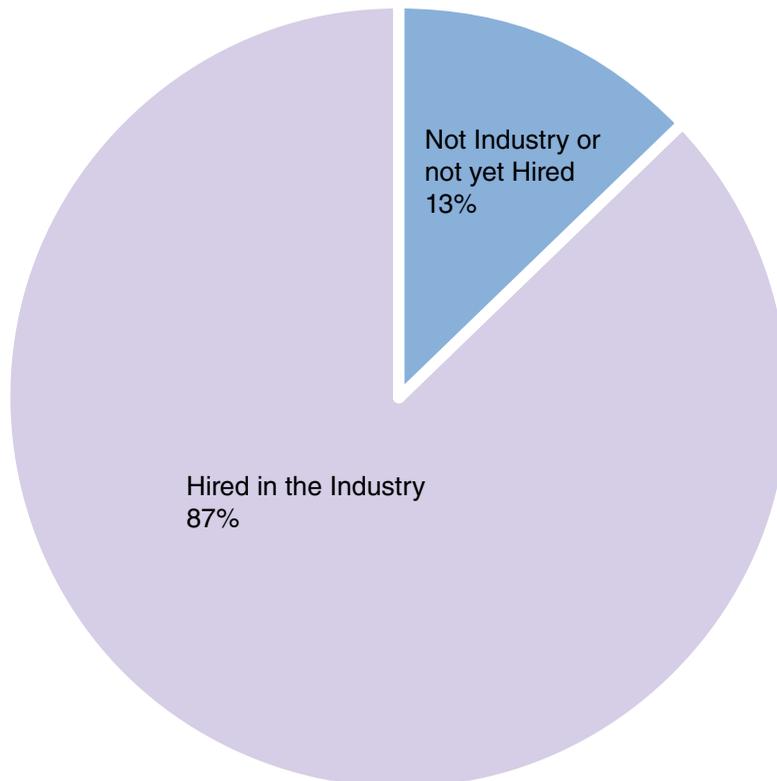
education, even the most well renowned and respected institutions have to reapply every 2nd year, with a risk of being denied to continue. The competitiveness between education organizers is very high, and game programs are located in the category DATA/IT where they have to be compared against all others in the same category.

Swedish National Agency for Higher Vocational Education decides which programs qualify to be offered. They also allocate government grants to such programs and analyze labor market demands for qualifications, conduct reviews, promote quality improvement, carry out inspections and produce statistics.

Within the polytechnical or engineering degrees there is a strong emphasis on the technical aspects of software development. Those universities that have an emphasis in game development usually focus

on game programming, but some also have minors and electable courses in Engine Programming, Tech Art, AI, etc. The students work with their peers in game projects, and because of a thinner discipline spectrum among students, the project teams will be less interdisciplinary by nature. The project teams will instead have more technical resources, which will make them more likely to write their own engines, build tools or have more resources to go deeper into physics, AI etc. even if the time duration for game development is relatively shorter than the Vocational and Academic counterparts.

HOW MANY HAVE A JOB SIX MONTHS AFTER GRADUATION FROM HVE GAME PROGRAMS?



Student Project *Upsurge* at Future Games





Art by student Monika Mikucha at The Game Assembly

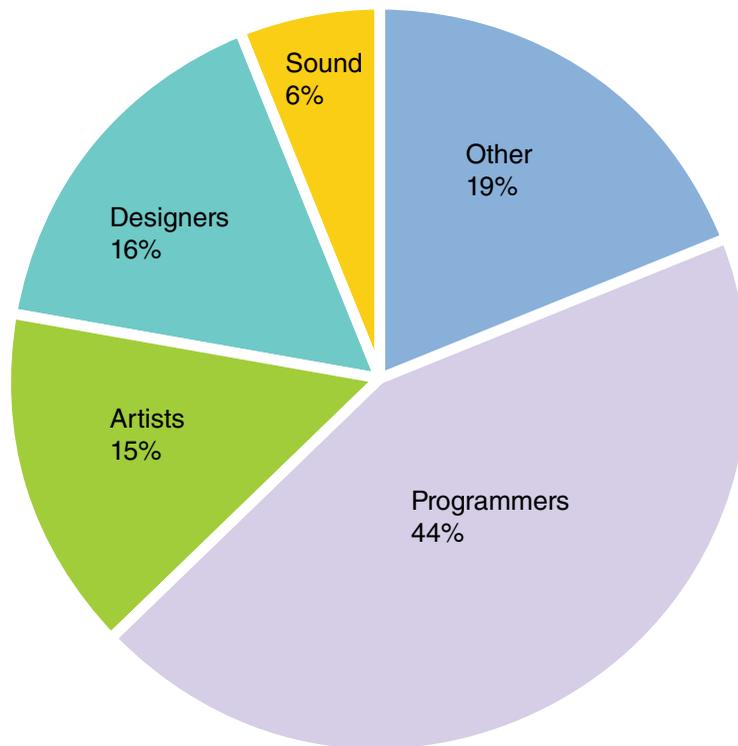
Line of Study

Swedish students in game development have many different programs to choose between. The emphasis of a discipline can vary from electables, to minors, to majors to full degrees.

One example is Game Design where Uppsala University offers a full bachelor's degree, and the students choose a combined major either in Programming, Graphics or Project management.

Others have a full emphasis in one discipline, for example in Upper Vocational Education where they offer Game Programming, Game Art, Level Design.

STUDENT DISCIPLINE DISTRIBUTION SWEDEN 2016



There are dedicated programs in the following disciplines:

- Game Design
- Level Design
- Game Art (2D/3D)
- Animation
- Tech Art
- Game programming
- Game Writing
- Project Management

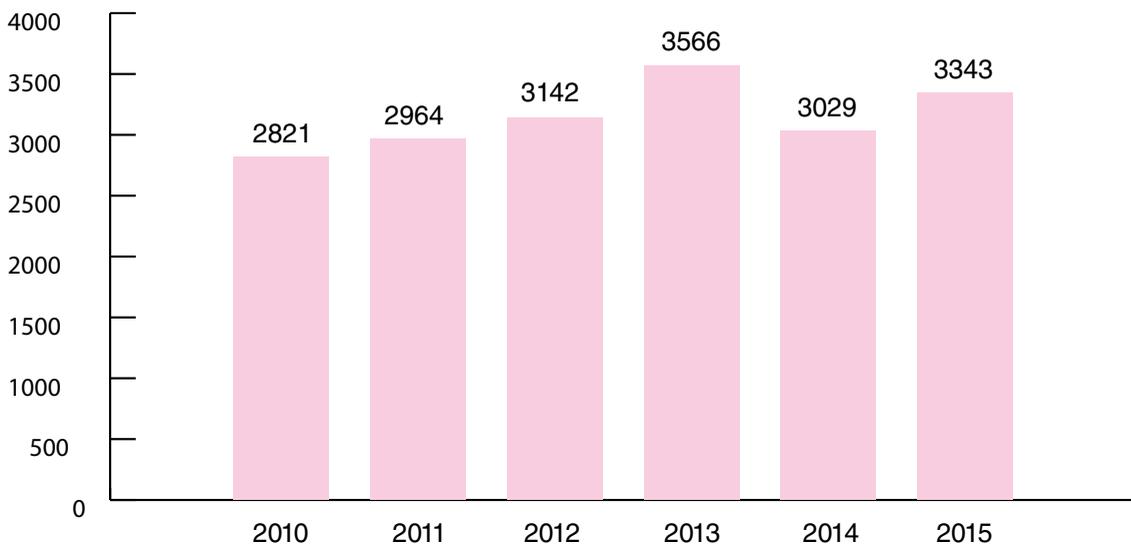
Teaching Practices

Today almost all Swedish education programs that provide degrees in game development have an emphasis on production. The curricular aim is often to provide the students an environment where they build knowledge in how to produce games while channeling their creativity. The students usually start off with shorter game projects such as paper prototyping, making concepts and iterating on tabletop games, card games etc, and analyzing the process. The student do these projects for a couple weeks before transcending into computerized tools and then deepening their technical knowledge. They will then

work in project in cross disciplinary teams, for example level designers, programmers, graphic artists, side by side. Throughout the program the transcend into creating more and more advanced game types and genres.

An important pursuit in the game programs is to build a strong portfolio for future job applications, and be ready to take their first step as professional game developers, either as employees or by starting a their very own game studio.

NUMBER OF APPLICANTS IN SWEDEN 2010-2015

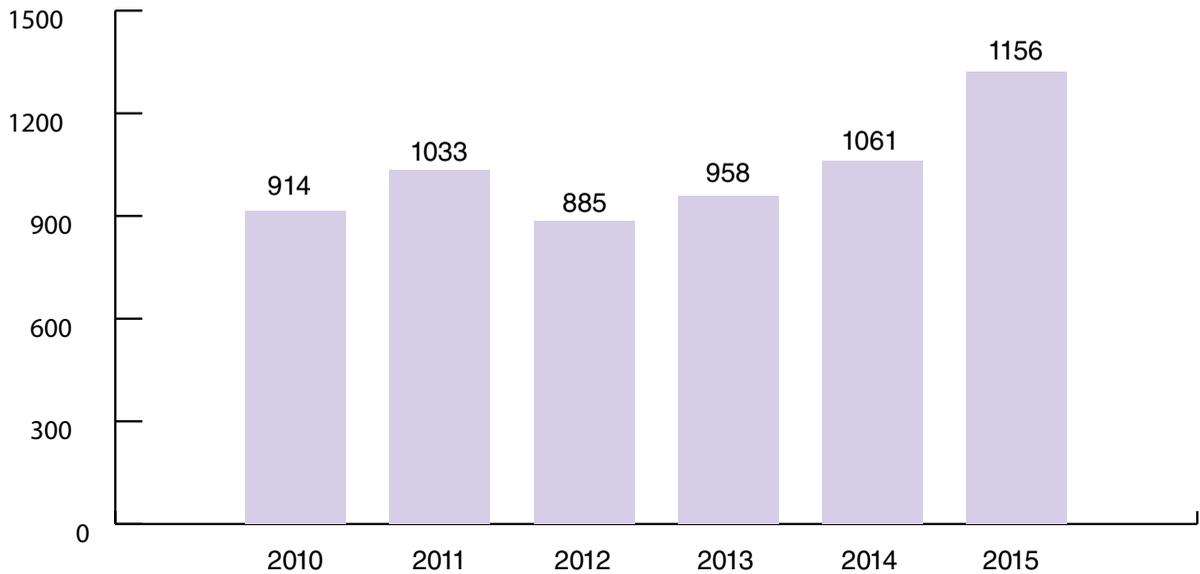


The number of first hand applicants, enrolled students and graduations within game development has doubled in the past decade. Even though it seems to be a slight decline in applications in recent years,

from 3566 in 2013 to 3343 in 2015, there has actually not been a decrease in popularity. What seems like a slight regression is due to the peak of academic programs in 2012, where there were less prerequisites for

applying compared to today. If you also account for the less populous generation born in the mid 90s this is rather a stable rate of applicants. The average number of applicants per program has stayed the same or increased.

NUMBER OF ENROLLED STUDENTS IN SWEDEN 2010-2015



Since some programs 2012 onwards have have discontinued or merged together, the same programs have increased their enrollment, and a few new programs have started. Game programs are still very popular with a high number of applicants.

STUDENTS GRADUATING 2016-2018: ROAD FROM APPLICANT TO EMPLOYEE





Photo: Sebastian Bularca

Denmark

Game developers alone broke the DKK 1 billion in 2015 - a significant milestone for the Danish interactive industry. The Danish interactive industry grew by +196% in turnover from 2009-2014. Game development and “other interactive companies” created a total turnover of DKK 1,7 billion in 2014, and displayed growth of 35%. Export was up 12% from the previous year, where 66% was turnover represented by the games industry.

Denmark has game education programs that stretch from the polytechnical “civil engineer” degrees to more general so

called medialogy degrees, or more art focused degrees and diplomas. Most of the programs in Denmark that offers game oriented courses have a more general scope within relating areas, such as computer science, animation, computer graphics et cetera. Students who are looking to study game development will choose to specialize within certain fields. For example, at the IT University of Copenhagen, the Games MSc program offers two tracks; The Design and Theory track to specialise in either game design or within the theory and analysis of gaming or the Game Technology track, which provides

a solid theoretical background and practical experience through programming and modern game technologies. Another example is the medialogy program at Aalborg University where a student can choose to emphasize on Level Design and Game Design, and will in the end receive a bachelor's degree in medialogy. A wide array of higher education and Danish universities offer game related education programs, such as the Technical University of Denmark, or the National Film School of Denmark, some more technical and some more based on studies in the humanities.

Game Hub Denmark

In Grenaa, by the coast of Kattegat, an eco-system for studying and making games has been established under the collective name Game Hub Denmark. This incorporates three upper secondary educations at Viden Djurs, two further educations at Dania Games and a three-stage incubation environment called Game Hub Denmark Incubation. At Viden Djurs, young people can study a technical or a business related upper secondary degree, which specialises in games programming, game art or the business of making games. At Dania Games, two applied science degrees specializing in game development exist, with one focusing on design and communication and another on programming.

The incubation environment is divided in three sections. One is for students from Viden Djurs, where focus is on finishing projects. The second is for students from Dania Games, where the focus is on building up a sustainable business. Finally, a third section contains an acceleration program that carries companies through several releases and towards attracting investment.

A student enrolling in educational and incubational programmes all the way through will have spent 7 – 7½ years working on games, while earning a general upper secondary degree and a specific applied science degree.

DADIU

In a collaboration between universities and art schools there is a framework for higher education within game development. DADIU – The National Academy of Digital Interactive Entertainment – admits 100 students each year. The students, gathered from many different fields (see figure), and will together attend classes,

workshops, and game productions. DADIU sets six teams each semester – each teams consist of 1 game director, 1 game designer, 1 level designer, 1 project manager, 1 audio designer, 1 Art Director, a number of CG artists, visual designers, animators, and a number of programmers. These inter-disciplinary team are created

to closely resemble work groups in game studios. The localization can vary throughout the program, but in the phase of production the student groups work together in production facilities in Copenhagen or Aalborg. The DADIU Program is held each fall semester, and enrolls senior students who have started their

master's program. Through these courses the DADIU program introduces students to the field of game development, which might be developed further through related initiatives such as game jams and other grass root

activities. The number of students in DADIU studying game design is about 40-50 a year, and by some accounts considered it to be one of the flagship creative institutions in Denmark. The semester at DADIU ends with a production that

has gained an increasing attention as several games have been nominated for the IGF Awards (Independent Games Festival, held in San Francisco every year next to GDC, Game Developers Conference).

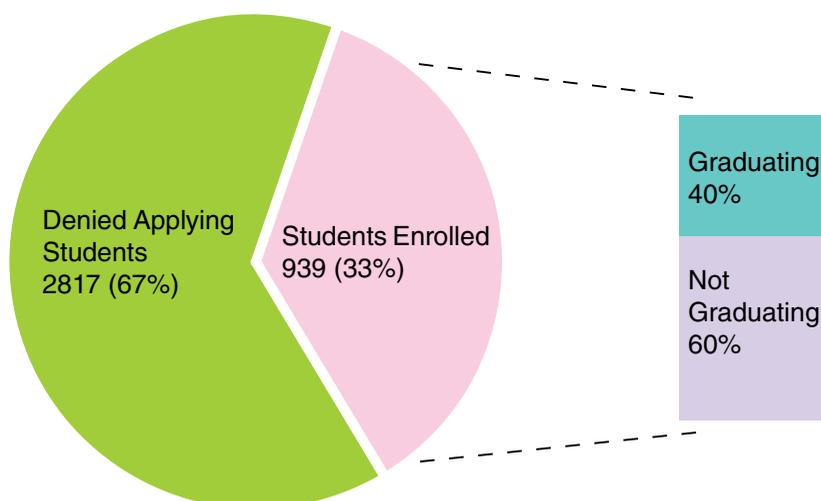
Universities

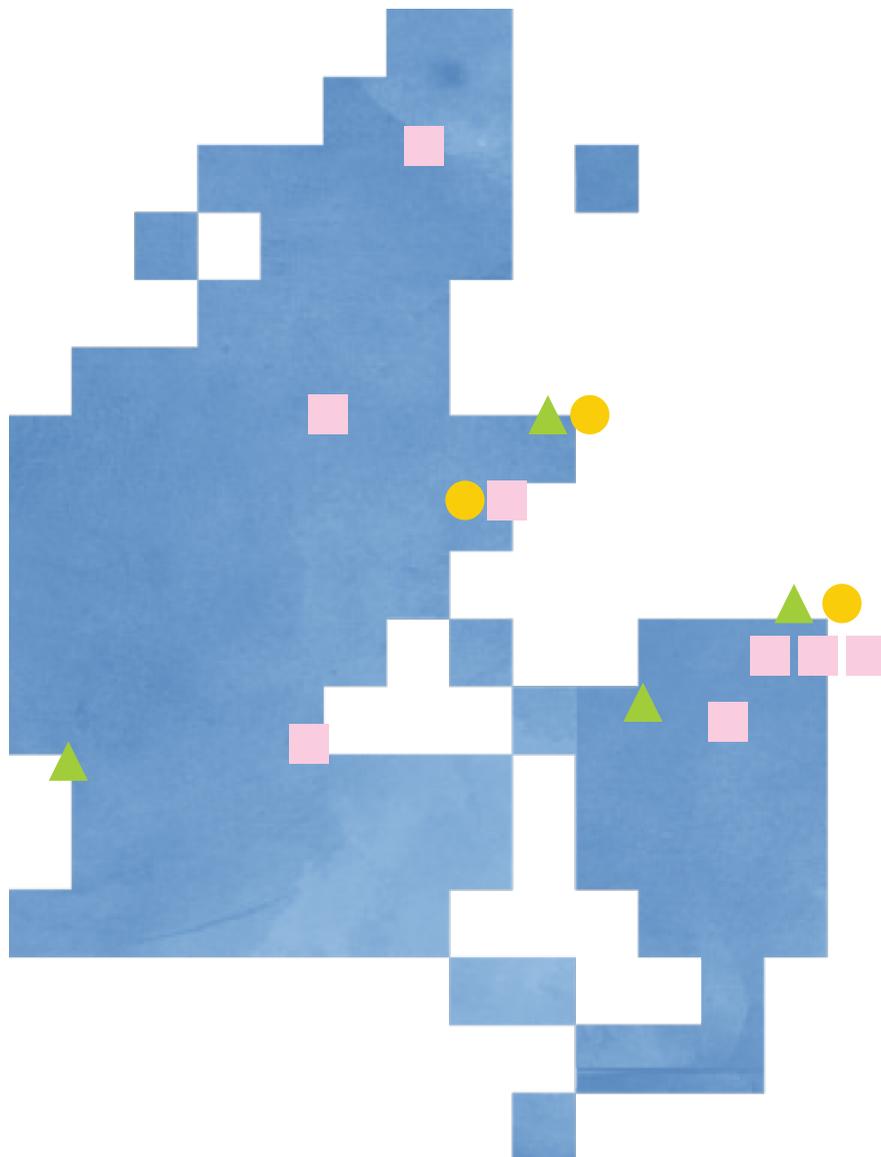
About 2000 students apply each year to university programs that can be related to games, or have a game track. However, it is difficult to make a true estimate how many actually apply to study game development. Because of structural issues of how data is handled by individual universities it is difficult to collect data of exactly how many choose certain electables, for example.

About 1000 are enrolled each year to these game related programs. The majority study computer science and media as their main field, but also animation to ha significant degree.

From the surveyed colleges around Denmark we can find that about 35-45 % of students graduate. Similar to the other Nordics. From the data available, in game related fields about 28% of students in Denmark are female, and 72 % are male.

FROM APPLICATION TO GRADUATION IN DENMARK, SAMPLE 2010-2016







University

Aalborg University

Aarhus University

IBA (Kolding)

IT University of
Copenhagen

University College
Lillebaelt

National Film School of
Denmark

The Animation Workshop
(Viborg)

Zibat -Zealand Institute of
Business and Technology
(Roskilde)

Royal Danish Academy of
Fine Arts (Copenhagen)



Higher Vocational

Business Academy
Southwest (Esbjerg)

Game College (Grenaa)

TRUEMAX Academy (CPH)

Vallekilde Højskole
folkhögskola



Applied Sciences

Business Academy Aarhus

Dania Academy of Higher
Education (Grenaa)

KEA - Copenhagen School
of Design and Technology

Finland

As the game industry has expanded rapidly, Finland's game industry has grown a strong reputation internationally, especially within the mobile market, and has contributed to make the Nordic region a world leader in the game development. With strong technical expertise and thriving grassroots together with strong cultural roots in engineering, design and development, Finland's games industry has been one of the fastest growing industries, with a turnover of 1800 million EUR in 2014, and more than 200 active companies

The Finnish Games industry employs about 2000 people and the number is growing, which means demand for recruitment is projected to be about 400 employees a year. This is reflected back on university level education. In 2014 approximately 150 students graduated with a degree in relation to game development.

Vocational education programs focusing on game development have been in existence in Finland since the early 2000s, but in recent years also Universities have started programs in game development. The most common disciplines taught reflect the most common roles in the industry: programming, graphic artists and level/game design.

What has been lacking for many years in the Nordic region, but is now being introduced in Finland, is course content concerning business administration, which is also anticipated to be one of the key competences 10-15 years ahead.

Education in game development is offered at universities, vocational education programs and universities of applied science (Polytechnics). Full programs have a focus of in software production, audio-visual media, programming, game design specialization options and a specialized MBA. Degrees are offered in completion of a Bachelor's degree of science and/or Media. A common Bachelor's degree will take an average of three years, with an addition of two years for a master. The programs normally have an emphasized in work-based learning courses and project work.

From 2014 self provided estimates of enrolment and graduation, Finnish Universities have displayed very positive number. According to these assessments, Finland probably has the lowest drop out rate of all the Nordic countries. The graduation rate is about 60%, which is by far the highest in the region regarding academic education and degrees in applied Sciences.

GENDER SPLIT IN FINNISH GAME-RELATED EDUCATION, ESTIMATION 2016

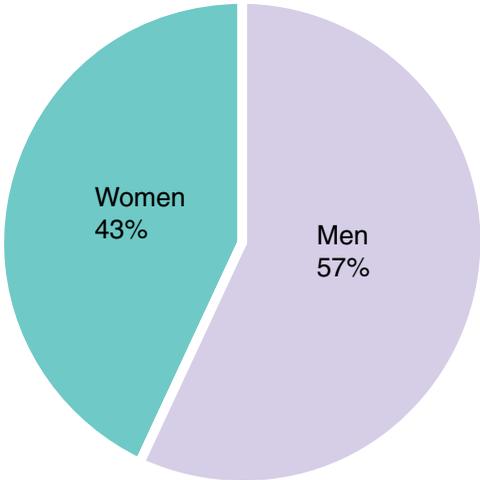


Photo: Sebastian Bularca



**60% of Finnish students graduate,
which is the highest average in
academia among the Nordics**



University

Aalto University

University of Helsinki

University of Jyväskylä

Lappeenranta University of Technology

University of Oulu

University of Lapland

University of Tampere

University of Turku



Upper Secondary

Kuovola Region Vocational College

Lapland Vocational College

Lappia Vocational College

LUKSIA, Western Uusima Vocational College

Helsinki Vocational College

North Karelia Professional College

Oulu Vocational College

Sataedu, Satakunta Educational Federation

Suupohja Vocational Institute



Polytechnic

Centria University of Applied Sciences

Jyväskylä University of Applied Sciences

Kajaani University of Applied Sciences

Karelia University of Applied Sciences

Kyminlaakso University of Applied Sciences

Lahti University of Applied Sciences

Lapland University of Applied Sciences

Metropolia University of Applied Sciences

Mikkeli University of Applied Sciences

Oulu University of Applied Sciences

Savonia University of Applied Sciences

Tampere University of Applied Sciences

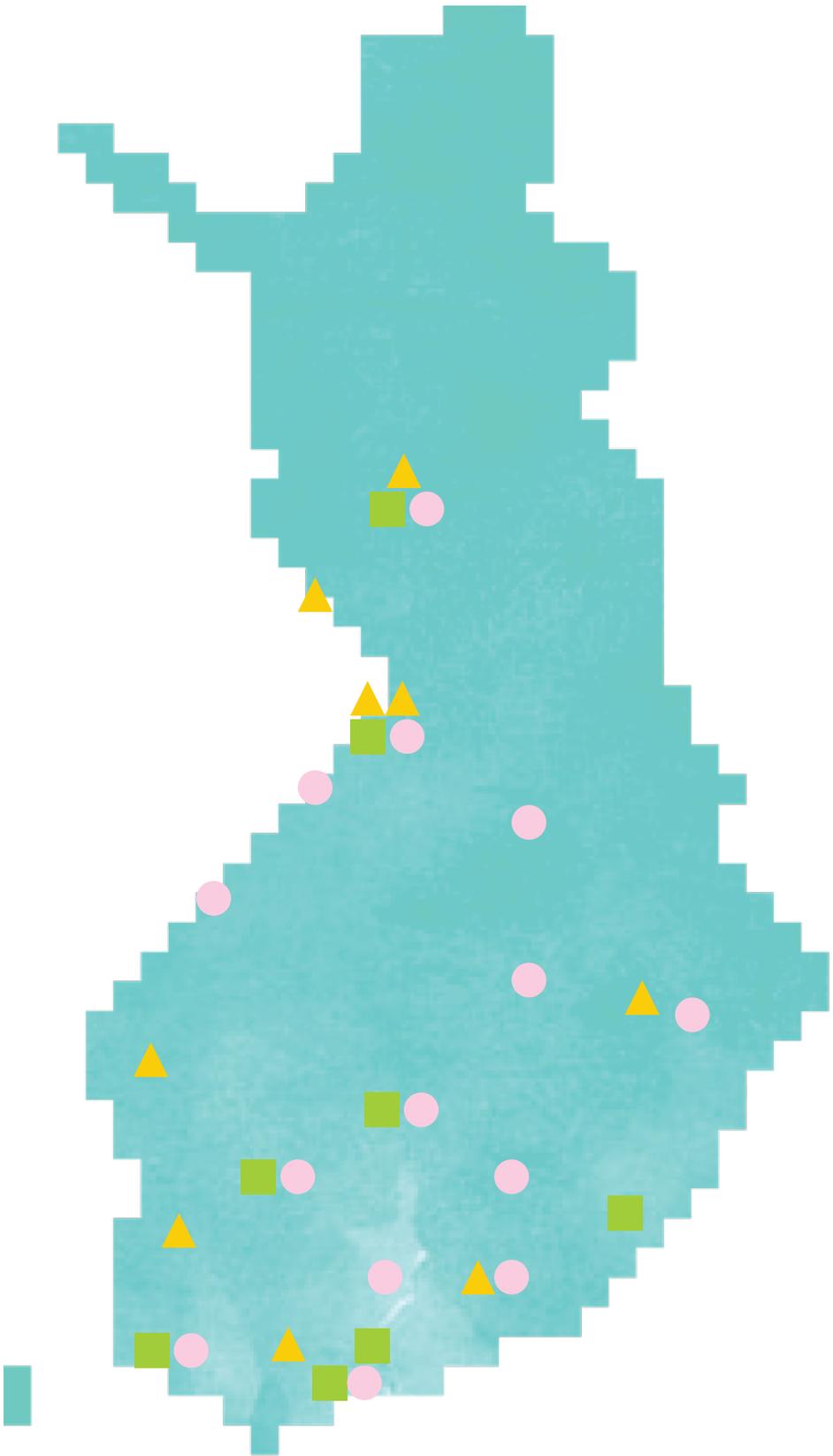
Turku University of Applied Sciences

300 Students enroll each year

400 hired in Finnish industry*

180 Graduate

*Not all work roles are Junior Positions



Estonia

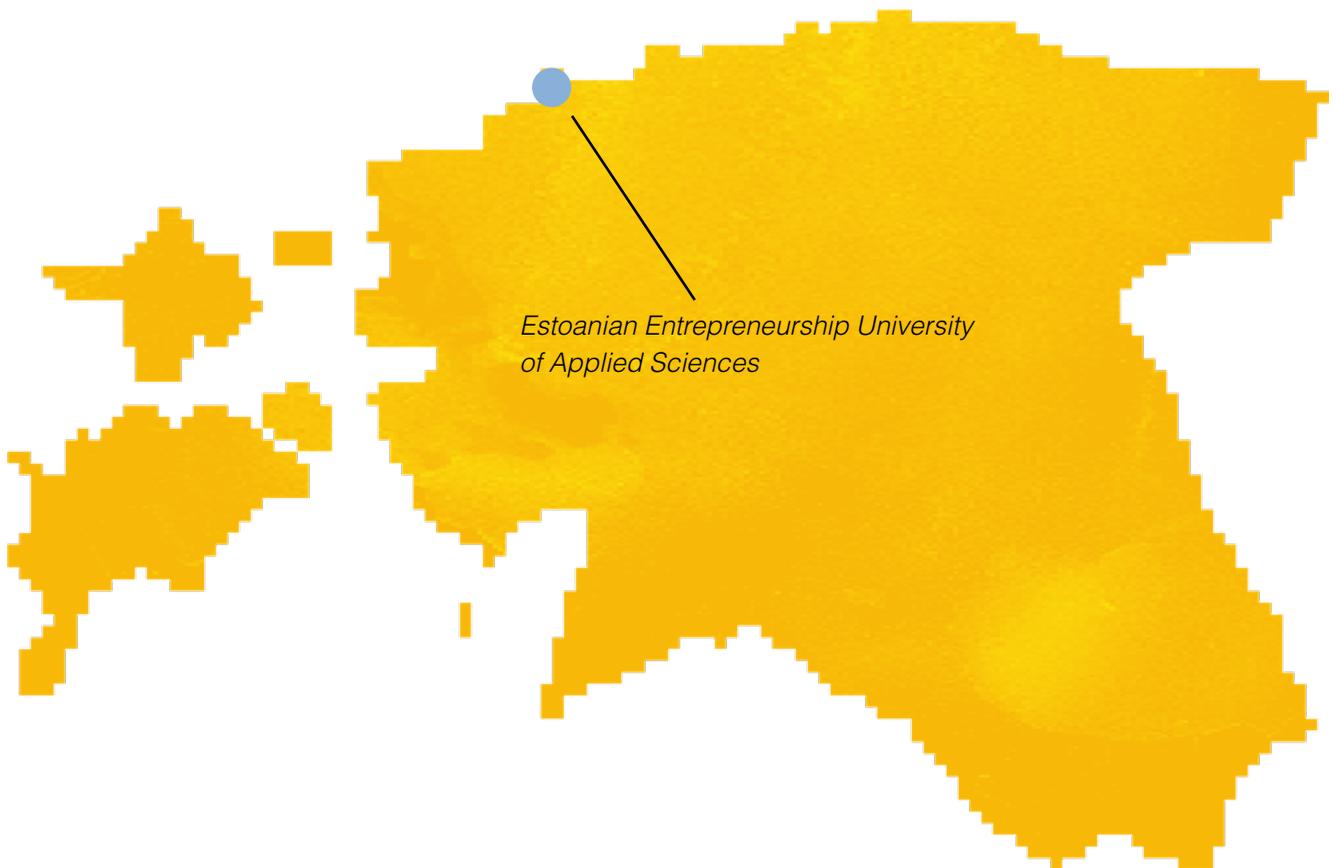
Estonian Entrepreneurship University of Applied Sciences - EUAS

Game Design curriculum will start in September 2016.

Curriculum is in Estonian and consists of 3 years full time in Tallinn or 3,5 years remote in Tartu. Graduates will receive a diploma of "Higher Education in Applied

Sciences" that is applicable for further Master's studies. The EUAS program will enroll 56 students in total.

There is more information on the EUAS website – eek.ee (in Estonian)





In 2016, Estonian Entrepreneurship University of Applied Sciences plans to start the country's first program in game development

The Future Talent

Game education programs in the Nordic region carry both similarities and differences and show an interesting diversity. But do they focus on the right skills and talents for future to come? Some focus on teaching and training in a specific discipline, while others let students explore a range of fields in game development, and sometimes specify in certain areas later. The programs that set students on a specific track, to become experts, have historically been better appreciated by hiring companies. And those who focus their student years in a specific field have had a higher chance to get a first job. However, with an increase in smaller and mid-sized companies, there is an increased demand for generalists. And the most growing segments of the industry, mobile devices, have a bigger need for generalists than the more traditional settings like AAA studios. Prognosis of game education in the future:

- Game education is moving more and more towards a production focus to emulate the work environment of current game studios.
- More art schools are interested in games as an artistic expression, and the number of cross disciplinary programs will increase, possibly Denmark's DADIU system can be an inspiration.
- R&D may become a more important groundwork for development, and collaborations between research institutions and companies may be a future necessity (such how AI is a current field of interest).
- A bigger number of prestigious and well renowned game programs, with 4+ applicants per spot during enrollment
- Vocational education will be implemented in more regions.
- Higher Vocational Education programs will be longer and stretched, if possible, from a standard of 2 years to a new standard of 2,5

Education for the structure, or to develop the structure?

When a new industry is taking form, it has a bigger freedom to form its own rules, norms and structures to build on. Since the games industry doesn't have a traditional structure or a traditional infrastructure, or some say even a standard way of working when

making a game, guidelines can be hard to give in a general sense. However, you can conclude a few success factors about the Nordic game industry, which game education program can build a foundation on.

- Flat organization. A low hierarchy level encourages creativity and openness.
- Iterative design process & early prototyping. The core gameplay mechanic and game design is developed and iterated in an early stage for effectively and efficiently creating quality games.
- Creativity. The Nordic countries have a long tradition of creativity and design, and social safety networks that provides an amount of safety for entrepreneurship and new ideas.
- Best idea wins, best argument wins. It's not necessarily the boss/manager/lead that is the decision maker.

Finnish Anticipation Report Summary

From the Finnish anticipation report conducted in 2015 it was concluded that a group of skills and competences will be needed in the games industry the upcoming 10-15 years. The fact that the Finnish game industry is heavy on mobile games can be read from this anticipation report. Mobile games is still the most rapidly growing segment, with free to play as the main category. Therefore subjects like data analysis and scalability are especially emphasized.

Some have been important for a long time, and some skills are in new demand:

- Team work skills, creative organizational leadership, competence in new forms of cooperation and agile development
- Skills in networking and establishing relationships, “internalizing a partnership mentality”
- Data analytics, such as big data utilization
- Gamification design
- Knowledge in the field of new technologies such as VR, wearables
- Knowledge of ethics and ethical values in a professional setting
- Multicultural competence and skills regarding cultural diversity
- Competence regarding teaching, education, health related services and serious games
- Skills in community management and handling an organizations social relationships
- Skills in turning a product idea into a productive activity, including sales and marketing competence and branding competence
- Knowledge and competence in target group scalability and adapting one idea to different target groups

Increase in following roles are anticipated:

Brand manager, social producer, digital media creative, product production manager, cinematic animator, game psychologists, multi-class-specialists, QA test specialists, game data analytics, UX specialists, business performance managers, psychology and behavioral science, sociology/ethnology and metrics/data, low level programming, machine learning and algorithms, high level programming and QA engineers, social producer.

Swedish Anticipation Report Summary

Game development studios in Sweden attended several workshops held by The Game Assembly in January-February 2016 to discuss and create an anticipation report of industry demand in 5-10 years. The attendees were representatives from small, mid-sized and bigger game development studios.

Polarization Between Small and Big Companies - Less Crafting, More Design

The difference in between large and small companies is very evident in the Swedish games industry. A few very large companies, the biggest employers, need front edge competence within certain fields, while smaller companies have a growing need for generalists. These smaller companies also have freelancers more frequently, and as they grow there will be a larger demand for freelance work. Smaller companies have a lesser demand for programmers and slightly lesser demand for graphic artists. Instead they have an increased demand for game designers and level designers. The bigger companies have an ongoing and growing demand of programmers, graphical artists and technical artists. Both small and big companies admit to have a demand for game designers and skills related to narration and storytelling. Also, it's noted that new techniques of storytelling will be implemented when new interfaces connected to VR and AR becomes a market.

User Focus, Metrics & Analysis

User focused design will be more important, and there will be a increasing demand for developers to utilize research, data and analytics to be successful. Because of this an increased demand

for game psychologists, multi-class-specialists, QA test specialists, game data analytics, UX specialists and business performance managers. Psychology and behavioral science will be subjects of increased demand, and game designers will have more focus on monetization, business, psychology, sociology/ethnology and metrics/data. The increased demand for a business-minded game design will also create an increased demand for entrepreneurship skills.

“More Mega Corps” – New Work Roles

The existing big studios are here to stay, which means that they will keep hiring specialists. With high probability more studios will grow into large ones, which will increase the need of leadership skills. Education and development in leadership will be in increasing demand for project leads and producers.

While the need for specialized skills at big companies will remain, new work roles will be created. With a higher demand for quality in games the work role of game designers will broaden to quality assurance, a type of “extraplus” quality engineering.

New Technologies

There will be new ways to experience games, for example VR (Virtual Reality) and AR (Augmented Reality). This means there will be an increased demand for programmers that know hardware and are skilled in low level programming, machine learning and algorithms.

Designers will have to take into account new range of interface possibilities when for example the shape of a room or the players hands will be important in the interaction. This will lead to a new demand of creative directors, where the experience will be a lot more than just game design, for example depth in storytelling techniques. This role is hard to describe at this early stage of development, but we know that new hardware will demand new interface, new and novel storytelling and a good understanding of limitations and possibilities of hardware.

Platform Convergence

There will be an increasing convergence between game platforms. This means that games will be less dependent on a certain platform, and users and customers will be able to purchase the same game on most platforms. This trend will lead a bigger need for high level programming and QA engineers.

PR & Community Management

Marketing games will be of bigger and bigger importance as the noise of the market increases. This means a dependency on social marketing and community management. The people staffed

in PR should have experience and knowledge in brand management, good entrepreneurial feel. A brand manager should be a digitally creative individual that can create PR material from scratch, for example animations and trailers, and have knowledge about IP and PR management. This person should be a part of the development from start, since more games go from development of a game to the development of a service. A type of brand manager can also be seen as a social producer depending on the tasks.

There might also be demand of consultant work in game market influence-liaison/community facilitation – a type of PR expert that can help smaller companies find their way to the market.

Older workforce, HR & Diversification

The average age of staff is increasing within the games industry, and with that comes new types of lifestyles. Older employees will demand less crunch and put more demand on HR. As the industry is growing, and more and more people are hired, the workforce will be more diverse. This means that companies have to manage a range of different personalities and backgrounds, and management will need to have a strategy to utilize their diversification.

To handle recruitment and new recruits, companies will need competence in and new skills in HR. There is also a lack of communicating the possibilities of the games industry as a valid career option, and career counselors with insight about the games industry is needed.

Method

This report has been based on educational institutions and governmental agencies internal and public statistical data. The Swedish data was retrieved from UHR (previously VHS) for academic game education programs, and asking the vocational education organizers individually. We have also contacted the educational institutions in this report

to individually ask for data on enrollment, graduation and information on alumni networks, if any. For anticipation data for future demand for talent in Nordic region we have utilized anticipation reports conducted in Finland, and workshops made with industry experts in Sweden.

National Differences - Inclusive Approach

Because of national differences in how education is structured and labeled, categorization can be a bit stretched or flawed. For example, the differences between Polytechnic/Applied science and other universities are less clear in Sweden, but more prominent and visible in Finland.

One of the hardest challenges conducting this report was to decide which university and higher education programs should be included. Many polytechnic universities have subject fields related to games (AI, object

oriented programming, physics simulations etc.), even if they are not directly teaching game development. Because of the interdisciplinary nature of game development, also other fields such as graphical art, media management or medialogy can be related to game development and have therefore been included.

To account for language barriers and other obstacles we have utilized through key authorities and trade organizations in each country to make sure that no school in higher education were left out, and have to tried to have

an inclusive approach in our decisions. The only examples of less inclusiveness have been towards Sweden and Norway, since these two countries have a larger number of University and higher education degrees in game development. Therefore, the main focus has been on the programs that profile themselves as game education programs. If you as the reader of this report find that a certain program should/shouldn't be included in future editions, please don't hesitate to notify us.

Approximating Graduation Rates and Gender Distribution

Another methodological importance has been the approximation of graduation and gender distribution. The majority of universities do not have a proper alumni system or available statistics regarding graduation rates. The samples of graduation rates used in this report have been self-reported by the institutions, which might constitute a risk for bias – maybe only the education programs with the proudest results have shared their data. We have been very conservative in our estimates of graduation rates, and have foremost presented the lower averages to account for any possible bias as much as possible.

The issue is the same regarding gender distribution outside of Sweden. Writing this report, we had full availability of gender distribution in Sweden from UHR, and comparing to the rest of the Nordic region where sample data was self-distributed, Sweden seems to have the lowest rate of women. There might have been a bias in distribution of data, with a tendency to share the gender distribution by programs who had more equal gender distribution.

This report includes higher education programs that offer game courses and put emphasis on game development as a career

choice in the program description. This is to create a fair image of the Nordic landscape of game education, since the countries have notable differences in their emphasis of certain disciplines. Universities and higher education programs were excluded if they did not include game development as at least an alternative career choice in their program description, or if they did not offer courses labeled as game development.



norden

Nordic Council