



# GAMIFICATION

## A PROMISING AVENUE FOR EDUCATION

### *The Minecraft Ecology Case*

What can we learn from video games and gamers who spend countless of hours developing their problem-solving skills, their creativity and resilience? **Alf Westelius** explores the potential of gamification in education.

**“If some of the triggers that today make people spend time developing their skills in “fantasy”, “post-apocalypse”, and first-person-shooter settings could be used for educational purposes, society, individuals – and the educational system – would benefit”**

Minecraft is an independently produced sandbox game developed by Swedish video game programmer and designer Markus “Notch” Persson.

Video gaming is a threat to society and corrupts children and adolescents. It is at best a useless pastime, where players hone skills that have no applicability outside the gaming world, and potentially, it is even harmful, making students neglect school, refrain from physical activity and cocoon in an imaginary world of violence that can spill over into real life, and can become an obsession, an asocial addiction that calls for treatment.” You have heard this many times. You may even have said it yourself. But is this the most valid and useful way to view the role of video games in today’s increasingly digitised society? Consider another favorite rant – the school system is going downhill: our young do not read books any longer; they do not know the times table, the list of monarchs, and can’t recite any poems from our national poetic heritage... Together, these two lamentations could possibly point in another, and constructive, direction. There is something in video gaming that entices people to voluntarily spend time at doing even seemingly repetitive tasks, increasing their skill at performing these tasks. And many young people today share and come to know songs, video clips, stories, and other digitised artefacts of contemporary culture. They retrieve facts on demand when needed in daily life. And many also try their hand at writing texts, translating dialogue, composing or remixing music, creating videos – and programming computers.

This has led both entrepreneurs and academics to investigate the potential that gamification can hold for education. If some of the triggers that today make people spend time developing their skills in “fantasy”, “post-apocalypse”, and first-person-shooter settings could be used for educational purposes, society, individuals – and the educational system – would benefit.

A traditional way is to devise a content to teach and try to package it in a gamified format, for example posing challenges or quests, providing rewards for achievements, introducing competitive elements and scoring, and perhaps some fun or entertaining aspects. The packaging should also be aesthetically pleasing (according to aesthetic criteria held by the target group) and feel fashionable. This has given rise to a range of educational games that have typically not achieved the goal

of capturing the voluntary attention of the target group. Neither enthusiasts nor commercial actors have yet produced anything that comes even close to the successes of pure games. However, new attempts keep appearing, and possibly such IT-based teaching material can be a useful addition to the traditional repertoire of teaching material.

One such current attempt is promoted by Justice O’Connor, the first woman in the US Supreme Court (serving from 1981 to 2006), a distinguished lady, born in 1930, who poorly fits the archetypical image of a video gamer. She views civics and government knowledge as an important basis for a democratic society, a basis that is seriously eroded. *No Child Left Behind*, a federal program intended to increase the level of math and science skills of US students by distributing federal money to schools where test results in those subjects were sufficiently good, has crowded out civics and government from curricula. Today, half the US states no longer make these subjects a requirement for high school. Without extra funding and without requirements, many schools no longer teach them.

Under these circumstances, Justice O’Connor looked to the fascination that video gaming holds for the young generation. If civics and government could be made the subject of video games, knowledge could possibly be imparted to young people even if it is not taught at school.

*iCivics*, chaired by O’Connor, now offers a range of games, described on the organisation’s web site in terms such as: *Running for the presidency isn’t easy! In Win the White House, you get to manage your very own presidential campaign by strategically raising funds, polling voters, launching media... In Do I Have A Right?, you’ll run your own firm of lawyers who specialise in constitutional law. Do you want to make your community a better place to live? In Counties Work, you decide about the programs and services that affect everyone! Ever tried to win a disagreement? In Argument Wars, you will try out your persuasive abilities by arguing a real Supreme Court case.* The cause is a noble one, and we could hope that the *iCivics* range of games become successful. However, it seems highly unlikely that they will rival the popularity of titles such as *Battlefield*, *World of Warcraft* or *Angry Birds*, and it is doubtful that young teenagers will voluntarily choose to spend time playing them.

There is an alternative way of trying to ally with gaming, to achieve educational outcomes that seem promising and worth exploring. It entails looking at games that are popular and trying to find ways of using them to achieve desired learning outcomes. A game that is currently attracting this type of attention is *Minecraft*. To explore this gamification avenue, let us start by looking at *Minecraft*’s path to fame. To me, *Minecraft* is an

interesting object of study because it exemplifies the ecological processes that are at work in our present, digitally intertwined society.

The program *Minecraft* differs from most of the stars on the video game canopy by being an indie product. This means that it was not developed and launched by a professionally managed development team commissioned by large game platform actors, such as Sony or Microsoft, or by video game publishers, such as Electronic Arts or Blizzard Entertainment. It was not sold via established online video game stores, like Steam. And it was not marketed through expensive and carefully planned ad campaigns. It was coded by a single individual, known as Notch, in close contact with a growing crowd of players. It was sold via his own website *minecraft.net*, using PayPal as payment solution. And it was marketed by word of mouth, to a large extent spreading via the Internet. The success thus depended on positive network effects, and on combinations of existing technical infrastructures, long-tail business models and social institutions in the Internet-connected society.

Webshops as an established retail solution in general, and especially well suited for digital products like video games, was an essential component in the development. 15 years ago, only a small minority of people were comfortable with purchasing products online. Today it is commonplace. PayPal, an international, widely used web-based payment solution with no fixed subscription cost, tailored to webshopping, seamlessly scalable from single transactions to large volumes and compatible with electronic bank transfers and credit cards, provided an established payment infrastructure. The webshop with PayPal integration thus constituted a scalable self-service retail solution with international reach and no financial risk.

Blogs and twitter – established, free communication channels in the Internet-active parts of society – served to connect Notch with users to exchange ideas about problems and future development of the game. But perhaps the most important ecosystem infrastructure was YouTube, both as a site for posting and viewing videos, and as an institution with genres such as amateur-created computer-animated music videos and *Let’s play* videos of different types: “*watch me play video games*”, “*see the cool things I have built*”, and amateur-created instruction videos. On YouTube, Notch could post his first video of the game he had begun to build, inviting people to start using the preliminary versions of the game and comment on it. For a game, *Minecraft* was extremely open-ended. It resembled an electronic Lego, but with a computer-generated initial landscape to explore and modify, a sun-based rhythm of nights and days, and with a basic game feature of menacing nightly creatures



## Ivo Zander *The Entrepreneurial Perspective* Can Entrepreneurship Be Taught?

I sometimes get the question if it’s possible to teach entrepreneurship. Quite often I get the feeling that the person who is asking implicitly wants to say that we all know that entrepreneurs are born, not made, so why waste time and resources on fancy education?

For one thing, over the past decades research has shown that entrepreneurs are not born, and instead start new firms as a result of their environment, life experiences, and personal choices. I also believe that entrepreneurship both can and should be taught at the university, for reasons that go back to some simple and fundamental drivers of the individual’s decision making.

The explanation is simple: We develop and follow through on intentions if we find a particular idea – in this case the idea to start up a new venture – both feasible and desirable. Basically, something is seen as feasible if we feel we have the ability to do it, and desirable when all taken together we think the outcome is something positive. In the context of teaching entrepreneurship at university or elsewhere, this has some interesting implications.

A first and somewhat paradoxical conclusion is that as long as we train students well in any discipline, which may have nothing to do with entrepreneurship whatsoever, they become well-equipped to at some point take the decision to start their own company. Anybody who has been trained to world-class standards is more likely to perceive the application of her acquired capabilities through a start-up firm as a feasible proposition. Notably, it doesn’t matter if it is training in software development, art appraisal, DNA-analysis, or animal husbandry. From this perspective, every effort spent on good and world-class education is effort well spent in terms of ultimately producing new and also successful companies (do make

sure not to cut back on funding to schools and universities!).

A second conclusion concerns the teaching of entrepreneurship-related matters. Here, it becomes a matter of explaining the particular circumstances and challenges that surround the founding of new ventures, and by means of prior examples illustrating ways of responding to them more effectively. Some of the skills that can be taught include the formulation and selection of promising business ideas, the writing of convincing business plans, how to talk the language that different types of investors like to hear, keeping track of the financials, or how to expand the firm into foreign markets. While every start-up story is unique and the outcome can never be predicted with absolute certainty, there is indeed much to be learned from both research and those that have tried before.

From this perspective, there are good reasons to believe that students who learn about the circumstances and challenges of entrepreneurship are more likely to develop the feeling that starting a new venture is indeed a feasible proposition. But attending entrepreneurship classes has one additional benefit, which works via the desirability component of the decision making process. Just being exposed to a number of like-minded students, all contemplating the possibility to one day start their own company, surely sends the signal that entrepreneurship is a both cool and desirable thing to do. When desirability meets up with feasibility, the likelihood of follow-through on emerging start-up intentions is greatly enhanced.

There is nothing better than seeing students of entrepreneurship classes grow in self-confidence and when smiles and body language tells you they are ready to go with their own ventures. Can you teach those things? I certainly think that you can.



Ivo Zander is the Anders Wall Professor of Entrepreneurship at the Department of Business Studies (Uppsala University). Scan the QR-code to the left with your smartphone to find out more about the author or contact him directly by sending an email to Ivo.Zander@fek.uu.se.



## Rian Drogendijk *The International Perspective* On Diversity, Exchange and Our Lingua Franca

Every spring I teach a course on cross cultural management, and it is a great advantage to have classes with students from diverse backgrounds. In a discussion on cultural stereotypes, I often ask non-Swedish students to list some of the characteristics of Swedish culture. They diligently mention all the available stereotypes: that Swedes are kind, egalitarian, not used to criticize openly, focused on everyone's well-being, not so outgoing, and so on. I continue to ask whether Swedish students agree with these descriptions and then who among the Swedish students feels it describes him or her personally for a full 100 percent. Most students agree on the general description, but realize that as an individual they deviate on several of the characteristics. This leads to interesting discussions; much more interesting than in a completely Swedish classroom.

Over the past twenty years, universities throughout Europe have harmonized their programs and all offer Bachelor and Master Degree programs, like in North America, Australia and also in many places in Asia and Africa. This means that today, students can more easily transfer between programs across countries. Within Europe, we have even made an attempt to harmonize our grading system. Instead of the Swedish grades U/G/VG, we used for a while "ECTS grades": from A to F. In practice, however, teachers continued to relate to their original national scales and there was still no consistency in their use and interpretation. The result: the EU decided to abolish the system. Despite these inconsistencies with regard to details like grading, there is much cooperation across borders between business schools. Basically every university has an exchange program that allows students at different levels to study abroad for one or two terms. Support for such exchanges comes from institutions like the European Union, the Erasmus program for example, but also from companies in the form of

individual scholarships. Our Department of Business Studies has numerous connections to universities and business schools around the world. In fact, we have the largest exchange program at Uppsala University. This underlines how important we find the international exchange, not only for our own students going abroad, but also for our classes with incoming students from several continents. Diversity enriches students' lives and our teaching.

The internationalizing trend is also visible on postgraduate levels: the eight new doctoral students that started recently at our department, represent many nationalities and have lived in even more countries across the globe. Also among teachers and researchers the numbers of non-Swedes are growing. An interesting issue that arises, and actually leading to significant debate, is whether Swedish should be the "lingua franca" or whether we should turn to English in all our meetings, education and writings. In a way, this question is not new of course. In the Middle Ages, Latin was the main language at universities throughout Europe, and later the elite language became French. Today, we try to strike a balance between maintaining Swedish as the main language of communication and social integration, and English as a language to unite people from different parts of the world. Most of our publications are in English (including the very journal you are reading now!), as are our courses at advanced levels. In meetings, however, it is different: people can feel limited in their ways of expression when meetings are held in English, and the switch to English for the one non-Swedish speaking colleague is not always made with pleasure. Moreover, all official documents are in Swedish, making it difficult for non-Swedish speakers to climb in the organizational hierarchy. Personally, though, I think it is unavoidable to make the switch, so Tally Ho! Anyways, we should be glad it is English, not Latin.



Rian Drogendijk is Associate Professor at the Department of Business Studies (Uppsala University). Scan the QR-code to the left with your smartphone to find out more about the author or contact her directly by sending an email to Rian.Drogendijk@fek.uu.se.

that a player would need to hide from by building shelters. The story or goal: (over and above bare survival) the players would have to design themselves.

The Lego feature – the possibility to build and rebuild any structure that you could imagine – proved to fascinate increasing numbers of people. And they would proudly share videos of their designs and of how they built them on YouTube. Others would see and become inspired, and Notch could see and derive satisfaction from the response and inspiration for further development of the game. People built Eiffel towers, spacecraft, landscapes and cities. In fact, the creations appearing in videos eventually convinced him to allow a pure construction mode, without the rhythm of days and nights and without destructive creatures. To many players, the game was not a stand-alone product; Minecraft formed a part in a creative process where videos on YouTube were essential components. To some, Minecraft became a tool in creating videos, rather than videos being a way to document the playing, the constructions or the problem-solving. Two Englishmen produced Yogscast, a series of let's play videos with or without a storyline, attracting a huge audience. It features hundreds of Minecraft videos with more than a million views each. Captain Sparklez, an American, became famous for Minecraft-style music videos that were viewed by tens of millions.

Building blocks were added that could be tuned to produce different notes when activated, and virtual wiring and power sources made remote activation, logic devices, crude programming and automation possible. SethBling, an American, created renderings of popular games and tutorials for building advanced functions, having his videos watched hundreds of thousands of times, or millions even. Not everyone is as popular, but also purely useful (not entertaining) tutorials can receive a decent recognition. For example, Flabaliki has created streams of tutorials on how to use the new components to create logic components, virtual circuitry, and reaches thousands or tens of thousands of viewers.

Some people who want a real challenge or who just want to really understand how computers work, have built virtual computers in games. A Frenchman built a calculator in Little Big Planet (inspiring the game developers to add electronic circuitry components to the game). Jonathan Ng, a biochemistry student in London, built an 8-bit universal computer in Dwarf Fortress, and the US computer science student Ben Craddock managed to build an Arithmetic Logic Unit in Minecraft, proudly showing his construction on YouTube.

The Israeli computer science professors *Shimon Schocken* and *Noam Nisan*, who have designed a self-study material for building a virtual computer

from scratch, to help people understand how computers work, appreciate the accomplishments, but note that it takes ten times as long to do it in a game as to do it using the tools suggested by them. However, if you want YouTube attention, you are much more likely to gain it by using Minecraft than using a conventional programming language.

With all this exploration and creativity going on, and the popularity of Minecraft surging, teachers and parents started experimenting with the program as a basis for explorative learning, and for structured, but playful, teaching. Again, posting videos on YouTube, blogging and twittering, the experiences spread and inspire. An American and two Finns linked up to form a company for modifying Minecraft into MinecraftEDU to more easily serve as a tool for class-room and non-classroom teaching. And on the blogs, children and teenagers join in with questions, observations, encouragement, laments about their own less game-friendly teachers, etc. By now, Minecraftteachr, a primary school computer science teacher, has reached more than 800,000 views of his large set of tutorials and has 6,500 followers. The opening video for how to use Minecraft in teaching has been viewed more than 100, 000 times. Other active teachers, like the Australian EduElfie, posting tutorials on how to use Minecraft in teaching about animal cells, gravity, probability, and other science applications, reaches hundreds of viewers with each of his videos, which is still considerably more than his conventional videos on pen-and-paper classes, viewed by tens of people each. Yet others, like Eric Walker, teaching at the American School in Kuwait, has built a "world of humanities" that his students are encouraged to explore. He not only shares the idea, but also writes about his systematic evaluation of the attempt, sharing his report-in-construction via a dropbox account.

A wiki and a Google site have been started at the MinecraftEDU website to serve as repositories for good examples and ideas, teaching tips, and discussion. As the examples above indicate, the open-ended structure of Minecraft means that the limits to its applicability are only set by the limits of imagination. But as the discussion venues become more structured, the growth and participation seems to get stifled. Much more is happening and is being exchanged on YouTube than on the MinecraftEDU wiki and teacher blog. The ecology where Microsoft grew to fame seems likewise to be important for the growth of Minecraft in teaching.

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**Rather than building on extrinsic motivation, such as scores and awards, the fascination for Minecraft seems to build on intrinsic motivation: the joy of exploration by "3D" navigation, the fun of creating virtual constructions by arranging blocks, and creating logic by building it from its basic components.**

sic components. There is a real challenge in keeping the intrinsic motivation when trying to move Minecraft from the world of voluntary play and socialising to an education setting.

Judging from the comments from students on blogs, there is an important social element that aids the attempts: approaching a subject from a point of reference that belongs to the children rather than to the school world – a popular game. This symbolic act appears to result in reciprocity; the students approach the tasks with a positive attitude rather than with reluctance. It is still too early to say that this alternative road to education leads to improved teaching and increased learning. Cumbersomely building block by block in Minecraft can turn out to be too much time spent on something else than learning. And trying to provide shortcuts and ready-made structures could risk taking the fun out of using the game if the opportunity to experiment and be creative becomes too restricted. Adding traditional external motivation elements would probably also corrupt the joy of using the program, turning it into a classical educational game, while engaging in the wider creative ecology by for example creating and posting Let's play videos on YouTube as part of the learning task could help support enthusiasm.

Although the use of popular games for educational purposes seems to hold a promise, popularity also poses a challenge. In the digital world, development is fast, and what is popular today may well seem outmoded tomorrow. Thus, those following this track will need to be attentive to how the image of the game in use changes in the target population, and devise ways to transfer teaching ideas to new games as popularity shifts. ■

For more about **Justice O'Connor's** initiative to promote civics knowledge by applying gaming concepts, visit [www.icivics.org](http://www.icivics.org).

For examples and discussions regarding the use of Minecraft in schools, visit [minecraftteacher.tumblr.com](http://minecraftteacher.tumblr.com).

For a richly annotated discussion about training and the capacity to learn, read **Andrea Kuszewski**, *You Can Increase Your Intelligence*, guest blog at Scientific American at [blogs.scientificamerican.com](http://blogs.scientificamerican.com)



**ABOUT THE AUTHOR**  
**Alf Westelius** is Professor at the Department of Management and Engineering at Linköping University. Scan the QR-code above with your smartphone to find out more about the author or contact him directly by sending an email to [Alf.Westelius@liu.se](mailto:Alf.Westelius@liu.se).