

Applying gamification in higher education as a method to develop the 21st century skills: A Literature Review

Judith Herrewijn (174296) | 2018

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Introduction

Society and technology are evolving so fast that conventional approaches to education no longer fits the way we live and work today. The skills needed for future workplace and to participate in modern society also evolve constantly. These are not skills that can be taught in traditional ways (Bandelli, 2017). P21 (Partnership for 21st century learning), the biggest organisation in the US who's focus is mainly on primary and secondary education, claims that "21st century learning environments are essential to prepare all students for the challenges of work, life and citizenship in the 21st century." If these new skills are a matter of such great importance than we have to find new methods how to teach those skills in a way this generation will adopt the learnings. A way to do so is applying gamification in higher education. This paper explains the transition from the industrial age to the digital age and focuses on the new skills of this new generation students. Since playing games is a way of doing for this new generation, applying gamification in higher education will effect not only the final results but will also create highly engaged and motivated students and will therefore have great impact on a broader perspective of the learning culture.

Higher education and the digital age

Education prepares students for participating in the future world. But the world is changing very fast. Our education system hasn't changed for hundreds of years and is still based on industrial age mentality, which is focused on mass production. Students' main principles are following instructions and doing exactly what they are told and this is how nowadays education is designed. (Next school, 2016). The effect of this industrial age teaching for nowadays students is lack of motivation, dissatisfaction and non-efficient studying. This will have immediate effect on engagement, communication and collaboration and shall eventually lead to lower learning results (Urh, Vukovic, Jereb & Pintar, 2015).

Since we live in the age of digital technology we need to fundamentally rethink our approaches to teaching and we have to come up with new ideas how new technologies can support education in order to improve students' learning attitude and get better overall results (Kirkman, Cornelius, Sachs & Schwab, 2002, p. 48). The use of new technologies, such as Internet, social networks and smartphones, affects the teaching process of higher education. Technology has an important impact on education in this digital age. Making possible better communication and providing systems which support individual learning, collaborative thinking and new methods to gain knowledge are crucial. One of the most common educational systems, which are supported by digital technology, is E-learning. E-learning has been introduced as a fundamental part of the students learning experience in higher education. However, many E-learning systems do not achieve the desired objectives. User satisfaction is one of the most important factors in assessing the success of system implementation (Urh, Vukovic, Jereb & Pintar, 2015). If students are not satisfied and motivation drops, how can they be stimulated to learn in the way we expect from them? For nowadays teachers it requires not only the knowledge

of technology but also a deeper understanding of the nowadays students (the N-Generation). Changing society and therefore the changing future workplace on the one hand, and the N-Generation on the other hand forces us to come up with new approaches to education.

The N-Generation and the 21st century skills

Digital natives, also called the N-Generation, spent their entire lives surrounded by computers, videogames, digital music players, smartphones, and all other tools of the digital age (Prensky, 2001). This provides them 24/7 access to information, connectivity with multiple users at the same time (using Social Media) and technology also provides instant gratification because everything they need is delivered on demand (Sinek, 2017). Therefore today's students think and process information fundamentally differently from their predecessors (Kennedy, Judd, Churchward, Gray & Krause, 2008). Digitally native students bring different skills, interests, and needs to the classroom and educators are struggling to understand these future skills in order to design new ways of education (Spires, 2008). Critical thinking, collaboration, problem solving, communication and creativity are the 21st century skills, which the N-Generation has developed naturally. On the other hand Net-Geners typically lack literacy skills, and even though they are exposed to the 21st century skills, their critical thinking and communication skills are often weak. They may be digital natives, but they do not necessarily understand how their use of technology affects their ways of learning (Spires, 2008).

What they also don't realise is that these 21st century skills are needed for future workplace productivity and although you can't predict the future, based on current expectations you may say that the business community trends are emerging in terms of new skills that are needed. Daniel Pink in *A Whole New Mind* (2005, p.1) boldly claims "the future belongs to a very different kind of person with a very different kind of mind – creators and empathizers, pattern recognizers and meaning makers." He believes that complex communication and expert problem solving shall become the most dominant skills that will fit the future workplace. Since teachers come from another generation and have developed other skills to serve other needs, they have no clue how to teach the 21st century skills in their education program. Aren't there any ways and methods to teach skills like problem solving and communication? As we look at the natural behavior of the N-Generation which is playing games at any time, watching series on Netflix and using Social Media a lot can we use something what is already there and apply this to our educational system?

Value of gamification in higher education

As the number of game players increases enormously among the N-Generation it becomes more important that educators find their way to harness this phenomenon for educational purposes (Spires, 2008). Game-based learning and gamification is a trend in the digital age and have become increasingly popular in higher education. Gamification is the use of gaming rules (game mechanics) to non-gaming environments. The game mechanics such as earning points, reaching higher levels, carry out challenging tasks and competing with others in the system can lead students into a state of being fully focused and engaged in an activity (Urh, Vukovic, Jereb & Pintar, 2015). This feeling of flow will make the student highly motivated. Csikszentmihalyi (1990) describes the flow as an optimal experience when completing a task that challenges one's skills. There are three basic elements that influence the experience of flow: the task itself, the person (individual differences) and the artifacts (tools & toys). When designing educational games all three components should be taken into account.

Another advantage of using gamification in higher education besides creating the flow, is the development of skills through practices, in which students can experiment, take risks, and learn from failure without fear of real-life consequences. Finally, higher order thinking skills such as critical thinking and problem solving can be evaluated by observing students as they play games and by analysing the performance data.

When we look at the characteristics of gamers, we see similarities with the needs of the future workplace:

- Rapidly **analyze** new situations
- **Interact** with characters they don't really know
- **Solve problems** quickly and independently
- **Think strategically** in a chaotic world and
- **Collaborate** effectively in teams

Applying gamification can also provide opportunities for learning flexibility, competition and collaboration (Pho & Dinscore, 2015). When gamification is well applied, the following effects can be expected: students are more engaged, more motivated, satisfaction increases and there will be better results (Urh, Vukovic, Jereb & Pintar, 2015). In the US there has been a research where gamification techniques are being used to teach mathematics to prove the impact of using gamification in college level education. They showed that the number of students who used MathDungeon (the game which was developed for the test) and scored above the median score on the test of math was higher than the number of students who used traditional teaching materials and scored higher than the median score. What they also found was the fact that students who remembered the quadratic formula were those who had played MathDungeon. They showed that making a new generation tutoring system that is able to make college level math understood can be done with successful results (Faghihi, Brautigan, Jorgenson, Martin, Brown, Measures & Maldonado-Bouchard, 2014). In the future, it would be useful to test if there is also a long term learning effect to make sure that gamification in higher education is sustainable.

How gamification foster the learning of N-Generations

According to a revised version of Bloom's taxonomy (2001) we can simplify the learning process as follows:

- Before we can **understand** a concept we have to remember it
- Before we can **apply** the concept we must **understand** it
- Before we **analyze** it we must be able to **apply** it
- Before we can **evaluate** its impact we must have **analyzed** it
- Before we can **create** we must have **remembered, understood, applied, analyzed** and **evaluated** it.

By letting the students use gamified learning materials, they will automatically follow the above learning processes (Jayasinghe & Dharmaratne, 2013).

What we also must take into account when we speak of educating the N-Generation is the fact that in the digital age, learning will take place in and out school. We therefore have to learn how to think of education in a broader perspective (Kirkman, Cornelius, Sachs & Schwab, 2002). According to Levy & Murnane (2004, p. 42) "we have to bridge the gap between how students live and how they learn". So we must rethink how and when students learn. Computer games may create a new learning culture that corresponds better with student's habits and interests (Prensky, 2001). Games satisfy the basic requirements of learning environments and enables learning from anywhere and at any time. It also appears that learning by experience is more efficient than learning by study. Wouters, Van der Spek & Van Oostendorp (2009) proposed a model of three kind of learning outcomes that games might have: cognitive learning outcomes, affective learning outcomes and communicative learning outcomes. It is important that these learning outcomes must be defined and further research can be done on the assessment of these outcomes. What is it that we actually want them to learn? When you apply gamification will students develop the 21st century skills automatically? And if that is what we want them to learn or to develop in a way that they can participate in future workplace, how can we measure the progress?

Conclusion

Changing society and changing future workplace forces higher education to dive into new and more suitable ways of teaching. Since we live in the digital age we are overwhelmed by technology. New technologies create opportunity to provide systems which support individual learning, collaborate thinking, better communication and new methods to gain knowledge. The students which we design education for, the N-Generation, grew up in the digital age with using technology since the day they were born. These students bring different skills and interests to the classroom and higher education does not fit the needs of the N-Generation.

Critical thinking, collaboration, problem solving, communication and creativity are the 21st century skills which the N-Generation developed naturally because they are exposed to the technology which provides them all the information they need at any time, let them make multiple connections because the use of Social Media and let them think of solutions while playing games. The characteristics of games such as earning points, reaching higher level and challenge the player because they have to carry out difficult tasks ensure that players are highly concentrated and reach a state of flow. Applying gamification in higher education is therefore very effective because students are more engaged, more motivated, satisfaction increases and there will be better results for final tests. Because they are used to playing games it's a natural way of doing. When designing games for educational purpose it will automatically be embraced by the N-Generation. Gamification will create a learning culture that fits not only the needs of nowadays students but also the needs of future society. In the 21st century we don't want followers, we want thinkers. Further research must be done to investigate if gamification in higher education contributes to sustainable learning. Developing and embedding the 21st century skills in education will automatically mean that assessment is needed. How can softskills be measured and is gamification a way of doing that properly? Future research should focus on that in order to learn more about applying gamification in higher education and if it fits the 21st century needs.

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