
Educational games for teens: what makes a teenager intrinsically motivated to learn?

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This paper will focus on educational games for teenagers. A review of the field and some examples of games are described. Games have the feature of being intrinsically motivating, but it is a tough question how to maintain the motivating aspect when moving games into the classroom. The article will propose nine possibilities for how educational games can be shaped to motivate the specific user group of teenagers. Educational games can (1) allow the teenager to geek out (2) be a place for peer-to-peer learning (3) be a safe-place for messing around (4) be an arena to express one's identity (5) let the teenager relate the material in the game to his- or her own life (6) appeal to teenagers' wanna-be adult side (7) be a place to get challenged and increase one's self-efficacy (8) be a place where the teenager creates his or her own rules (9) be a place to practice one's social and emotional skills. Lastly, it is argued that educational games are a tool for motivating teenagers to learn, but only when designed with the specific user group in mind.



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Introduction

Among teenagers, motivation for school work can often be in short supply. One popular answer to how we can make teenagers more motivated for learning is to make them learn through *educational games*. The area of educational games have grown and are considered a promising way of motivating students to learn. Games have the feature of being intrinsically motivating, which is something that's desirable inside the classroom. Intrinsic motivation is where the student is motivated herself, without any kind of reward when the student have learnt (Gärdenfors, 2010).

It shouldn't be difficult to get teenagers to play educational games, as they're accustomed to the medium. 97% of all american teenagers play some kind of entertainment game. In Sweden the number is 83% when talking about children aged 9- to 15-years-old (Lindell, 2010).

This all seems good, but the thing is that it's not a question of simply moving games inside the classroom. Educational games differ from entertainment games because of the purpose of the game (Gros, 2007). The question is how to keep the intrinsically motivating aspect of entertainment games, while creating educational games that are good for learning. When trying to answer that question when creating educational games that're aimed at teenagers, you need to explore what actually is intrinsically motivating for a teenager.

This question hasn't been much explored in the research of educational games for

teenagers. But combining research on teenagers from developmental psychology, sociology research and research of entertainment games, you may find some clues. And this is what this article will try to do.

When combining these fields of research, the result is nine possibilities for how educational games can be shaped to motivate the specific user group of teenagers.

The first step in the disposition of this article is to present the promising features of educational games. The next step is to review what actually can be found in the research of educational games and teenagers, and give some examples of educational games for teens to let you have a frame of reference of the games that exists today.

Lastly, teenagers can be referred to with a variety of names – teens, adolescents, youth, young people or young adults. To keep it simple I'll refer to them as *teenagers*. The age span when I refer to teenagers is children aged 13- to 16-year-olds. When talking about educational games for teenagers I will keep it short by using the term *educational games for teens*.

Educational games

Let me first abstract what the research of educational games states as the features that makes educational games a promising alternative inside the classroom.

- As already been mentioned, games can be intrinsically motivating (Hromek & Roffey, 2009; Millians, 1999)

- Games can be engaging, as they have the ability of immersion (Pereira & Roque 2009)
- Games can create virtual world, and therefore also make it possible to develop situated understandings, shared values and ways of thinking of important communities of practice (Shaffer, Squire, Halverson, & Gee, 2005 p.7)
- Games allow experimentation with and comparison of several perspectives of one single concept (Gros, 2007; Pereira & Roque, 2009)
- Games support various types of representations, e.g. pictures, videos, interactive material and virtual worlds (Pereira & Roque, 2009)
- Games can provide contextualized learning (Pereira & Roque, 2009)
- Games can provide learning through co-operation, as games can be multiplayer (Gros, 2007)
- Games can practice problem solving skills (Gros, 2007)
- Games can take individual differences into consideration (Divéky, Jurnečka, Kajan, Omelina & Bieliková, 2007)

These features bring a considerable amount of expectations and hopes on what games can contribute to the area of learning.

Educational games for teens

The topic of teenagers playing educational games are less common than other topics in the research of teenagers and games; e.g. the topic of whether or not violent

entertainment games are unhealthy for the teenager (Anderson, 2004; Gentile et al., 2004), what habits teenagers have in playing massive online multiplayer games (Griffiths & Hussain, 2009) and what else teenagers are doing online (Eynon & Malmberg, 2010; Lenhart & Madden, 2005).

So to complement the reviewing of literature on educational games and teenagers, a review was done on the website *Länkskafferiet* held by the Swedish National Agency for Education (Länkskafferiet, 2011). This website has a collection of links to educational games and therefore gives an overview of what educational games there are for teenagers from a Swedish perspective. Most of the links are to games developed in Sweden, but there are also links to games from other parts of the world. All the games are online games. In total there are 4500 links with educational resources, and 231 of them are marked as "games".

The games are categorized into different target age groups, if not by the game developers then by *Länkskafferiet*. If a game has a target age group of 13-year-olds, it could either be marked as for the target age group of "over 13 years of age" or as "10- to 15-year-olds". When the game is marked as "over 7 years of age" or similar I assume that the game doesn't have an upper age limit.

Of the 231 games the largest age categories are "for 10- to 15-year-olds" and "from 13-year-olds" with 55 games in each category. The third largest category are "from 10-year-olds" with 44 games.

So teenagers seems to have plenty to choose from. When looking at a graph this view is confirmed.

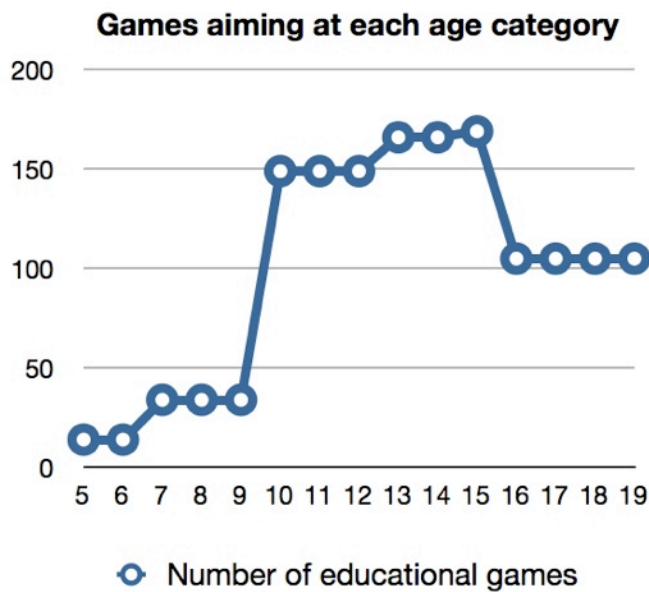


Figure 1. Educational games from Länkskafferiet aiming at each age category.

In fact, 15-year-olds have the most games to choose from. As shown, 16- to 19-year-olds also have lots of games to choose from, due to the absence of an upper age limit of many games.

But looking closer at the age categories shows that only 66 games (29%) are for sure aimed at people over 13 years of age. The majority of the games aimed at 13- to 15-year-olds are also aimed at 10- to 12-year-olds.

So to conclude, most of the educational games at *Länkskafferiet* are in the description aimed at teenagers, but many of the games probably aren't made specifically for them.

Examples of games

Historically, many educational games for teens were about sexuality issues. As early as in the 1980's articles was published arguing the benefits of teaching about sexuality issues through educational computer games (Paperny & Starn, 1989; Philliber & Gutterman, 1980). One example of an educational game teaching about sexuality issues is *Pomp and Circumstance* made in 1979 (Greenblat, 2001). The game modelled the

circumstances leading to premarital pregnancy and could be played by up to 30 players. The target group was teenagers 13- to 17-years-old. *Pomp and Circumstance* is in Japan proving useful still today (Kashibuchi & Sakamoto, 2001). A modern example of an educational game teaching about sexuality issues is *Adventures in Sex City* (Swanson, 2010). It was developed for teenagers by a health unit in London in collaboration with local teenagers.

But of course there're educational games for teens that are not about sexuality issues. Examples found at

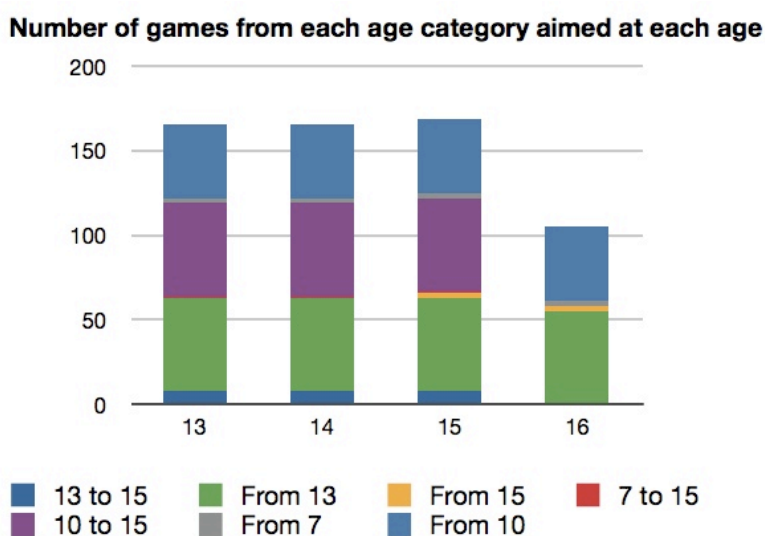


Figure 2. Educational games from Länkskafferiet aiming at the ages 13- to 16-year-old categorized in the appointed target age group .

Länkskafferiet in the age group category of “over 13 years of age” are:

- *His and Hers* - an online game that handles gender issues [<http://www.ur.se/hishers/>].
- *RixDax* - an online board game teaching about the Swedish Parliament [<http://rixdax.riksdagen.se/>].
- *Cookie Tycoon* - an online game where the aim is to make and sell cookies [<http://www.addictinggames.com/cookietycoon.html>].
- *Peace Corps* - an online game about what it's like doing relief work [<http://www.peacecorps.gov/kids/>].
- *Mot Alla Odds* (eng. Against All Odds) - an online game letting you experience how it's like to be a refugee [<http://www.motallaodds.org/>].

Some other examples of educational games for teens mentioned in different articles are:

- *PeaceMaker* - an educational strategy game to teach about the Israeli-Palestinian conflict. The game developers wanted to prove that computer games can deal with current and serious political issues and that playing for peace and non-violence can be as challenging as playing for the opposite goal (Burak, Keylor & Sweeney, 2005).
- *WhyVille* - an online virtual world popular in the US. The average player is 12.3 years old, which makes it more a game for tweens than a game for teens (Mayo, 2009).

There are also cases of games such as *SimCity*, an entertainment game, used as

an educational game for teens in schools (Tanes & Cemalcilar, 2010).

But are the games good or not?

The overview provided has shown that there are educational games for teens, but there is no telling how many of the 66 games from *Länkskafferiet* (Länkskafferiet, 2011) that are specifically designed to suit teenagers.

Only one of the examples brought up had an article written about it. This was the game *His and Hers*, where the game developers argued for the importance of designing educational games with the user group in mind. The game developers did this by involving teenagers as co-designers through the method of participatory design (Danielsson & Wiberg, 2006). So the teenager can use educational games for learning in school today, but we don't really now if the games are good or not.

The next question to ask is simply, how should educational games be designed to make the teenager think it's fun to learn? How can we through games make the teenager motivated to learn?

What makes a teenager intrinsically motivated to learn?

The question of how educational games should be designed to make teenagers intrinsically motivated to learn haven't been explored before in the literature on educational games and teenagers. The discussion will therefore be based on a combination of research on teenagers from

developmental psychology, sociology, pedagogy, cognitive science, serious games and games for entertainment. When combining these fields of research, the result is nine possibilities for how educational games can be shaped to motivate the specific user group of teenagers.

#1: Educational games could allow the teenager to geek out

Hanging out, messing around, and geeking out is an ethnographic study that found the three above genres of living to be widespread among American kids and teenagers (Ito et al., 2010). By *geeking out* the authors meant that the teenagers used new media to go deep into a subject and through self-directed learning become experts.

“Looking around online and fortuitous searching can be a self-directed activity that provides young people with a sense of agency, often exhibited in a discourse that they are “self-taught” as a result of engaging in these strategies. The autonomy to pursue topics of personal interest through random searching and messing around generally assists and encourages young people to take greater ownership of their learning processes.” (Ito et al., 2010 s.57)

To allow them geeking out, is to let them have space for their own self-oriented learning and exploration. Educational games could then be a space where they feel that they are in control and have a sense of agency. Educational games facilitate this feeling of autonomy, because of the lack of an authority in the role of a teacher within the educational game.

When directing their own learning process, they would also be more intrinsically motivated to learn within the space of the educational game.

A practical implication of this view could be to let the educational game have an infinite amount of depth in the information and material provided. Through for example linking to other websites on the internet. Another practical implication could be to not obligate the student to go through the entirety of the game, but to let the student have large amount of freedom to which parts or topics of interests in the game the student could pursue.

#2: Educational games could be a place for peer-to-peer learning

This geeking out can be done together with other people, of course. When looking into the world of gaming, you'll find an elaborate gaming community where hints and practices are shared and discussed. The players engage in experimentation on their own in a context of social support. Many key dimensions of game play in complex games are not spelled out by the designers, but players learn about them from other players either directly or through online resources such as fan sites, game guides and walk-throughs (Ito et al., 2010).

Already in the 1990's Donald Norman (1993) talked about gaming communities in terms of learning. He distinguishes between what he calls *experiential* and *reflective* cognition. Experiential cognition is the mode when we experience things,

e.g. when we are immersed in a game. Experiential cognition is in the gaming sense then a motivator for using reflective cognition; when the gamer learn the secrets and develop the best strategies.

Transferring the features of online gaming communities into the formal learning environment gives an effective learning situation when the student has an intrinsic motivation and engages in active self-directed learning.

A practical implication of this view could be to create a local-, nation- or globalwide community where the students can see other peoples' solutions to problems, post their own problems, get feedback and through helping others learn themselves.

#3: Educational games could be a safe-place for messing around

Teenagers likes messing around, Ito et al. (2010) conclude from their ethnographical study. Experimentation and play are central practices for young people messing around with new media.

James Paul Gee (2003) argues that games and other interactive technologies have the affordance for messing around. A requirement is that the game have low stakes attached to making mistakes. He suggests that games can have multiple scenarios to solve a problem, and provide a lot of trial and error to the player when solving the specific problem.

This suggests that educational games that engages teenagers the most are perhaps those that give the most freedom for messing around.

A practical implication of this for educational games could be to let the teenager create the content in the game him- or herself. Perhaps also sharing it with others or comparing creations with others.

#4: Educational games could be an arena to express one's identity

The primary developmental task of the teenage years is to form a sense of identity. The teenager transform from being a child to becoming an adult. During this phase the individual is self-centered and egocentric (Millians, 1999). Teenagers have more agency than children, self-consciously construct public and private selves and challenge conventions of adult life (Ito et al., 2010).

Millians (1999) suggests that educational games that explore one's future adult role could appeal to teenagers.

A practical implications could be to let the teenager express him- or herself inside of the game towards his- or her peers. Another implication could be to let the game be a platform for trying on different roles that the teenagers wouldn't have created themselves, e.g. different gender roles.

#5: Educational games could let the teenager relate the material in the game to his- or her own life

One design criteria for the educational game *His and Hers* was that it should have characters that the teenager could identify

his- or herself with. No stereotypical characters, such as “a geek” or “a popular girl”, but ordinary characters dressed in common clothes (Danielsson & Wiberg, 2006).

Another study showed that when the teenager constructed their own virtual world, they psychologically connected the virtual world to their physical life (Subrahmanyam & Greenfield, 2009).

A practical implication could be to try to change the situations in the game from being fictional to being based in real life, e.g. by having content in the educational game that let the teenager relate to his- or her own life or have the teenager create the content in the game him- or herself.

#6: Educational games could appeal to teenagers' wanna-be adult side

Another design criteria for the educational game *His and Hers* was that it should be serious and neutral in its design, with basic colors (Danielsson & Wiberg, 2006).

Early tests of the educational game *PeaceMaker* showed that the game highly engaged teenage students, but that it also was appealing to adults and non-gamers (Burak, Keylor & Sweeney, 2005).

Taken together with the teenagers choice of a “serious” design for the game *His and Hers* (Danielsson & Wiberg, 2006), implies that teenagers as an user group are similar to adults, at least regarding the user interface. This appeal to adult-like games could be because of the teenagers' identity construction; they want to be seen as an adult and not a child.

Their analytical abilities are also more like adults than children, and Millians (1999) argues that designers should create games that take advantage of that fact.

A practical implication could be to make educational games more serious and “adult-like”, e.g. in the game dealing with real life tasks or having content tackling non-teen issues. This hopefully could give the teenager a sense of authority which appeals to them, which would make them motivated in their learning.

#7: Educational games could be a place to get challenged and increase self-efficacy

Elly Konjin and Marije Nije Bijvank (2009) state that a feeling of control and mastery of challenges are key issues in teenagers' development of a stable identity. It has also been found that motivation is higher if the cognitive skill demands in a game are consistent with the teenagers' own cognitive strength and that game players prefer games that require cognitive skills consistent with their own (Subrahmanyam & Greenfield, 2009 s. 169).

Albert Bandura (1997) coined the term self-efficacy. One consequence of high self-efficacy is a belief that you're able to deal with given tasks or situations successfully, and will therefore have stronger motivation to engage in those situations and will invest more effort.

A practical implication of this is of course to provide enough challenge in the educational game. This can be done through adapting the challenge level to the individual. The teenager needs to be

challenged, but also to perceive mastery and success. When she perceives mastery and success in terms of her own decisions and skills, she will feel pride and an increase in self-efficacy. This is perhaps one of the biggest arguments for why educational games for children isn't suitable to teenagers. If not challenged enough the teenager will soon lose interest.

#8: Educational games could be a place where the teenager creates his or her own rules

In 1932 Piaget discussed how rules are understood from a developmental perspective (Subrahmanyam & Greenfield, 2009). When he studied children playing, he found that in the first stage of development (from 4-5 years old) rules aren't understood. In the second stage (from 5-6 years old) rules are sacred and unchangeable. For the last stage (from 10 years old) rules are established by mutual consent.

Assuming that teenagers still are at this last stage in their relationship to rules, then multiplayer games with changeable rules might be how games should be designed. But if we assume that teenagers revolt against rules given by authority as a way of taking risks and shaping their own identity, this would have other implications when designing educational games for teens. Warner (2010) states that risk-taking is the major tool that teenagers use to shape their identities and something that the teenager does all the time to stretch what's possible.

Practical implications of this could be how rules are shaped in the game to motivate the teenager the most. The game could involve less rules but more consequences of the teenagers' actions, or the game could have rules but they would be bendable. Or the game could be more unpredictable and the rules more difficult to grasp, e.g. constraining the control the teenager have over the characters in the game by letting the characters be unruly.

#9: Educational games could be a place where teenagers meet peers

What matters to teenagers are their peers. Teenagers want to look good in front of their peers and see their peers at school as their primary reference point for socializing and identity construction (Warner, 2010). Compared to children, teenagers develop more elaborate peer cultures (Ito et al., 2010).

Hromek and Roffey (2009) argue that games are an ideal vehicle for teenagers to practice social and emotional skills. The skills involve regulating negative emotions, taking turns and sharing and support orientations to others that are fair, just, and respectful.

Another practical implication could be that multiplayer games may be the more appealing choice for teenagers. The social arena where teenagers interact with peers could e.g. be supervised by a teacher so that examples from the encountered social situations could be brought up in post-discussions led by the teacher.

Another practical implication of the teenagers peer culture is to use it to teach

about different countries, cultures, lifestyles and geography, through letting the student play with other students from other parts of the world. This would both make the teenager able to risk less in their peer interaction as the students are unfamiliar and it would broaden the perspective of the student's own culture as he or she learns of other cultures.

Conclusion

What conclusions can you draw then? Well, that educational games can be a way of reaching out to unmotivated teenagers, but only if the games are designed with the age group in mind. There are age-specific motivations and by considering these, better educational games could be made. Educational games can be a way of exploring serious topics in a teenage life in a playful manner, as the educational games handling sexuality issues already has shown. To sum up, educational games have plenty of areas where there is gain to be made. Maybe this is even more true talking about teenagers, as their need for motivators may be the greatest.

Areas for further research

The research on educational games for teens have some areas to cover. What types of educational games engage a teenager? What educational games makes teenagers learn the most? What educational games do teens prefer if they get to choose? Which educational games do they play most frequently? How should they be graphically designed? How can they be

integrated in the teenage life? What makes educational games fun and not simply uncool? What can peer-to-peer learning look like in games? How do real life issues fit into educational games for teens?

Answering these questions open up for a larger discussion on how educational games can aid in making education more motivating and fun. Further discussions and research is needed and I hope that educational games will play their part in shaping the future educational system.

References

- Anderson, Craig A. (2004). An update on the effects of playing violent video games. *Journal of Adolescence* 27 (2004) 113–122
- Bandura, Albert (1997). *Self-efficacy the exercise of control*. Freeman.
- Burak, Asi; Eric Keylor & Tim Sweeney (2005). PeaceMaker: A Video Game to Teach Peace. *Intelligent Technologies for Interactive Entertainment*, p307-310.
- Danielsson Karin & Charlotte Wiberg (2006). Participatory design of learning media: Designing educational computer games with and for teenagers. *Interactive Technology & Smart Education* 3 (4) p275-292.
- Divéky, Marko; Peter Jurnečka, Rudolf Kajan, Ľuboš Omelina & Mária Bieliková (2007). Adaptive Educational Gameplay within Smart Multipurpose Interactive Learning Environment. *Second International Workshop on Semantic Media Adaptation and Personalization*.
- Gee, Paul (2003). *What Video Games Have to Teach Us about Learning and Literacy*. New York: Palgrave Macmillan.

- Gentile, Douglas A; Paul J Lynch, Jennifer Ruh Linder & David A Walsh (2004). The effects of violent video game habits on adolescent hostility, aggressive behaviors, and school performance. *Journal of adolescence*, 27 (1) p5-22.
- Greenblat, Cathy Stein (2001). The Design and Redesign of Gaming Simulations on Health Care Issues. *Simulation Gaming*, 32: 315.
- Griffiths, Mark D. Hussain, Zaheer (2009). The Attitudes, Feelings, and Experiences of Online Gamers: A Qualitative Analysis. *CyberPsychology & Behavior*, 12 (6) p747-753.
- Gros, Begoña (2007). Digital Games in Education: The Design of Digital Game Based Learning Environment. *Journal of Research on Technology in Education*, 40(1) p23–38
- Gärdenfors, Peter (2010). *Lusten att förstå: Om lärande på människans villkor*. Natur & Kultur.
- Hromek, Robyn & Sue Roffey (2009). Promoting Social and Emotional Learning With Games: "It's Fun and We Learn Things". *Simulation Gaming*, 40: 626.
- Eynon & Malmberg (2010). A typology of young people's Internet use: Implications for education. *Computers & Education*.
- Ito et al., 2010. *Hanging Out, Messing Around, and Geeking Out: Kids Living and Learning with New Media*. MIT Press, Cambridge; US.
- Kashibuchi, Megumi & Akira Sakamoto (2001). The Educational Effectiveness of a Simulation/Game in Sex Education. *Simulation & Gaming*, 32:331.
- Lenhart, Amanda & Mary Madden (2005). *Teen Content Creators and Consumers*. Report from Pew Internet & American Life Project.
- Länkskafferiet (2011). Retrieved January 19, 2011, from [<http://länkskafferiet.skolverket.se/v2/cgi-bin/search.cgi?mode=keywords&pattern=spel>]
- Lindell, Martin (2010). *Dags att Spela Dataspel*. Report from Dataspelsbranchen; Swedish Games Industry.
- Mayo, Merrilea J. (2009). Video games: a route to large-scale STEM education? *Science* (New York, N.Y.) 323 (5910) p. 79-82
- Millians, David (1999). Simulations and Young People: Developmental Issues and Game Development. *Simulation & Gaming*, 30 (2) p199-226.
- Norman, Donald (1993). *Things that make us smart: Defending human attributes in the age of the machine*. Basic Books; New York.
- Paperny, David M. & Jane R. Starn (1989). Adolescent Pregnancy Prevention by Health Education Computer Games: Computer-Assisted Instruction of Knowledge and Attitudes. *Pediatrics* 83(5) p. 742-752.
- Pereira, Luís Lucas & Roque, Licínio Gomes (2009). Design Guidelines for Learning Games: the Living Forest Game Design Case. *Breaking New Ground: Innovation in Games, Play, Practice and Theory: Proceedings of DiGRA 2009*.
- Philliber, S. G. & Gutterman, E. M. (1980). Playing games about teenage pregnancy. *Evaluation and Program Planning*, 3, 237-243.
- Swanson, Lynne (2010). Willy the Kid and Wonder Vag teach teens online about sexual health. *Canadian Medical*

Association journal. Vol 182 Issue 8, p323-4.

Subrahmanyam & Greenfield (2009). Ritterfield, Ute; Micheal Cody & Peter Vorderer (Eds.). *Serious Games: Mechanisms and Effects*. Routledge; London.

Shaffer, D. W., Squire, K. D., Halverson, R. & Gee, J. P. (2005). *Video games and the future of learning*. Phi Delta Kappan, 87(2), 104–111.

Tanes, Zeynep & Zeynep Cemalcilar (2010). Learning from SimCity: An empirical study of Turkish adolescents. *Journal of Adolescence* 33 (2010) 731–739

Warner, Laura (2010). A Place for Healthy Risk-Taking. *Educational Leadership*, ASCD.