

# The Game Genre Factor in Computer Games Based Learning

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## KEYWORDS

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## ABSTRACT

As the usage of commercial, off-the-shelf computer games as teaching tools are being discussed and empirically studied, the varying properties of different game genres is an important factor that should be taken into account. The possible impact on study results that may be inherent from game genres as such is an issue that needs to be studied in order to assess the potential of using commercial games in a learning situation.

To obtain more information on the impact of game genre on a learning environment, an interview study was conducted. Students undertaking their 10:th and 11:th year of study as part of a test project using commercial off-the-shelf computer games of their own choosing as the main teaching tool, were interviewed about their favourite game genres. This was correlated with their study results in the subject of English (as a second language), for students favouring FPS (First Person Shooter) games versus MMORPG:s (Massively Multiplayer On-line Role-Playing Games).

Results show that students with MMORPG:s as their favourite game genre (with or without other genres in conjunction) received a higher average number of yearly grades in English (as a second language) than students with FPS games as their favourite game genre.

## BACKGROUND

As computer games occur in many different shapes and genres, they possess vastly different properties with respect to learning. These differences are manifested as different visual styles, as well as different game tempos and regarding the type and intensity of the player interaction. Independently from this, also the typical feedback mechanisms differs among various game genres. This includes what types of player actions are rewarded with beneficial objects and/or valuable skills, leading to advancement in the game. In effect, these feedback mechanisms are controlling what the player has to strive for in order to succeed in the game. Such differences among game genres results in different genres having different potential as tools for learning.

Among the first observed learning effects regarding computer games are those related to reflexes and hand-eye co-ordination. As remarked by Griffiths, these findings are also accompanied by those pointing out particular aspects of games as having important bearing on using them as

educational resources: *“Research dating back to the early 1980s has consistently shown that playing computer games (irrespective of genre) produces reductions in reaction times, improved hand-eye co-ordination and raises players self esteem. What’s more, curiosity, fun and the nature of the challenge also appear to add to a games educational potential”* (Griffiths 2002).

The idea to use games as learning tools emerged long before the existence of computer games, however, with *“The modern era of simulation gaming”* (Wolfe and Crookall 1998) including large simulation games such as the RAND corporations logistics simulator for the US Air Force, and the first business simulation being used in college education as early as 1957 (Dickinson and Faria 1997). These and other developments made Duke suggest in 1974 that games may become an entirely new form of communication in education, as noted by Woods: *“He suggested that simulation games might offer a possible answer to the problems of education in an increasingly complex society”* (Woods 2004), in reference to: *“...gaming is a future’s language, a new form of communication emerging suddenly and with great impact across many lands and in many problem situations”* (Duke, quoted from Woods 2004).

Further research in the area of specific advantages of computer games as educational tools has pointed out several aspects where games fit very well into key patterns of successful learning. As Gee points out, these aspects need not be related to those features that are perhaps most often noted regarding computer games, such as the graphics: *“The secret of a videogame as a teaching machine isn’t its immersive 3-D graphics, but its underlying architecture. Each level dances around the outer limits of the players abilities, seeking at every point to be hard enough to be just doable”* (Gee 2003a). This positive aspect of something being hard, and the danger of making things too easy, is also discussed by Papert: *“What is best about the best games is that they draw kids into some very hard learning ... The fact is that kids prefer things that are hard, as long as they are also interesting”* (Papert 1998).

This touches on the Practice Principle, outlined by Gee as one of several principles involved in successful learning situations: *“Learners gets lots and lots of practice in a context where the practice is not boring (i.e. in a virtual world that is compelling to learners on their own terms and where the learners experience ongoing success)”* (Gee 2003b). Among other notable such principles are the Achievement Principle: *“For learners of all levels of skill there are intrinsic rewards from the beginning, customized to each learners level, effort, and growing mastery and signalling the learners ongoing achievements”*, the Ongoing Learning Principle (abbreviated):

*“The distinction between learner and master is vague, since learners ... must, at higher and higher levels, undo their routinized mastery to adapt to new or changed conditions ...”, and the Probing Principle: “Learning is a cycle of probing the world (doing something); reflecting in and on this action and, on the basis, forming a hypothesis; reprobating the world to test this hypothesis; and then accepting or rethinking the hypothesis” (Gee 2003b).*

In the light of these principles, it becomes clear that computer games fit in very well as an educational tool, especially if one also takes into account that many games span across subject boundaries, being able to offer learning in several areas at once. As pointed out in a study by Kirriemuir and McFarlane regarding the roller coaster simulator game RollerCoaster Tycoon: *“The game could be used across a number of subject domains, such as physics (motion and velocity), and business and economics (running a theme park)” (Kirriemuir and McFarlane 2003).*

The usage of unmodified, commercial, off-the-shelf games is not the only possibility, though. The development of a combination of educational software and computer games, often referred to as “edutainment” has been the result of efforts trying to explore the game format and fill it with more traditional, school curriculum oriented material. However, the usefulness of such edutainment software has been questioned in many cases, as observed by Kirriemuir: *“However, when game-oriented entertainment and learning or educational material are combined, the result has often been disappointing; the educational value is debatable or irrelevant, and the gaming and engagement qualities compare poorly to those of pure games” (Kirriemuir 2002).*

A similar standpoint is taken by Papert, viewing this edutainment “offspring” from games and education software as one possessing none of the best features from either “parent”: *“Shavian reversals – offspring that keep the bad features of each parent and lose the good ones – are visible in most software products that claim to come from a mating of education and entertainment” (Papert 1998).* More specifically, Kirriemuir and McFarlane points out several reasons for these shortcomings: *“Most edutainment has failed to realise expectations, either because: • the games have been too simplistic in comparison to competing video games ... • the tasks are poorly designed and do not support progressive understanding ... • the target audience becomes aware that it is being coerced into ‘learning’, in possibly a patronising manner” (Kirriemuir and McFarlane 2004).* These known issues regarding edutainment makes it interesting to investigate if unmodified, commercial off-the-shelf games may be more useful as educational tools.

Another issue central to using computer games as educational tools, is the role of the teacher. Here, Kirriemuir notes various misassumptions about teaching using computer games in the classroom, such as: *“The teacher will be marginalised, and become partially or fully redundant, by the game. The role of the teacher is reduced to an assistant who turns the computers on and off” and “The pupils work individually, boothed, one to a game, in monastic silence. Learning is an isolated and unsocial experience...” (Kirriemuir 2005).* As Kirriemuir points out, these are misassumptions, and if realised such learning environments would be very unfortunate indeed. Instead, if treated by the teacher as a beneficial resource, computer games may take the role of tools that may enhance his/her teaching, the key point being that the games are tools

in the hands of the teacher. Being able to use activities occurring within computer games as starting points for educational activities extending out from the games, is one example of how the teacher in a highly creative and active way may create fruitful learning situations. A key point from a study conducted by the British Educational Communications and Technology Agency, BECTA, is that a strong teacher focus is essential: *“The role of the teacher in structuring and framing the activity of the learner remains crucial if learning outcomes are to be achieved.” (BECTA 2001).*

### **Game Genre classification and learning potential**

In the absence of a formally defined genre classification scheme, a spontaneously developed de-facto model is commonly used to classify computer games. A number of generally accepted type genres are thus often used to describe a games genre, including the common case that a game may be considered to be a combination of several of the type genres.

Examples of commonly referred to type genres on a high level of abstraction are *action games, strategy games, and role-playing games.* Examples on a more detailed level of abstraction are *FPS (First Person Shooter) games, construction games, and MMORPG (Massively Multiplayer On-line Role-Playing Games).* The boundaries between various genres are not always clearly defined, but although the genre boundaries are sometimes fuzzy, these type genres are commonly accepted and serve reasonably well as a reference model for the classification of computer games, at least if mixtures of genres are also taken into consideration.

When considered as potential tools for game based learning, the various game genres of commercial computer games offer different possibilities, in some cases present as a natural consequence of the game concept as such. With game genres that possess a high natural potential as a learning tool, a noticeable learning effect may occur also in those commercially sold games that are not developed for the purpose of being a learning tool. An example of this is several construction/strategy games, from which the player can gain insights in areas such as city planning, elevator algorithms, and the operation of amusement parks, by training on these tasks as they are being simulated in the games.

Another genre with interesting properties from a teaching/learning perspective is MMORPG:s, Massively Multiplayer On-line Role-Playing Games. These games, also referred to as *online games,* are commonly capable of handling many thousands of simultaneous players interacting with each other and the game environment in very large game worlds with complex in-game economies and social structures. Gameplay is constantly ongoing, around the clock, carried out by the players currently connected to the game servers, *persistent worlds.* The possibility to chat online with other players during gameplay is being used frequently.

Online games adds an interesting dimension, increasing the potential for online games as learning tools. As a result of the games online nature, player behaviour and progress can be monitored by game controllers with access to the game servers. If needed, game controllers could also adjust the players situation, either by centrally manipulate settings in the game servers, or by taking physical form in the game world and communicate with the players directly, for instance in a mentor-like manner. Alternatively, others than the those

controlling the game servers might use the game in this way, for instance a teacher appearing in the game through his or her own game account, having in-game meetings with students in a mentor-like fashion.

### The studied test project

In Botkyrka, Sweden, a test project using computer games as the primary teaching tool for a class of students in upper secondary education was initiated in the fall of 2003. The project first included students in their 10:th year of education, and now in the second year of the project includes students in their 10:th and 11:th year of education in a mixed fashion. This represents the first and second year of the non-compulsory education in the Swedish school system, normally corresponding to students reaching the age of 16 and 17 if continuing directly from the compulsory school system.

The pedagogical issue of using unmodified off-the-shelf commercial computer games as the main teaching tool was of great interest. The students were free, up to the limitations of the project budget, to suggest game titles to be used. Although the teachers has the right to refuse any suggested game they feel would be too extreme, this veto right had never been used up to the time of the study. The resulting mix of game titles thus reflects the preferences of the students themselves:

Game titles used	Number of regular players
World of warcraft	20
Counter strike	18
Battlefield 1942	15
Age of empires	11
Age of mythology	11
Star wars galaxies	11
Warcraft III	10
Diablo	9
Rise of nations	9
Morrowind	7
Tibia	7
Sims	5
Neverwinter nights	5
Sim City 4	3
Matrix	3

*Game titles used in the project, ordered by the number of students having played them regularly during their participation in the project.*

With kind permission from all involved parties, we were allowed to perform an independent study interviewing both students and teachers. Previous results from studies on this test project can be found in (Wiklund and Glimbert 2005) and (Wiklund 2005).

### RESEARCH QUESTION

As the learning potential of computer games is debated, more information in this area is needed. The usage of unmodified, commercial off-the-shelf games as teaching tools in schools is of special interest, as their edutainment counterparts have been observed to possess deficiencies while pure games are observed to be highly engaging. Since commercial games show highly varying properties though, and thus may be more or less suitable as teaching tools, the game genres factor is a key issue in a learning situation using commercial computer games.

The research issue addressed in this paper is to find out if students using unmodified, commercial off-the-shelf computer games of their own choosing in class, show any notable differences in study results related to their favourite game genres. For the purpose of this paper, the subject of English (as a second language) has been used as an indicator of achieved results.

### METHODOLOGY

The empirical contribution of this paper is an evaluation study of an ongoing test project in Botkyrka, Sweden, using commercial, unmodified computer games as the main teaching tool in upper secondary education. The project in question includes students in both their 10:th and 11:th year of education, in a mixed fashion. The interviews were conducted towards the end of the second year of the four year test project, at a time when it was clear to the teachers which grades they would give the students at the upcoming end of that semester.

All 21 students in the project participated in the study through in-depth interviews, as well as the two teachers. The moderate number of students participating in the project is a limitation to the possibility to generalise results to the entire population, thus only conclusions regarding the participants in the project in question are drawn. Also, as all the participating students were male, gender issues are not addressed in this paper. However, as all the students in the project were interviewed, rather than just those choosing actively to participate, the risk of results being biased as a result of personality differences in this area was minimised.

The interviews were conducted individually in a separate room, away from the class room, with no possibilities of anyone else overhearing the conversations. The students retained full anonymity, only being identified by a sequential number untraceable to the specific individual. Each student was informed of this anonymity, and that his or her answers would not be disclosed to anyone else. By taking these measures, the risk of students not daring to answer the questions honestly was reduced as much as possible.

During the interviews, the interviewer followed a fixed form with questions to ensure equal coverage of topics with all students. Only follow-up questions may differ somewhat among the students, depending on the answers given. The information was entered into a database for processing. Key quotes were translated to English for the purpose of appearing in this paper.

### RESULTS

A total of 21 students participated in the test project, all of which were interviewed for this paper. Regarding gaming background, all the students reported having played games frequently prior to entering the studied project, with 13 of them (61.9%) belonging to clans or guilds.

#### Favourite game genres

The two most common game genres stated by the students as their favourite genres were First Person Shooters (FPS) and Massively Multiplayer On-line Role-Playing Games (MMORPG:s). When entering the test program, 11 students (52.38%) stated FPS games being their sole favourite genre, and 1 additional student (4.76%) stated FPS games to be the

favourite genre in conjunction with (offline) Role-Playing Games (RPG:s), making FPS games a favourite genre of 12 students in total (57.14%) when entering the test program. At the end of the period studied, these figures had decreased to 7 students in total (33.33%), out of which 5 students (23.81%) regarded FPS games as their sole favourite genre and 2 students (9.52%) also mentioned other genres in conjunction (RPG:s and adventure games, respectively).

MMORPG:s were the sole favourite game genre for 3 students (14.29%) when entering the test program, and a favourite in conjunction with other genres (strategy and offline RPG:s) for 2 additional students (9.52%), making MMORPG:s a favourite game genre for a total of 5 students (23.81%) at the time of entering the studied program. At the time of study 8 students (38.09%) regarded MMORPG:s as their sole favourite game genre, with an additional 3 students (14.29%) having other game genres (strategy games, offline RPG:s and adventure games) as their favourite genres in conjunction with MMORPG:s), taking the total number of students having MMORPG:s as a favourite game genre to 11 (52.38%).

### Grades

A large number of grades had been given in several subjects specific to the program in question, for instance digital culture, game development, and web design, as well as general subjects such as history and social science. Focusing specifically on the subject of English (as a second language), 10 students (47.62%) had at the time of the study received grades in what is known in the Swedish school system as "English B", corresponding to the 11:th school year level, the second year in the test program). An additional 7 students (33.33%) had received grades in "English A" (10:th year level, the first year in the test program) only. A group of 4 students (19.05%) had not yet received any grade in English as a second language while in the test program.

### Game genres and received grades

Correlating the favourite game genres stated by the students with the grades in the subject of English as a second language received by individual students, the results are as shown in the following table:

Game genre	Students	No English grade	English A only	English A+B
FPS only at start of project	11	4 (36.36%)	4 (36.36%)	3 (27.27%)
FPS + other at start of project	1	0	0	1 (100%)
MMORPG only at start of project	3	0	1 (33.33%)	2 (66.66%)
MMORPG + other at start of project	2	0	1 (50%)	1 (50%)
FPS only at end of period	5	2 (40%)	3 (60%)	0
FPS + other at end of period	2	0	0	2 (100%)
MMORPG only at end of period	8	1 (12.5%)	1 (12.5%)	6 (75%)
MMORPG + other at end of period	3	1 (33.33%)	1 (33.33%)	1 (33.33%)

*Number of students with MMORPG versus FPS games preferences at the start of the test project and at the time of the study, having received 0, 1, or 2 grades in English studies while participating in the project.*

The average number of completed years of English studies, as a function of the favourite game genres MMORPG and FPS games (with or without other genres in conjunction), is shown in the following table:

Favourite game genre stated	Students	Average number of completed years of English studies
FPS, at start of project	12	1.00
MMORPG, at start of project	5	1.60
FPS, at end of period	7	1.00
MMORPG, at end of period	11	1.45

*Average number of completed years of studies in English (as a second language), measured as the number of yearly grades received, for students with MMORPG and FPS games as favourite game genres when entering the test project and at the time of the study, respectively.*

### Teaching methods employed

Interviews with the teachers revealed that their main approach to teaching using unmodified computer games involved using in-game activities as starting points for discussions and assignments of various kinds. This method was applied constantly. Both teachers reported that the students seemed highly motivated and interested in discussing issues in various fields, if the event spawning the discussion/assignment had occurred in one of the computer games.

The in-games activities are thereby leading to a learning process starting in-game and then expanding outside of the game. This is exemplified by one of the teachers: *"When I observed the students gathering [in the online role-playing game World of Warcraft] to decide which one of two dungeons to enter, I was thrilled to see that they performed an ordered voting procedure, standing up or sitting down to indicate if they were in favour or opposed to the suggested alternatives. This led me to have several very fruitful discussions with them, going into all sorts of voting taking place in the society, from shareholders of companies to politicians in the Riksdag [the Swedish Parliament]"* (Wiklund and Glimbert 2005). Both the interviewed teachers state that in their opinion such in-game starting points is a key factor when using unmodified, off-the-shelf computer games in a learning environment.

### DISCUSSION AND CONCLUSIONS

The method of interviewing the entire class in question, as opposed to ask for volunteers, has the advantage of not just reaching a subset of individuals who might differ from the rest in various ways. In studies performed on volunteers that have actively chosen to participate, great care must be taken when interpreting the results. In such cases it is vital taking into account that the participants are more interested in the subject at hand, or at least more active and willing to take part in a study, than other people in general, even in the same age group, etc. This potential problem has been reduced as much as possible by interviewing not just enthusiastic volunteers, but everyone in the class.

Given the large amount of communication both between players and between players and NPC:s (Non Player Characters) in many modern games, the English language is used extensively also by players from non-English speaking countries. Since geographical distances become unimportant when using the computer mediated communication techniques

inherent in online games, a natural consequence is that players frequently encounter other players from various countries, making chatting in English extremely common. Local servers using local languages (other than English) are perfectly possible, but are in practice used less than the ones with English as the main chatting language. Given the extensive verbal (textual or in some cases by voice) communication between players, it is easy to see how students with other native languages quickly can improve their English speaking capabilities through such computer games.

Regarding communication between player and game environment, game genre and atmosphere can greatly influence the type of English texts encountered, such as quest texts in for example the MMORPG World of Warcraft being of a fairly verbose nature. Another example is games set in historic time, as one student playing the Age of Empires strategy game remarked: "When you ask the teacher what some tricky medieval English word means, he tells you the Swedish word for that. Then you don't know what that means, either. Then he explains it, and you know a new word both in English and Swedish" (Wiklund and Glimbert 2005).

During the interviews, 3 students also made spontaneous comments directly related to different game genres and their varying suitability for learning. While all 3 comments pointed out that game genre has an impact on a games potential as a learning tool, 2 did so more strongly: "You can learn things from some games, like English and about history and stuff. From WoW [online game World of Warcraft] and games like that, I mean. And medieval strategy games. But not from the shooters, you don't learn anything there" and "They shouldn't allow CS [FPS game Counter Strike] and games like that in school, only online games. Because there you have to think more.". The third comment was slightly more vague, while still attributing some importance to game genre in order to achieve learning: "I don't think it matters what kind of game it is, I've learnt things from all games! Well, no, perhaps not from all games, not from really stupid games, those that's just reflexes. But from all others". Although vaguely defined, it seems clear that at least one game genre, possibly FPS games, is unsuitable as a learning tool in this students opinion.

Using the number of yearly grades awarded as a measurement of the number of completed years of studies in English as a second language, the average among the students having FPS games (First Person Shooters) as their favourite game genre (sole or in conjunction with other genres) at the start of the test project is 1.00 completed years of English studies. Comparing this with students having MMORPG:s (Massively Multiplayer On-line Role-Playing Games) as their favourite game genre (sole or in conjunction with other genres) at the start of the test project, this figure increases to an average of 1.6 completed years of english studies. The corresponding figures at the time of the study is that the average number of completed years of English studies remains at 1.00 for students having FPS games as their favourite genre, while students with MMORPG:s as their favourite game genre had completed 1.45 years of English studies on average.

Although there is a change over time regarding the students in favour of MMORPG:s (a decrease from 1.6 to 1.45 completed years of English studies on average), in both cases this can be compared to the lower average of 1.0 completed years of English studies for those in favour of FPS games.

It is worth noting that the visible difference, although interesting enough in itself, may have at least two different explanations, neither of which has yet been proven or falsified. On one hand, its possible that the observed differences described in this paper may be the result of students more motivated to study harder also having a tendency to favour MMORPG:s (massively Multiplayer On-line Role-Playing Games) to a higher degree than students favouring FPS (first person Shooter) games. On the other hand, its also possible that the described differences regarding study results can be contributed to the fact that those students playing MMORPG:s to a higher extent are receiving more training in, and exposure to, the English language, and as a consequence are both more experienced in, and possibly also motivated to study, the subject of English (as a foreign language). Both possibilities may have interesting implications either regarding games preferences as indicators or measurement tools, or regarding games as teaching tools.

## FUTURE RESEARCH

The study described in this paper indicates a varying learning potential being present in using unmodified, commercial off-the-shelf games in class. As the students results, measured as the number completed years of English studies, varies with the students favourite game genres, the learning potential inherent in different game genres is an interesting topic worth more study.

To better understand whether the observed differences in study results are the result of students more exposed to certain game genres receiving specific training through the games as learning tools, or if students more inclined towards studying more often than others also choose certain game genres as their favourites, more research in this area would be valuable.

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