

Learning from epistemic games

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Note: epistemic = Of, relating to, or involving knowledge; cognitive

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Abstract

In the Nordic countries collaborative project work has been an important part of children's education for many decades. The national curriculum also encourages teachers to engage students in project work where students examine some loosely defined problem from multiple disciplinary angles. Epistemic games represent interesting ways of orchestrating learning environments where students working in groups solve complex and ill defined problems through engaging in actual activities such as for instance building a house or designing a city. It might be a way of designing learning environments that students find motivating, foster the development of more transferable skills and competencies and facilitates the development of students' deeper understanding of important disciplinary domains. There is a need to research how games are introduced into institutional settings including how they can be integrated with or used to change schools assessment practices and teachers orchestration and scaffolding of students learning. This is the main aim of the project we are reporting from. Up until now epistemic games have mainly been implemented outside of formal schooling.

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LEARNING FROM EPISTEMIC GAMES

1. INTRODUCTION

In the National curriculum in Norway digital competence/literacy represents one of five basic skills. This makes computer games highly relevant as a possible means to develop innovative teaching and learning practices. But, what makes games good for learning at school? And what does it take to introduce games in a school context for learning purposes? Bearing this in mind, this paper aims to discuss one possible approach to the issue.

The paper is based on previous experiences with games in some Norwegian schools. Moreover, the paper describes an upcoming case, which aim is to study one particular genre of games for learning, namely epistemic games (Shaffer, 2006), and to see how this game works out as being introduced to a Norwegian upper secondary school context. Several subject syllabuses are to be included as learning contexts, and these are serving as contexts for the game. Central research goals are:

- To study how epistemic games foster students learning
- To study how the use of epistemic games interact with institutional practices
- To study how students engage with games differently depending on their previous experience with using computer games for entertainment

2. BACKGROUND

Beginning in fall 2006, the Norwegian Ministry of Education and Research introduced a new National curriculum. One central objective was to foster the development of a digital literacy among pupils and teachers. Moreover, the reformed curriculum included a shift from prescribing in great detail the content student were supposed to learning, to describe precise goals of the students' competencies.

2.1 The Knowledge promotion (1)

(1) Chapter 2.1 is a revised version of the official presentation of the Knowledge Promotion as stated by the Norwegian Ministry of Education and Research.

The Knowledge Promotion is the latest reform in the 10-year compulsory school and in upper secondary education and training in Norway. It introduces certain changes in substance, structure and organization from the first grade in the 10-year compulsory school to the last grade in upper secondary education and training. The reform took effect in autumn 2006 for pupils in grades 1-9 in 10-year compulsory school and for pupils in their first year of upper secondary education and training (i.e. the 11th grade). The Knowledge Promotion, with its special emphasis on competences, is meant to help ensure that all pupils receive a differentiated education.

The following are the most important changes in the Norwegian school system that stem from the Knowledge Promotion:

- Basic skills are to be strengthened
- Reading and writing are emphasized from the first grade
- New subject syllabuses in all subjects, clearly indicating what pupils and apprentices are expected to learn
- New distributions of teaching hours per subject
- New structure of available choices within education programmes
- Freedom at the local level with respect to work methods, teaching materials and the organization of classroom instruction

Under the Knowledge Promotion, schools are to prioritize the cultivation of basic skills in all subjects. This is an important foundation for all other learning. These basic skills are as follows:

- the ability to express oneself orally
- the ability to read
- the ability to do arithmetic
- the ability to express oneself in writing
- the ability to make use of information and communication technology

These basic skills have been incorporated into the subject syllabuses for all subjects. All teachers are therefore responsible for enabling pupils and apprentices/trainee teachers to develop basic skills through their work in various subjects. New subject syllabuses have been worked out for all subjects. The new subject syllabuses contain clear goals for what pupils should know in each grade. In assigning such skills targets, the subject syllabuses are expressing high academic ambitions for all pupils, who in varying degrees should be able to reach the targets that have been set. Each pupil shall be stimulated to the best realization of his or her goals through differentiated education. Digital competence is crucial in this, both as one of the key competences within the curriculum, as well as to be included within all subject syllabuses. Following this, computer games appear as an interesting approach to new pedagogical practices which are to involve digital learning recourses and to develop digital competence.

3. THEORIES AND METHODS

3.1 Games for learning: edutainment, serious games and epistemic games

Computer games bring different associations to peoples' minds; the notion itself is wide and includes both a variety of devices, like handheld games and PC games, and various activities, from online interaction with other players, like World of Warcraft, single person playing, like Tetris to social games, like SingStar. Moreover, there are commercial games and games developed for educational purposes. Games from both of these categories have been tested in schools (Kirriemuir & McFarlane, 2003). However, as for the educational use of gaming, there is yet no clear effect established in academic learning (Egenfeldt-Nielsen, 2006). Still, there is evidence that games contribute to improve general skills, like collaboration skills, perceptual and motor learning, ICT skills and higher order thinking skills; like problem solving and strategic thinking (Kirriemuir & McFarlane, 2003).

Research on games has raised at least two issues: Firstly, how do computer games serve as effective learning environments, which constitute interesting learning design models? The second issue questions how games as such might be included in learning; how games can be used to situate learning in regard to more realistic and authentic problem solving. All games described in this paper highlight these issues; they are actual games, and they are developed in line with existing research on game playing and learning strategies.

Games developed for educational purposes have been framed by several notions; from edutainment, serious games to epistemic games. As for edutainment, this notion derives from a combination of education and entertainment. Lately, serious games and epistemic games have emerged and it seems like they are more likely to have replaced edutainment for educational purposes. One possible explanation might be that these games appear to be more innovative pedagogically. Moreover, there is no single definition of serious games, but games in this category are most likely to include games for training or education. As for epistemic games, David Schaffer describes these games as follows:

In epistemic games, players learn to think about real problems by doing in game form what professionals in the real world do to learn innovative and creative thinking - the kind of thinking that young people need in the digital age of global competition (Shaffer, 2007: 68)

Furthermore, according to Shaffer, epistemic games provide ways of helping students learn to think like professionals. This concept is based on the idea of "epistemic frames"-the way of thinking and working of a profession or other community of practice-and entails a situated and action-based form of learning based on the ways in which professionals develop these epistemic frames. Epistemic games are also about a particular way of working and engaging with knowledge. Therefore, it is just as important to carefully consider how we design the activities happening around the actual game play.

3.2 Games and learning theories

Egenfeldt-Nielsen (Egenfeldt-Nielsen, 2006) claims that the educational use of games has to include a learning experience which has a specific goal, and a strategy to fulfill that goal. Moreover, educational computer games can be categorized by different learning theories, and those are behaviorism, cognitivism, constructionism as well as a socio-cultural approach. Different educational games have different key functions

and these can relate to various strategies for motivating and learning. Many "drill and practice" games are for example based on behavioristic learning principles, while games that are based on the student building things often respond to constructionistic learning principles. When discussing the socio-cultural approach, Engenfeldt-Nielsen emphasizes that the way the game is situated in context appears to be more crucial than features in the game itself: The lack of specific titles comes from the fact that the socio-cultural approach has less to do with the actual video game and more with the explorations, reflections, and discussions that are activated around video games among students and teachers. It is therefore natural that the socio-cultural is more about the perspective on the educational use of a specific title rather than the actual development of a given title (Egenfeldt-Nielsen, 2006: 64).

Bearing this in mind, teacher's facilitation of the learning activities becomes crucial to create productive learning environments. Consequently, teaching aims to strengthen the students' abilities to make their knowledge and skills relevant to the context they are facing - while their abilities to solve realistic problems are being emphasized.

Many theories about games and learning stress the games' capacity to motivate and engage students. However, such an approach might face some challenges, if it results in that teachers believe games simply can be given to students and that the built-in-features in the game itself are good enough as motivating learning resources. This is for example highlighted by Stevens, Satwicz and McCarthy in their ethnographic study on game playing, where they argue:

(...) we do not appeal to the games-are-highly-motivating explanation, but we do see a reason that young people play games and get them tangled up with the rest of their lives, and this reason is cultural. (Stevens, Satwicz and McCarthy, 2008: 63).

Consequently, it becomes a main objective for the teachers to create a context that makes the game playing relevant to both school and real life challenges, and create epistemic frames where the gaming experiences become relevant and important for the students' learning goals.

3.3 Games, situated learning and digital competence

Arnseth (2006) discuss a possible dichotomy between those that consider games as something one "reads" versus something one "does". The first perspective identifies learning with games as a relation between the learner and the computer game, whereas the latter considers the activity of game playing - in where the objectives are to explore the social practices that surround the game playing. Linderoth (2004) argues that it does not make much sense to make universal claims about meaning-making in games, because the player's experiences are fundamentally tied to the specific context of use. The project that is to be further described in this paper aims to focus on playing games as a social practice and an activity that concern both the game and the context of playing. This holistic focus on the activity of playing and on the context of learning, are to explore designs for learning - inside and outside the actual game - as well as reviewing the game in particular. This socio-cultural view on learning with games correlates with epistemic games, and their promising scaffolding features for orchestrating learning activities with games.

A broad perspective on the activity of playing is important in order to explore how computer games actually affect learning in schooling. Another objective is to investigate how the concept of "epistemic frames" provides framing for transfer of learning between different contexts - also within the project work as it evolves.

Establishing a joint epistemic frame is much about creating a culture for learning within the class; a community of practice where the students share a common goal and ways of communicating and sharing knowledge (in accordance with Lave & Wenger 1991).

Gee (2003) argues that computer games can create a motivating environment for situated learning. Our objective for initiating projects with computer games in schools is to explore games' potential for solving problems in surroundings where the value of learning something is obvious - not disconnected from context like much of learning in schools can be accused of. But Gees' work is also criticized for not sufficiently dealing with the usability of game literacies in real life, and the transfer of game skills to real life issues (ex. Buckingham 2007).

One of the research questions includes to find out more about students' ability to use skills and knowledge acquired in the game in other contexts. So far, research on what causes transfer and training student's ability to recontextualize knowledge is still in an early phase, as claimed by Stevens, Satwicz and McCarthy:

Not only do learning scientists disagree about what causes transfer or what prevents it from happening, they disagree even on what counts as transfer (i.e., knowing when they see it) and how to assess it when they think it might be taking place (Stevens, Satwicz and McCarthy, 2008: 41).

Moreover, these researchers underline the necessity of defining the phenomenon itself, and to recognize when it happens. Consequently, the need for empirical research of computer games in schools, as well as defining what counts as learning outcomes are crucial.

3.4 Previous experience: Global Conflict: Palestine

There has been some attempts to study computer games at schools (Kirriemuir, 2004, Egenfeldt-Nielsen, 2006), and there are projects run in these days. One of those is to be described in more detail as follows. The crucial significance of contextualizing and creating joint goals for learning, as argued above, became clear in a previous project at one Upper Secondary School in Oslo. In that case, we explored how the computer game Global Conflicts: Palestine served as a learning resource for understanding the complexity in the Palestine-Israel conflict. Students played freelance journalists who should cover the Israeli-Palestinian conflict. The goal of the game was to publish an article based on quotes from dialogues from the game.

The game was played by 16-17 year old students, from supplementary studies qualifying for higher education and from vocational education and training. The project is yet not concluded, but some preliminary findings were the importance of the teacher's ability to connect the game playing to both the actual conflict and to other school activities. Making it clear to students how playing the game could give insight to the complexity of the conflict. Discussions before and after the game playing, strengthening the game's assessment and other feedback through including their experiences in the game to the student's forthcoming school tests turned out to be crucial for making the game work. It became obvious that one of the challenges when introducing the game's working method in schools was that the learning outcome does not always correlate with the student's opinion of what knowledge is. For example, in one of the group discussions after playing the game, some of the students expressed that they did not learn anything from playing the game: That in some way the opposite thing happened - it actually became harder to obtain their strong opinions

from the earlier discussions. This was not - at first - considered as learning by the students, but this sense of confusion does in many ways correlate with the game's learning objective; to show the complexity of the conflict.

When using computer games in classrooms, the teacher's ability to make the game play relevant to the curriculum is important. There are several reasons for this: To motivate students, to make sure that the activities are in accordance with the school's goals for learning, and to ensure sensible assessment of the students' work.

4. A TRADITION FOR COLLABORATIVE PROJECT WORK: THE NORWEGIAN CONTEXT

In the Nordic countries collaborative project work has been an important part of children's education for many decades. The national curriculum also encourages teachers to engage students in project work where students usually examine some loosely defined problem often from multiple disciplinary angles. For instance, students can do projects on immigration and integration through studying and creating fictional biographies of immigrants coming to Norway (see Rasmussen, 2005). In science education, we also encounter some examples of students learning the sciences for example through the construction of cardboard bridges.

We know from previous research that engaging in cross-disciplinary projects is motivating for students. We also know that students learn better when they are actively engaged in constructing things. However, a problem with much of the project work going on in Norwegian schools is a lack of development of students' deeper understanding. Students usually focus too much on the products of their work, they do not engage critically with one another's ideas and the teachers scaffolding and framing of events do not provide adequate direction for the development of their understanding of complex phenomena. The frequency and length of projects where students actively construct things is also limited. This might be due to the fact that is time consuming and practically difficult to manage and organise activities where students have to construct things using material objects.

Epistemic games suggest to offer realistic environments for creating things, solving problems that are closely attached to real life work challenges - and curriculum issues. These games aim to develop competence among students that more easily transfers to work place settings and that facilitate the development of students' deeper understanding of important disciplinary domains.

According to the curriculum's focus on developing competence among students - and competence being defined as the ability to activate skills and knowledge (Rychen, D.S. & Salganik, L.H. 2003). The notion of transfer become a main issue when evaluating learning outcome. The idea of students learning best when their activity is placed in useful contexts - does not always correlate with an aim for using skills and knowledge over a variety of contexts. The notion of situated learning versus the curriculum's idea of competence. This will require special attention, and the relation between situated learning and transfer of knowledge may become a main research objective in the forthcoming project.

5. ONE SCHOOL, THREE SUBJECT SYLLABUSES; THE SANDVIKA CASE

In Urban Science, players engage in the professional practices of urban planning and learn how to become ecological thinkers in the process. They work together to tackle the urban issues that face their city, using iPlan, a Geographic Information System (GIS) tool that helps them develop a comprehensive plan for their community. (Schaffer, 2007)

As an epistemic game, Urban Science is constructed by asking questions based on the computers ability to create virtual worlds. The game is moved forward on the basis of reading and writing. There are two ways of communication in the game; 1) e-mail correspondance, which is integrated in the game. Players will receive e-mails with new questions as they make progress when playing. 2) Instant Messaging communication, which is based on real time feed back with real people serving as mentors within the game. In our case this is most likely to be teachers at school.

As previously stated, there is a need to research how games are introduced into institutional settings including how they can be integrated with or used to change schools assessment practices and teachers orchestration and scaffolding of students learning. This is the main aim of this project. Up until now epistemic games have mainly been implemented outside of formal schooling. Against this background this project is very important and interesting.

One central perspective is to add the Norwegian school context to the game Urban Science, as it is communicated throughout the national curricula and within the syllabuses.

Bearing this in mind, the study involves students from upper secondary education and teachers. Furthermore, competence aims from are to be covered from three subject syllabuses; Social economics, Marketing and management studies and English as a foreign language.

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