Serious about mobile gaming

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Abstract: A closer look at game-based learning reveals tensions between the two parties games and learning. Game-based learning is examined here from the perspective of one party within this relationship against the background of globalization and cultural change. Getting serious about mobile gaming this paper aims for a deeper understanding of mobile games and the particular learning potentials within these kinds of game play. First principles are derived.

1 Introduction

A closer look at the concepts of game-based learning reveals tensions between the two parties games and learning processes, as we understand them today with regard to our own experiences having been kids and students some time ago, and being parents and teaching students today. For different reasons some hopes for change of educational processes are directed to games and game-based learning. There is the emergence and the pervasive distribution of computer games in divergent formats all over the world during the last three decades. Meanwhile even elder persons play Nintendo DS. There is the concurrent development of the computer game industry from a Computer Science experiment in the early sixties, to a hobby culture and niche market in the late seventies to a *very big* industry today. According to the annual report of the Entertainment Software Association ESA the Video Game Industry took in 9.5 billons USD$ in the US in 2007 [Wi08a]. There is the experience of teachers in schools and universities that there is a change in the learning behavior and in the skills of incoming students. Sometimes the skills of the current generation are compared to the skills of former generations. The results are interpreted as a decline of quality, and then ascribed to continuously playing computer games. And there is the vision that interactive entertainment is becoming not one but *the cultural form* of the 21st century.

Getting serious about mobile gaming I neither promote games as a silver bullet for education nor damn them as responsible for cultural decline. I just concentrate on mobile games and look for the learning potentials, inherent to this particular form of games. Doing so I refer to our mobile game prototype *On the Streets* we have developed, played, and play tested within our research on mobile gaming experiences. First principles are derived. Concluding a further principle is introduced, which again refers to the tensions between games and learning.

2 Forms of learning in the school and cultural change

The traditional form of learning in school has become questioned against the background of globalization, cultural change, and the emerging forms of thinking and acting of the younger generation familiar with computer games. Positively seen, traditional learning is, the organized appropriation of theoretical and empirical knowledge, the organized building of competence, the efficiency of the learning process with regard to the scaffolding provided by the teacher and the advancement of individual development … Very negatively seen, traditional learning is deathly boredom, stupid repetition, and injustice, leveling of personalities, outer constraints and the exclusion of individual development … The form of learning in both cases is the predefined goal, the predefined disciplinary content, based on the division of labor, the asymmetric student-teacher relation, the schematization of the learning process, that is the abstraction away from the individual way of motion and from the everyday life and the separation of body and mind. This form of learning produces knowledge and competences for stabile, organized relationships. The problem is our life and work relationships are not stabile and not organized. They are characterized by complexity, unpredictability, and permanent change of conditions. What we need, but do not learn within the traditional form are sense making of complex, ambiguous information, and responsible action, the willingness and the capability to take chances and risks and to bear the consequences. Are computer games are mobile games a solution to this problem?

Talking about globalization and cultural change the domains of education are not the only ones undergoing transformation. This also happens to games. The borders between games, work and everyday life are becoming permeable. One extreme example is gold farming in China. There are estimated 100.000 players of massively multiplayer online role-playing games (MMORPG), who play those games to achieve („farm") valuable items, which then are sold outside the game world for real world money and used to advance the player status of the buyer within the game world [Wi08b].

3 Mobile games

Mobile games are based on the physical movement of players in a game-world, merging real and virtual world, to which the players get access by means of mobile devices. These kinds of games are also called location-based, augmented, pervasive or ubiquitous games. For further understanding and elaborating the definition I shortly introduce our mobile game prototype *On the Streets*, which has been played by meanwhile by more than 500 players.

The mobile game *On the Streets* is played in a game world, which encompasses a real world environment, as for example the downtown of Bremen and a virtual dimension mapped onto the same area. The game world is virtually divided into squares we call fields. The players are organized in gangs. A gang consists of one to five runners and a boss. The boss is virtually located in the home base, a particular field of the game world, and physically sitting for example in our lab at a desktop computer. The goal of the game for each gang is to gain power and influence by capturing as much territory as possible that means fields, and particularly the home base of the other gangs. All runners have a virtual map of the game territory displayed on their PDA's, where they can retrieve detailed information about the field they are currently in as well as about the eight surrounding fields. The play actions of a runner are in detail: conquer territory via physical movement from field to field; conquer the home base of the other gangs and the fields they own via fights; maintain and gain power via finding and using items and via conquering particular bank fields; gain life energy via visiting a hospital field. The play actions of a boss are in detail: observe, coordinate and support the movement of your runners by means of advices; observe the development of the field-ownership of your gang; buy and place (ro-) bots to defend conquered fields; defend the home base.

The physical movements of a player and the fight, supporting social interaction among the players, are the decisive game mechanics of the game *On the Streets*. The fight mechanics is turn-based and organized as follows: Each time a runner enters a field already occupied by an opponent both runners have the opportunity to fight for the ownership of the field. In order to start an attack and initialize the fight a player needs to identify his enemy in the real world. For this purpose every player in the game wears a shirt in the color of his gang and a unique colored cap indicating the individual gang member. All possible clues of both types are listed in the bottom bar of the screen and have to be selected by the attacker. After selecting the appropriate clues the fight dialog for both players appears. The fight dialog displays the virtual characters of the players that are divided into three body parts: the head, the torso and the legs. Within a certain time limit both, attacker and defender, simultaneously have to choose which body part they want to attack or defend. Being hit in one turn will cause a loss of life energy that is displayed on both screens. After that the roles change and they start the next fight turn. This procedure continues until one of them has lost his complete life energy or one of them flees by moving out of the field physically.

The game is based on a client server system. The system comprises two servers for two different tasks: The game server manages all of the game events, and the tracking server visualizes the player movements during a running game for an audience. The movements are recorded for further research purposes. On client side again different types of clients are used: PDA clients for the runners and PC clients for the boss of each gang as well as an admin client to administrate the game.

The runners' technical equipment consists of three elements: a PDA, a GPS mouse and a PoC[1] phone. The PDA, the platform for the client software is controlled via touch screen. The data link between the client and the servers is established by a TCP/IP connection via GPRS using the integrated radio module. The position data of the player is provided by a GPS mouse, which is connected to the PDA via bluetooth. Via the PoC phones all players within one gang may communicate with each other.

Mobile games like *On the Streets* are location-based in that they provide play possibilities situated in the real world. In our example the play possibilities items, banks, hospitals, home bases, are attached to a location, a field; and fight or flight possibilities are attached to the hostile encounter of runners, runners and (ro-) bots, runners and boss. Mobile games are augmented games in that they combine real and virtual world dimensions. They are pervasive games in that the game technology works with computational models of the environment of the player, able to sense and react to nearby devices. Mobile games are ubiquitous in that they combine mobile and pervasive technologies. The so far introduced general definition of mobile games has further implications: the changing contexts, the embodied and situated interaction and the permeable borders of the game world with the everyday life. One further feature characterizes mobile games in most cases: the social interaction of distributed distant and/or proximate players.

4 Learning inherent to mobile gaming – first principles

We derive the learning potential of mobile games from the general features of mobile game play. As a preliminary result we present first principles: (1) Mobile gaming re-integrates the body into cognition, learning and individual development. Mobile gaming is part of and contributes to the currently subliminally ongoing shift in the understanding of cognition: from cognition as a solely individual and brain based phenomenon to cognition which is at the same time embodied, situated and social; from learning as a primarily cognitive process to learning which is embodied and contextualized. Our body is the only instance of cognition we may try to, but cannot abstract away. Mobile players discover and invent play possibilities within and by doing and bodily accessing the game world. Mobile players immerse themselves bodily into the game. Also skeptical players physically move and thus become drawn into the game. Feelings accompanying bodily immersion are basic and persistent. The gamers actively create and re-create the magic circle for their game play by means of body communication and mutual synchronization [GO07].

(2) Mobile gaming unlocks resources for learning having been excluded from the traditional form. Cognition emerges in the player-environment interaction, the game-context interaction, the sensor-motor coordination, and particularly in the social interaction.

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[1] Push-to-talk over Cellular

The mobile game *On the Streets* enables and requires continuously collaborative sense making of spatially distributed players within complex, rapidly changing situations. Mobile players have to compile and to integrate distributed information for understanding their current situation, re-directing their action and re-defining their task-division with regard to the rapidly changing context.

(3) Mobile games require, enforce and reward abstraction and concretion as a condition of game play. Mobile players start as novices and play immediately. This experiential form of playing and learning enables and requires abstraction. Players have to understand the underlying game logic by means of abstraction and they have to appropriate this abstraction to their context of playing to fathom out their space of possibilities, if they want to achieve their goals. Mobile games further enable and require the discovery and the invention of novel play possibilities. The magic circle of mobile games has permeable borders with the everyday life. Mobile players have to deal with unexpected chances, risks and disturbances of their game play. They collaboratively re-create the magic circle by compensating disturbances and inventing novel play possibilities.

Concluding remark

The tensions between games and learning continue to exist also if we conceptualize game-based learning from the perspective of mobile games. Instead of leveling the different parties researchers at the University of Wisconsin, some of them with a focus on augmented games [Ma08] develop and play test game-based curricula, which aim to integrate games, sciences and everyday life [BR06]. Starting and reference point for the continuous integration are the activities of the students themselves.

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