Motivations for Play in the UFractions Mobile Game in Three Countries

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ABSTRACT

UFractions (Ubiquitous fractions) is a storytelling mobile game that utilizes fraction rods in solving real life related math problems. The prototype of UFractions was tested during the period March 2009 to May 2011 in South Africa, Finland, and Mozambique amongst 279 players, ranging in age from 10 to 32, the majority being grade eight students. A multi-method approach, comprising of both qualitative and quantitative data collection strategies, was employed to develop a trans-cultural taxonomy for play motivation in mobile games, as observed in the evaluation of UFractions, i.e., altruism, challenge, cognitive restlessness, curiosity, fantasy, relations, and technology.

Keywords: Mathematics, Mobile Games, Mobile Learning, Tangible Manipulative, Taxonomy for Play Motivation

INTRODUCTION

Educational games are used to increase motivation and various studies emphasise the power of digital game-based learning (Alessi & Trollip, 2001; Rieber & Matzko, 2001; van Eck, 2006). In mathematics, students may do calculations more effectively while playing educational games than with pen and paper. Above all, learning by means of games can be more purposeful and cognitively situated, meaning that digital game-based learning occurs within a meaningful context. However, it is quite difficult to make good games for studying purposes, and there are just a few captivating games for education and especially for mathematics (van Eck, 2006). The designing of compelling educational games would become easier, if we were able to answer the following questions:

Why is digital game-based learning engaging and effective? What features of the games are most interesting for students? What kinds of
issues make them continue playing? Are players’ motivations similar in different contexts?

In this paper, the motivations for playing the educational UFractions mobile game are examined in three countries. UFractions (Ubiquitous fractions) is a story based game designed for grade eight students in and for South African schools for learning fractions. Finnish researchers developed the game for the South African context with the help of local cultural and educational experts at the beginning of the year 2009 (Nygren (née Turtiainen), Blignaut, Els, Laine, & Sutinen, 2009). UFractions makes fractions concrete by utilizing colorful, wooden fraction rods (Cuisennaire rods) and by encouraging players to use the rods to solve the mathematical tasks relating to the lives of Mother Leopard and her cub called Senatla.

UFractions was evaluated in South Africa in March 2009, and the results of the empirical studies indicate that South African students immersed themselves in the story. Learning fractions by mobile game brought several dimensions into learning; the story induced ethical, physical and cognitive rationales, meaning that playing provoked feelings that are not typical in ordinary mathematics classes, such as an urge to help and feed the cub or run with him. Reasons for liking mathematics in the UFractions game are affective (intrinsic motivation to mathematics), functional and action-oriented (Nygren (née Turtiainen) et al., 2009).

A year later, in 2010, UFractions was reverse-transferred to a Finnish context. The term reverse transfer refers to a technology designed in and for a technology-alien context and taken as such to a technology-familiar context. Moreover, UFractions was evaluated in Finland during the first months of the year 2010. An analysis of these two empirical studies shows the importance of the game’s adaptation to the pedagogical and cultural context of its users. Therefore, a successful learning environment requires context adaptation in addition to reverse transfer. In other words, for ubiquitous learning games, such as UFractions, our findings indicate that learning contents and activities need to be re-contextualized to be captivating for players (Laine, Nygren et al., 2011). We have previously identified a set of disturbance factors that negatively affect the experiences of the players (Laine, Sutinen, Nygren, & Joy, 2011). In 2011, UFractions was translated into Portuguese, and it was evaluated with 70 players in Mozambique.

This paper is structured in three distinct sections, comprising (a) a description of the three contexts where UFractions have been tested; (b) exploring previous work on play motivation related to digital games, and especially educational games; and (iii) the UFractions game evaluation and its relationship to motivational aspects, leading to a taxonomy for play motivation in mobile games.

THE TESTING OF UFRACTIONS IN THREE CONTEXTS

The UFractions mobile game was tested in three varied contexts, i.e., in South Africa during March 2009, in Finland during March 2010, and in Mozambique during May 2011. Although UFractions was initially developed and for the South African context, its effective pedagogical use and evaluation in two other contexts (Finland and Mozambique), as well as its recent translation into Portuguese, indicate the trans-cultural nature of UFractions for mathematics education.

The South African Context

The population of South Africa is culturally diverse with over 49 million people, and 11 official languages. About 50% of the population lives in rural areas (OECD, 2008; SouthAfrica.info, 2011). Twelve point three million students attend over 26,000 schools. School life covers 13 grades from grade 0 to grade 12. Education is compulsory, but not free in all cases, though students in very poor schools are not charged any fees. Despite heavy investments in education made by the new democratically elected government, the quality of instruction still requires drastic improvement. International comparisons, such as the International Math-
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