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TYPE OF CONTRIBUTION: Workshop or discussion session

ASPECT(S) OF THE THEMES: 2 = Appropriate technologies; 1 = Innovations in curriculum and assessment;

PID 80 and 81

TITLE: Developing Games for Use on Mobile Phones and using games for education.

Kirston Greenop, Research Manager, & Dylan Busa, Senior Manager- Technical Development, Mindset Network, South Africa

ABSTRACT

Gaming developments and advancements are becoming increasingly pervasive and utilized. Over 30 million people have access to mobile phones in South Africa. In general, in 2004 in sub-Saharan Africa 52 million people had access to mobile phones, while only 5-8 million had access to the internet. In terms of the three screens of technology (television, internet and mobile phones), people living in Africa may have access to television and mobile phones, or only mobile phones. In addition, mobile phone usage is growing the most rapidly in the developing world, where the technology does not depend on existing landlines. This level of 'reach' rivals only the radio.

As a model of education support, games on mobile phones are being investigated. In this vein, three questions are pertinent: what happens while the learner plays the game that is of use to educational methodology and learning, can existing gaming platforms be used to deliver educational curricula, and what aspects of existing games need to be replicated in 'educational' games? In essence, what can educators learn from gaming? Are there existing games that have educational value and if so, what is this? How can we replicate traditional gaming's success and position gaming within an educational setting? It is important to clarify that gaming in this context is gaming in a technological format, as games have been used in education for countless years.

The current research project developed two innovative educational games for use on mobile phones and positioned these within the context of Mindset Learn's educational content platform. Mindset is a not for profit organisation that provides ICT educational, curriculum aligned content free of charge to learners and teachers.

INTRODUCTION

Recent statistics show that computer games rival the movie and popular music industries. Sales figures for 2005 stood at 228 million units generating revenue of \$7 billion. 70% of children play computer games at least once a week and 68% of children have played games on their mobile phone. When asked why gamers play computer games the results have been quite surprising. Although 87% are reported as saying they play because it is fun, 78% respond that it is because games are challenging. 42% of players cite the social and collaborative aspects of modern computer games as an important reason for playing. Primarily, however, they elicit powerful emotional reactions in their players, such as fear, power, aggression, wonder, or joy.

It seems clear, therefore, that without even considering the notions of computer games in education, already their impact and influence in popular culture is growing. Recently, however, a growing research effort has begun to pose and answer a triad of key questions that seek to position gaming

correctly in the educational space. Firstly, what is happening during the game play process, and what can the formal educational sector learn from this and possibly redeploy? Secondly, can conventional computer games be used in traditional settings to assist in the delivery of formal curricula? Thirdly, what are the key aspects of conventional computer games that need to be embedded to produce effective learning software?

Many people carry an intuitive sense that games should have a place in education. Even where teachers and parents have expressed concern about games being used in the classroom, study after study confirm the fact that the majority think games can support valuable skill development such as

- strategic thinking,
- planning,
- communication,
- application of numbers,
- negotiating skills,
- group decision-making,
- data-handling.

This workshop aims to lead a discussion around the questions raised above concerning the place of games in education, their value, role and possible future developments to incorporate them into the educational arena to a greater degree.

Question: Why develop games for mobile phones?

Mobile learning is generally agreed to have developed out of e-learning (Mutinda, et al., 2007). Traxler (2007) contrasts 'mobile' learning and 'static' learning, the latter of which has contained e-learning in that it was tied to static devices such as desktop PCs, institutions and infrastructure. 'Mobile' learning is in contrast more portable, flexible and personal, flexible and most importantly, portable. Keegan thus defines mobile learning as "*the provision of education and training on PDAs/palmtops/handhelds, smartphones and mobile phones*" (p.3). They are more 'mobile', while laptops and desktops are conceptualized as more e-learning.

The above definition raises the following questions:

- What impact does mobile learning have on pedagogy, and vice versa? Is a new pedagogy appropriate or a modification of existing pedagogy?
- What content and games best suit mobile devices? Adaptations of existing content or newly designed and developed content?
- What form of content delivery is suitable for mobile phones: games, videos, text, or a combination?

Question: Is mobile learning suitable and/or appropriate to developing countries?

Traxler (2007) argues that the reason mobile learning is developing as rapidly as it is, is due to poor infrastructure and connectivity, availability of PCs and mains supply. (In the area of mobile phones, people in rural areas are charging their phones using car batteries or solar panels). This may raise differing views of mobile phones in education: intrusive versus supportive and sustainable.

Mindset Network is in the process of piloting a project that has the potential to be supportive, sustainable and accessible. A partnership with Nokia has led to the development of educational games designed for mobile phones. Following Traxler, we need to be prepared for our project to raise as many questions as answers.

“[Mobile phones] permeability varies from country to country and from one economic class to another. However, the ownership of the mobile phone has been democratized as a wide spectrum of the populace, irrespective of race, economic status and country, have embraced its use” (Prensky, 2004 cited in Muyinda et al., 2007, p.291).

Mobile phones with educational content and games loaded onto them create a traveling educational resource, especially when curriculum-aligned, quality content is provided free.

Archibald (2007) outlined the potential impact that mobile phones could have in a developing world context. Mobile phones have more functions and processing power than ever before – their potential is vast. However, Archibald notes that the attitude towards them in the classroom is generally negative. On this note, schools in South Africa have a cell phone policy which generally states that cell phones are not be used at all in classrooms. This appears to negate their usefulness in the classroom, but also offers an opportunity to extend their use beyond the classroom. The question is then raised, however, of how their educational impact and the skills learnt can be transferred to other areas of learning (more on this below).

Examples of educational content on mobile phones includes the following:

- The Meraka Institute (SA) – development of a few modules that have educational potential, and merely require development and placement to make them sustainable and cost friendly.
 - The first is the MobileEd project with audio-Wikipedia. This is the audio version of the online encyclopedia that is socially constructed. Learners or the educator sends a keyword via sms to the device, which then calls back and reads the entry from Wikipedia.
 - Another project is the Doctor Maths module which uses MXit, an instant messaging service popular in South African adolescent communities. The service is based around help with the maths syllabus.

The Meraka institute argues that mobile phones provide access to information when no other access exists (for example, libraries or internet connections). These initiatives are not games based, however.

Leach (2005) reports that almost 77% of people are within range of a mobile device. Minges (2001, cited in Leach, 2005) argues that mobile coverage is one of Africa’s success stories: 150% subscriber growth in 2004; 75% of all telephones in Africa are now mobile; in 2005 there were 8 phones for every 100 people (Economist, 2005; cited by Leach 2005). The place of these devices in education is key – one cannot merely place an advanced device in an educational setting and expect educators and learners to be able to or be motivated to use them. With mobile phones, however, both educators and learners have a working knowledge of the devices already. They have become everyday devices. However, a caution is raised as the power dynamics of the device are complex as the learners often know more than the educators.

Questions raised from the above literature include:

- How do educators/learners use the technology?
- What is the best way to transmit technology and information in an accessible and useful manner?

- How can this technology leapfrog the developed world to empower educators and learners? The technology will continuously evolve; it is our role to understand how educators and learners will benefit. How can we do this?

Question: What games has Mindset developed for mobile phones?

As part of a larger technology innovation for educational content for mobile phones, Mindset has developed two games specifically targeting High school level mathematics.

The games are:

- Fashion Empire – In this game the mathematical concepts are implicit and not directly obvious to the girls. The game was set in a fashion setting to create a successful business, but has the potential to be placed within other arenas such as Soccer Empire or Baking Empire. There are smaller games within the Fashion game that need to be played in order to build the empire. These include reading graph forecasts of trends and seasonal changes, three dimensional problem solving in the box stacking warehouse, designing the clothes and the patterns on the clothes using geometrical shapes and colours, dealing with a bank by borrowing money and interest rates, selling the clothes to buyers, hiring and firing staff. This game also extends the purely mathematical aspects of the game to include social responsibility – there is a portion where one’s actions create a ‘reputation’ within the game and one may lose or gain points by acting ethically.
- “Mathstermind” – this is an overt mathematical problem solving game where a progressively more difficult equation is provided, and the object of the game is to attempt numbers and functions to solve the equation. Clues and small teaching sessions inherent in the game allow the user to progress and learn as they move higher in the game.

Questions that Mindset is formulating research around for this project include:

1. What gaming content is best suited for mobile phones?
2. What content best suits the mobile device form factor?
3. What functionality is the minimum requirement for certain levels of content (including sms services, games, educational lessons, interactive lessons, connection to the internet)?
4. What model is the most efficient and effective for the target audience?
5. Is the model usable?
6. In what way is the game used by the target audience?
7. Is there spill over to other audiences?
8. In what way is the mobile phone content/applications/services¹ integrated into other systems/curricula etc?
9. How long can the games be used for? Is there a ‘shelf life’?
10. In what way do the games impact on academic performance, but also self-efficacy, psychosocial issues?

¹ Content is viewed as individual files that can be downloaded, shared, deleted etc. e.g. ringtones, wallpapers, videos, pictures. Applications are viewed as programs that are downloaded, shared and then (un)installed, share data e.g. games, calculators, GPS. Services are conceptualized as functionality provided to users where most of the intelligence is on a remote computer although a client-side application may be required e.g. USSD, browsing, IM (MXit).

Question: Is there a place for high-level concepts such as governance, responsibility and accountability in digital games?

The question was raised² as to the extent and possibility of incorporating governance concepts such as **cooperative relationships, shared decision making, honesty and transparency, responsibility and accountability into games**. Many games are seen as competitive which is often constructed in a negative sense, with the majority of focus on winning and losing rather than the process of playing the game.

Many games exist that address these issues. In terms of shared decision making and cooperative relationships, any multiplayer game has value. When the success of a team is dependent on the actions of each player in the team, a very real sense of cooperation and collaboration has been demonstrated to result. As such, although not immediately apparent, games do emphasise collaboration, cooperative and shared decision making and often require an orchestrated, planned response from a team of players. It is important to disassociate the goal set by the game from the collaborative team work required to achieve that goal. For example, the United States military has used gaming as a training tactic for many years. In this instance the goal is some military objective which on the face of it does not seem that collaborative in nature. However, the game dynamics are used to force the various participants to strategise and execute as a team in order to achieve the objective.

In many respects, issues around honesty, transparency and accountability lend themselves well to gaming. When playing traditional board games for example, it is virtually impossible to cheat either the game or the other players enforcing high levels of honesty and transparency. Things do become a little murkier when playing computer games though. Having said this, however, some computer games are well enough designed to not allow players to cheat the system. Even when “cheat codes” are made available, the application of these is most often very transparent. Again, when playing in a multiplayer environment issues of accountability come to the fore. Most games make it abundantly clear what other members of the team have and have not been doing in the game. There is often very little room for deviant play

The only area where gaming may fall short to some degree is concerning responsibility. One of the features that make games such powerful learning tools is the safe spaces they create for failure. As such, simply restarting the game can sometimes be seen as an easy way out of a predicament. There are seldom long term consequences for not handling responsibility correctly or carefully. It is certainly conceivable that a game can be developed that forces players to accept the responsibility for their actions without providing the escape hatch of eth restart button.

In stating all of the above, it is important to note that all of these skills or attributes can be derived from gaming not by way of the substantive content of the game but more often by means of eth dynamics of game play. It is possible (and examples do exist), where issues of honesty, accountability, collaboration and transparency form part of the actual game, its subject matter or storyline, but it would be a mistake to view these as the only subset of games capable of imparting these attributes. Even potentially very violent first person shooter games pitting one team of players against another (Doom and Quake are examples) can be said to help players learn these attributes.

Question: How do the skills of gaming overlap and extend into other areas of learning?

² Grateful thanks for this comment to Tanyss Munro and Firoze Manji, COL.

How are these above aspects of gaming integrated, overlapping or transferable into other learning or educational arenas? One may argue that for digital games to be of the most value, they should work collaboratively with schools or ODL to deliberately encourage the transfer to real life situations.

It is critical that games are located correctly and appropriately in modern educational settings. This issue requires debate and interrogation in order for the integration to be meaningful, otherwise the opportunity that digital games with educational value will be missed. A parallel for this scenario may be situation of the initial introduction of computers in education. Instead of critically analysing how best ICT in general could support and facilitate better and more appropriate learning, they were simply dumped into the classroom with the expectation sometimes that everything would work itself out. A recent news report of computers become increasingly out-dated in Namibian storerooms bares testament (The Namibian, 2008).

Thus, it will likely be insufficient to have learners play a game that requires deep analytical thinking, collaboration and cooperation and then simply expect that they will be able to seamlessly transfer to other, perhaps, more real world situations. There is little evidence currently to suggest that this is a reasonable expectation. Instead, we will need processes that draw out what was experienced during the game play that helps learners to extrapolate this to other situations. These exercises could take the form of debriefs and critical evaluation and reflection of what occurred in the game. Further, there is room for more intelligently designed educational games that have at their core the ability to track the progress and process of learning occurring through a game. In so doing, detailed discussions could occur around why particular decisions were taken during the game and what the results of these were.

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