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ARTICLE

Game: A Strategy for Science Communication

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ABSTRACT

Low literacy levels in developing countries is one of the reasons behind less rational thinking which hinders the development of scientific temper. If children are educated from the time they start to understand things, it may help them analyse the facts with validity. Games may be considered as a way to enrich communities with scientific temper since they are entertaining. Children could learn easily with calculations and puzzles than with the traditional math class. Today, the number of educational games in app stores is increasing each day. This study analyzes the different traditional games and digital games that communicate science and their balance between entertainment and scientific information.

KEYWORDS: Edutainment, Digital Games, Traditional Games, Science Communication, Science Education

Introduction

With a single click or a tap, hundreds of educational games scroll down our app stores. But, are all of them educational and to what extent they are providing information? Studies showed that reading and writing are most efficient for learning. Games may not provide that learning experience to users but they are definitely entertaining, attracts people of all ages, are even addictive. With such potential, games could be a strategy to communicate science.

Games are not new to us, ancient India was rich in culture, heritage and also in entertaining games. Our traditional games are highly influential in a player's development. Most of our traditional games are related to calculations and positions. They are also great in influencing once cognitive abilities. But the

effectiveness of our traditional games as edutainment tools is highly questionable.

With the advent of mobile phones and faster internet, children are more used to video games than our traditional outdoor games. It is important to understand the needs of today's players, in order to create scientifically influential games that can be used for science communication as well as science education.

Materials & Methods

A number of traditional games and digital games that communicate science or with the potential to communicate science were identified and analysed. We identified five digital games and four traditional games. Insights on the total number of installs and nature of the usage of digital games were derived from the data available at Google Playstore. Nature, scope and utility of traditional games were analysed based on the prior studies.

Digital games were identified based on their scientific contents and the novelty of the concepts. Care was taken to not include the games with methods to develop cognitive abilities. Traditional games were identified based on their impact factor in our society. Some of the games are not that popular in the digital era but analysing their impact on the players is necessary to unravel their potential.

Results and Discussions

Science games have the potential to influence and develop rational thinking among children. Both digital games as well as traditional games are influential but simple games with science as a component are more influential than heavy games, which only speak about science. Thus, a heavy load of information in games is also not preferable.

Digital Games

Five digital games were identified with varying rate of scientific contents – the games are from diverse fields of science.

Atomos: Atomos is one of the top science puzzle games that allows players to create elements. This game has more than 5 million installs. The major reason behind this is that Atomos is simple and easy to use. Players can easily learn and will get familiar with the game in a few minutes. At the same time, Atomos is highly entertaining.

Euclidea: As the name suggests, Euclidea is a game of geometrical construction. With more than a million installs, Euclidea ranks second in our list of digital games. Like Atomos, simplicity is the key to the popularity of Euclidea. Here, players creating simple geometric construction in the shortest possible time will get higher scores. "It is fun to learn geometric concepts using Euclidea," says one of the users.

Bioblox: This game designed by the researcher team from the Imperial College of London is all about problems of protein docking. It is designed to learn about the world of bio-molecules and their interactions. The team also developed a 3-D version of this game. The user response was great like the other two games but the number of users is far less. Bioblox has less than 1000 downloads.

Accelerator: acceleratAR is an augmented reality game that allows its users to build particle accelerators with just papers using augmented reality technology. Developed by the physicists at the Cockcroft Institute and the University of Liverpool, this game is the best solution for teachers to give a practical lesson on accelerators to students.

Cosmolander: Cosmolander is a fascinating game that entertains kids as well as elders to travel into space and to learn about the heavenly bodies. Unlike other games in our list, this game is under a paywall. It also incorporates quizzes to convey planetary facts. Total installs of this game are less than a thousand.

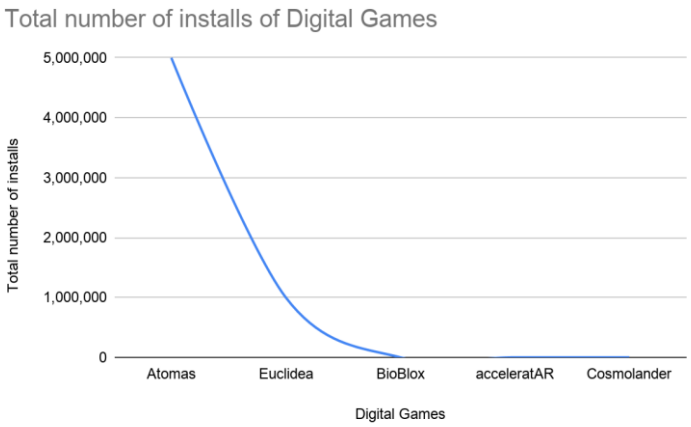

Figure 1: Number of installs of digital games

The graph in Figure 1 depicts the number of installs with respect to different digital games. From the graph it is clear that Atomos with more than five million installs is far superior to others in the list. Euclidea is second on the list with around one million installs whereas BioBlox, acceleratAR and Cosmolander combined are not making installs more than five thousand. Though all five digital games are simple to use, have their application in science education and also are used as tools for science communication, the latter three games fall far behind the first two. In our analysis, we found that apart from simplicity the right amount of content matters. Atomas and Eclidea are not only about science, but they also used science as a component whereas BioBlox and acceleratAR are dealing with far complex scientific concepts. The complex scientific concept in games may attract only enthusiastic users from the respective fields.

Table 1: Nature of usage of digital games

Digital Games	Nature of usage
Atomas	Free
Euclidea	Free
BioBlox	Free
accelerator	Free
Cosmolander	Paid

Apart from BioBlox and acceleratAR, Cosmolander is a simple and interesting game like Atomas and Euclidea. But it only manages to get installs of a few hundreds. The reason could be evident from the Table 1. Among the selected five games, Cosmolander is the only paid digital game. This may prevent a user from using this game though it is interesting.

Traditional Games

Top four games were identified in this section based on their impact on Indian society in science through their entertaining and interesting mode of playing.

Pallanghuzi: Also called Pallankuli or Alaguli Mane. This is a traditional ancient Tamil mancala game played in South India especially Tamil Nadu. This game is more popular among kids and old people. The game is played by two players, with a wooden or mud board that has fourteen pits in all, seven pits on each player's side. The pits contain cowry shells, seeds or small pebbles used as counters. The game encourages kids to learn to count and to improve eye-hand coordination.

Crossword: This game has been considered as a traditional game keeping in mind its date of origin and is played by many in India. The goal of this game is to fill the white squares with letters to form words. The shaded squares are used to separate individual words. These words are the answers to the questions being asked in the game. Since the 1860s, newspapers and magazines used to publish this game to entertain their users. They played a major role in popularizing this game. This game comes up with questions of various fields including science mainly current science. After a series of researches and experimentations, it was determined that crossword puzzles can improve memory and brain functions, even in older adults. A simple game of crossword every day has the potential to improve mental functions in patients with brain damage or early dementia.

Abacus: An abacus is a calculating tool that was in use in ancient times before the adoption of the written Hindu–Arabic numeral system. This tool has been used as a game to encourage kids to learn addition, subtraction and the arrangement of different numbers. It is way different from just scratching

numbers on boards or on paper. Most believe it is a smart and interesting way of learning mathematics.

Snakes and Ladders: The traditional game of Snakes and Ladders has been further developed for educational purposes mainly to make people aware of symptoms of diseases like infectious tuberculosis (TB) disease. These games are being played in many primary schools of India. Every time students step on the ladders by throwing the dice, the correct information written on TB is being read aloud by them. When they reach the mouth of the snake, they read the pseudo information or myth on TB. After coming down to the tail of the snake, students were given to read the factual message on TB. The game is interesting and can be manipulated according to the information needed to be spread. This game is used to target primary school students and spread information on diseases like TB. It also teaches strategy skills to children, teamwork, and colour recognition. The interesting part of this board game is not only it develops counting abilities, but also basic addition skills.

Most of these games are mainly for learning basic math skills. Crossword has played a significant role in popularizing science by asking questions based on science. Like, Snakes and Ladders, other traditional games can also be customisable with respect to the requirements of science communication. Children from rural parts of our country find it difficult to stick to digital games resulting in less game play time. Repacking the traditional games in the new digital format could successfully convey the message of science and the joy of learning to both rural and urban students.

Creating digital games for disseminating science is critical since the difference between entertainment and education is a thin line, if not in the right proportion, the effort may not create any impact.

Conclusion

Science games can influence children and have higher communicating power but the right balance of entertainment and science should be maintained. This is true for both traditional and digital games. Atomas is the best example of creating a

science game with no complex science. With simplicity and engaging game play, Atomas received more installs and also sustained its users. Whereas, Bio Blox's complex subject fails to attract more installs comparatively.

Games should be entertaining, and also help the user learn skills either directly or indirectly. Designing science games with a proper amount of entertainment and scientific information could result in more robust games to communicate science.

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