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Hygiene Awareness Through Digital-Game-Based Learning

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Abstract

Hygiene education is the major issue in developing nations. Improper sanitation and hygiene are hampering growth in other sectors, particularly education and health. Deaths of 110 children are being caused by improper hygiene in Pakistan [United Nations Children's Fund (UNICEF)]. Hygiene is essential for eliminating communicable diseases, however in Pakistan, as UNICEF states few people wash their hands with soap after defecation. Hence, with intentions of diminishing malpractices, various serious games have been developed, focusing on training users regarding health, and are gaining admirations in this digital age. In Pakistan, serious games are being used for educational purposes only by elite schools. A pilot study was conducted as phase one of this research for impact assessment of the available games on hygiene as well as to assess the need for a hygiene game in local context. Qualitative research was adopted in this study. Ten learners from socio-economic marginalised areas volunteered in achieving goal by playing serious games. Keeping in mind the fact that these learners have limited vocabulary, interviews were conducted with participants from the focus groups. The participants were engaged and motivated during intervention; however, they required guidance throughout. Therefore, the need for hygiene games depicting local context to minimise guidance required by the learners.

Keywords: Hygiene, education, serious game, Pakistan.

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1. Introduction

Hygiene education is one of the major issues faced by developing nations. Hygiene is an essential part of health, key to a nation's development. According to Peal, Evans and Voorden (2010), improper sanitation and hygiene are hampering growth in other sectors, particularly education and health. Furthermore, United Nations Children's Fund (UNICEF, 2016) states that in Pakistan, daily 110 children lose their lives due to diseases caused by improper hygiene. Hygiene is essential for eliminating communicable diseases, however in Pakistan, as UNICEF states few people wash their hands with soap after defecation. Hence, with intentions of diminishing malpractices, various serious games have been developed, focusing on training users regarding health, and are gaining admirations in this digital age (Wattanasoontorn, Boada, Garcia & Sbert, 2013). In Pakistan, serious games are being used for educational purposes only by elite schools.

The core of the study conducted was to observe whether selected serious games have an impact on hygiene awareness and to analyse the need to develop a context-based serious game for imparting knowledge about hygiene. The research question developed keeping in mind these factors is as follows:

'How hygiene relevant digital technology (serious games) increases awareness among learners of socio-economically marginalised community?'

Qualitative research paradigm was adopted to examine the increase in level of awareness about hygiene in the learners under the technological pedagogy approach. In order to make this idea a reality, ten learners from the socio-economic marginalised areas helped us in pursuing our goal by playing the serious games regarding hygiene. Keeping in mind the fact that these learners have limited or no proficiency in language, interviews were conducted out in the form of pictures and videos.

2. Literature review

According to the UNICEF Pakistan 2016 annual report, the issues faced by Pakistan related to water, sanitation and hygiene (WASH) include open defecation primarily which is the cause of diarrhoea, typhoid and other sanitation related diseases. 25 million people defecate in the open in Pakistan putting their lives in danger particularly the children leading to unhygienic conditions and causing environmental pollution that deters well-being of the society. This unhygienic environment causes hindrance to students' progress in education where lack of proper sanitation facilities and inadequate hygiene awareness and knowledge play a major role. So far, UNICEF has been successful to reach and educate five million people regarding prevention of diseases related to inadequate hygiene.

Peal et al. (2010) mentioned in their research about hygiene and sanitation approaches that even though a massive amount of resources have been utilised to ensure water and sanitation facilities; however, still over 2.5 billion people do not have access to basic sanitation services. They further emphasised the need to introduce practices and interventions which they termed as software, as there are cases where the hardware or sanitation facility is available yet people do not use it which is an obstacle in ensuring a better hygiene and health. They have provided different approaches and techniques by different organisations that can be used in the local context but applied keeping in mind the local culture. Freeman et al. (2014) reviewed studies worldwide from 1990 to August 2013 on handwashing practices and their effects on health. Although the benefits of hand washing have been reported in all the studies cited, it is not practiced widely after defecation. Therefore, a developing nation such as Pakistan needs to double its effort in promoting hygiene awareness and successfully implement United Nations Sustainable Development Goal (SDG) 3 and 6 related to health and WASH, respectively. In order to ensure better progress, an approach known as game-based learning can be utilised. Kebritchi and Hirumi (2008) reviewed numerous papers and games and cited the link between students' motivation and digital-game-based learning. However, there is a missing link between digital-game-based learning and hygiene games specifically in Pakistan. Hence, to escalate the

progress on SDG 3 (health) in Pakistan, innovative approaches like game-based learning are the need of today as well as the focus of particular study.

Kostkova et al. (2010) highlight and emphasise the potential of hygiene awareness games by presenting the study on ebug games, a funded project of EU that focuses on teaching junior and senior school students about hand and respiratory hygiene and microbes.

3. Methodology

3.1. Research paradigm

To give a brief and clear view of the methodology, the research paradigm and approach that was adopted for this particular study is 'Qualitative' to better observe and understand yet to gain the fruitful outcomes through study.

3.2. Research ethics

Research ethics were given the first priority, and supervisors of the participants were asked about informed consent to avoid any misunderstandings or possible risk.

3.3. Sample size

Considering the consent and willingness of participants, a focus group of sample size 10 was determined to collect the relevant data. Regarding the sampling method, convenient sampling was used to select participants who were the students of Out of School Children School.

Furthermore, there were two sessions with each participant spanning around 25 to 30 minutes, where few times necessary sessions with participants were increased in order to collect adequate data for analysis. Questions relevant to the topic were prepared for all the sessions while the progress of the sessions was recorded in the video form to be analysed later.

4. Discussion

For the collection of relevant data for study, personal and food hygiene practices and knowledge of the participants of mentioned hygiene types were gathered through interviews. Initially, general questions were asked regarding personal and food hygiene to assess their aptitude. Later, they were briefed about the selected games and then were provided tablet devices to find out coherence among their prior knowledge and the awareness they acquired through the game content. Two games were selected for this study where one targeted hand hygiene and the other overall personal hygiene through interactive visuals. Selected games for the study are as follows.

4.1. Baby Hazel hygiene care

This game had three levels of learning based on 4 minutes instructions and activity. A baby girl named Hazel as the leading character that guides the user is introduced. At the start of each level, a text-based overview is provided. The game overview with respect to level is as follow.

- *Level 1.* Baby Hazel returns home dirty after playing outside with mud and the user has to help her by washing, drying and ironing her dirty clothes and aid her in putting a washed dress. She cries if the user delays any task. A white hand points to the sub-elements of the tasks to guide the user.
- *Level 2.* In this level, user has to help baby Hazel complete her other personal hygiene tasks such as washing face with soap, brushing teeth, cutting nails, combing hair and washing hands.
- *Level 3.* This level involves user helping Hazel in eating her baby food. The user performs series of task: first putting on her bib, and then washing her hands with soap (the baby cannot eat her food if her hands are not washed).



Figure 1. Baby Hazel hygiene care



Figure 2. Baby Hazel hygiene care level 1

4.2. Ella's hand washing adventure

It focuses on teaching hand hygiene to children aged 2–6 years old. It defines why, how and when they should wash their hands to prevent the spread of infections. There is an interesting feature to take a picture of the user's face in order to personalise the experience; however, the photo is not stored.

It is built around the main character Ella and her friends Max, Sam and Dino, who love to play and do fun things, especially in the playground of their kindergarten.



Figure 3. Ella’s hand washing adventure



Figure 4. Ella’s handwashing adventure level 1

4.3. Nodes and themes defined in Nvivo

The questions asked and participants’ replies were evaluated on Nvivo.

Participants were asked few questions regarding food and personal hygiene. The themes that emerged and evaluated in Nvivo (analytical tool for the qualitative study) are as follows.

Table 1. Food hygiene

Questions	Responses with respect to participants
What is necessary before eating the food?	‘You should cut nails, wash hands and drink water in three breaths’. And ‘If I don’t wash my hands before eating, I can’t eat food’. (Ali Rehman)
What is necessary while preparing food?	‘Washing hands’. (Alisha)
If I have prepared food and I wash it with water, will it become clean?	No. First clean the dishes. Then cut tomatoes on it... (All participants)

Table 2. Personal hygiene

Questions	Responses
What is necessary for being healthy?	Cleanliness ('safai'). (Ali Rehman) Clothes should be kept clean, self-cleanliness... cleaning home and coming first in studies. (Masooma Zahra)
Why do we fall ill? What is the reason?	For being dirty, not taking care of cleanliness. (Alisha) We should cut nails, brush teeth, pray and do good deeds. (Ali Rehman)
When do we wash our hands?	Before eating food, ...after waking up in the morning...then we also wash our hands when we take shower. (Zain Ali) Yes, also after going to toilet. (In a lower voice by Zain Ali)

Table 3. Attitude towards selected games

Questions	Responses
What was the game about?	There was a doll and she was dirty and she was crying. (Masooma Zahra) Her clothes were dirty. Then she placed them in the machine. Later spinned and ironed them and wore again. (Ali Rehman and Alisha)
What was in the game?	It involved washing hands. First, hands are washed with water, then soap is applied and after that hand is washed with water again...then they are dried with towel. (Zain Ali)

5. Results

After this comprehensive research, the results show that game-based learning technique is fruitful and far beneficial in teaching students specifically when it comes to teach them about hygiene. Interactive visuals and colours motivate and appeal the students by bringing them out of the serious world of books and school and they can relate better when this approach is employed as pedagogy. Learners show more interest in games these days so teaching them their way will be more effective when they are fully motivated to learn via modern ways.

6. Limitations and recommendations

Not everything can go as planned and no one can find the ideal scenarios to collect the relevant data. Few limitations were also faced while collecting the data for study which are given in the following.

- Games selected for the study were not designed in the context of Pakistan so it was hard for student to relate.
- All of the text-based instructions inside the games were delivered in the English language that was hard for the participants to comprehend.

After conducting this study and on the basis of the data obtained, we recommend the development of a hygiene game incorporating local context besides local or bilingual audio and text-based instructions for the users. The users will be able to relate better and may even adopt practices with a greater level of enthusiasm. This type of game will help learners of socio-economically marginalised communities of Pakistan to take effective measures to lead a healthier life. Furthermore, it is possible that such game to be utilised by NGOs such as UNICEF for their WASH programmes.

7. Conclusion

The approach of game-based learning is relatively new in Pakistan; however, it yields greater benefits through proper planning and monitoring. The games were beneficial in the sense of providing new information participants did not know as well as reinforcing existing knowledge. Initially, it was planned to include games regarding food and environmental hygiene; however, relevant and contextual games were not available. Hence, the focus of the study was aimed at hand and personal hygiene.

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