

## **Integrating digital games for teenage mental health education in classroom teaching**

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### **ABSTRACT**

This study was on the development and integration of digital games for mental health education in secondary schools. Mental health challenges are becoming common among the youthful population due to substance and drug abuse and depression. A team of 5 researchers and 10 secondary school teachers jointly designed a digital game for teaching and learning mental health lessons in schools. The game prototype was tested and implemented in 5 secondary schools in a period of six weeks. A total of 218 students used the games to take mental health lessons. Game-based learning was evaluated using a questionnaire with five measurements on a Likert scale. The results indicate that the learning process was supported by the students' experience of using digital games and their conscious attention when participating in game-based lessons. The adjusted  $r$  square value was 22.5%. Digital game-based learning is an effective tool for teenage mental health education in secondary schools.

**Keywords:** *digital games; mental health; education; teenage; classroom*

### **INTRODUCTION**

Digital technologies have the greatest possibilities in improving health outcomes of adolescents (Patton et al., 2016). Adolescents' mental health problems are becoming common in communities worldwide. Adolescents' mental illness may be caused by poor academic performance, social dysfunction, teenage pregnancy, substance abuse, and self-mutilating behavior (Grant et al., 2006; Ruini et al, 2006; Zachrisson et al., 2006 and Huen et al, 2016).

The fourth industrial revolution, which is characterized by innovations in information and communication technologies, makes the integration of digital game elements into teaching and learning more appealing to today's adolescents (Kapp, 2012). Digital game-based learning is becoming popular in classrooms. Digital game-based learning is the use of entertainment power of digital games for the purpose of engaging and motivating learners to attain defined learning outcomes (Prensky, 2001). Huen et al (2016) claimed that digital game-based learning which combines education and entertainment equips youth with knowledge and skills of psychological constructs.

The COVID-19 pandemic had exacerbated mental health challenges particularly for the vulnerable people experiencing poverty, socio-economic distress, and insecurity. The pandemic also made face-to-face solutions less feasible (Hamady & Marinos, 2020). Most studies on digital approaches and mental health focus on the Global North, and there are gaps in knowledge about how technology can be used to support adolescents in low- and middle-income countries (Rost, 2020).

In this research we developed and implemented digital games for mental health education in 5 secondary schools of Uganda. Evaluation of the digital game intervention for mental health education was done to establish its viability for teaching and learning.

### Study objective and the case study

The study approach followed setting general objective, establishing hypotheses and answering the key research questions.

**Objective:** The primary objective of the study was to develop and implement digital game for mental health education among adolescent teenagers in secondary schools, and hence investigate the key variables that influence game-based learning in schools.

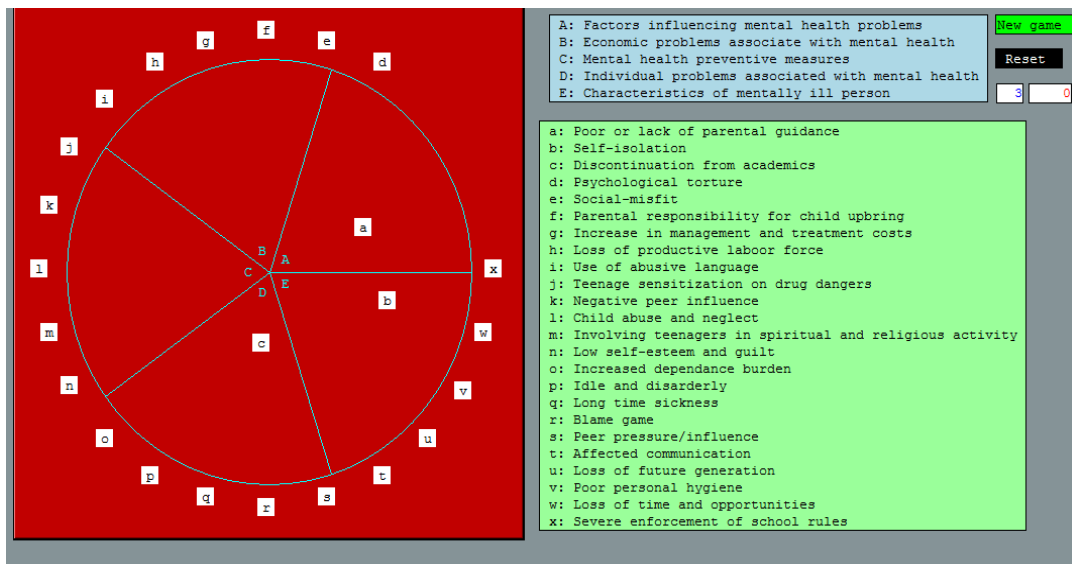
### Case study

This study was done in 5 secondary schools in northern Uganda. The mental health digital game was jointly designed by a team of researchers and 10 high school teachers. The digital game prototype was tested and approved by teachers for classroom use. The game was implemented in schools for students to learn mental health challenges youth experience in different communities. In addition to the digital game, a manual was developed for teaching mental health in the five schools. After administering the digital game intervention for a period of six weeks, an evaluation was done by use of questionnaires and the data was analyzed using descriptive and inferential statistics. The table 1 below presents the functional requirements of the digital game.

**Table 1:** Functional requirements list for mental health education game

Branch (sub-topics)	Leaves (Points)
Factors influencing mental health problem	Poor or lack of parental guidance
	Child abuse and neglect
	Long time sickness
	Peer pressure/influence
Economic problems associated with mental health	Loss of productive labor force
	Increase in management and treatment costs of families
	Loss of time and opportunities
	Increased dependence burden
Mental health preventive measures	Parental responsibility for child up brings
	Teenage sensitization on dangers of drug use
	Involving teenagers in spiritual and religious activities
	Severe enforcement of school rules and regulations.
Individual problems associated with mental health	Discontinuation from academics
	Social misfit
	Psychological torture
	Loss of future generation
Characteristics of mentally ill person	Self-isolation
	Poor personal hygiene
	Use of abusive language
	Affected communication
	Blame game
	Negative peer influence
	Low self-esteem and guilt
Idle and disorderly	

The game interface students interacted with during the lessons is shown in Figure 1 below.



**Figure 1:** Game interface for mental health education

The aims of the digital game for mental health education were to:

- Introduce students to factors influencing mental health problems
- Explain to students' economic problems associated with mental health
- Equip students with mental health preventive methods
- Introduce students to individual problems associated with mental health, and
- Introduce students to characteristics of a mentally ill person.

In the next section we review the related literature with focus on educational digital games in schools, state of practice of application of games, advantages of game-based learning and limitations of using games for learning.

## LITERATURE REVIEW

### Educational digital games in schools

Game based learning is an approach to teaching and learning based on a constructive pedagogy (Tokarieva et al., 2019). It is the utilization of games to support teaching and learning. The aim of using games in learning is to develop an enthusiastic learner; motivate and engage learners; reduce monotonous learning methods; and help students to develop self-esteem (Zirawaga et al., 2017).

### State of Practice of Application of Games

Games are used as a complementary tool to the traditional teaching methods to help improve students' learning experience while teaching other skills such as following rules, adaptation, problem solving, interaction, critical thinking skills, creativity, teamwork, and good sportsmanship (Zirawaga, 2017). Some of the traits of educational games include attractiveness, motivation, active engagement, data handling capabilities, and enabling learning by doing (Sakamoto, 2008). Several

games have gathered praise or enjoyed continued success such as: 'Math Blaster', 'The Typing of the Dead', and 'where in the World Is Carmen Sandiego' (Barr, 2013).

### **Advantages of Game-based learning**

The following are some of the benefits for applying games in learning (Tokarieva et al., 2019; Alsawaier, 2018; Zirawaga et al., 2017; Ibrahim, 2017; and Gozcu & Caganaga, 2016.):

- 1) Increased student motivation: Game based learning increases students' motivation, provides a more authentic learning experience, teaches system thinking, facilitates collaborative problem-based learning and influences the social sphere.
- 2) Enhances learning experience: Game based learning enhances the learning experience through challenge, exploration, interaction, reflection and decision making while maintaining a balance between the content, gaming and its application to the real world.
- 3) Creates a unique learning environment: Educational digital games create a unique learning environment which allows students to interact, experiment with their ideas, discover research, analyze, and reflect on the gained experience.
- 4) Engage students: The major role of applying technology is to engage students and to encourage them to participate. The use of games in education plays an important role in engaging students by encouraging hands on approach.
- 5) Help students remember: Games help students remember what they have learnt as active participation is encouraged. Students can use games to remember the critical points which they can apply in their examinations as well as in real-world situations.
- 6) Visual and computer literacy: By playing games, students gain visual and computer literacy skills which will prepare them for the world of work.
- 7) Rule following and problem-solving skills: Game drills are based on rule following and students are required to follow rules to achieve a high score and move to the next stage. Students can easily apply this knowledge in real world situations as they are encouraged to think outside the box.
- 8) Beneficial for students with attention disorders: Using games can help capture students' attention as this is a fun way of learning. Research conducted has discovered that web-based games can assist kids who experience attention problems.
- 9) Teach other skills: Games can be used to teach other skills such as critical thinking, problem solving, sportsmanship, interaction, and collaboration with peers. This helps in creating less stifled individuals who are not limited but can adapt to any real-world situation.

Ibrahim (2017) summarized the benefits of using games in learning into nine main points: Games are learner-centered (the student is always in focus); Games promote a communicative competence; Games create a meaningful context for language use; Games increase learning motivation; Games reduce learning anxiety; Games integrate many various linguistic skills; Games encourage creativity and spontaneous usage of the language; Games construct a cooperative learning environment; and Games foster participatory attitudes of the students.

### **Limitations to using Games in Education**

Using games in education has some setbacks which need to be addressed (Zirawaga et al., 2017 noted the following: On the teacher's side, providing a platform for students to play revision games becomes a challenge when teachers or instructors cannot control such an environment. Students can have access to other platforms which are harmful; Students who rely on games are often isolated from real life interaction; Using computers and other electronic devices can cause health hazards such as eye strain and other physical problems; and the technologies required for full participation can be quite expensive and this can create a gap between the students who have access to the technologies and those who do not have access.

In the next section we present the theoretical background of the study. The latent variables presented are motivation, user experience, learning, absorption, and conscious attention.

## **Theoretical Background**

### ***Motivation***

Ryan & Deci (2000) have defined motivation as the ability to be moved to do something. Motivation is temporal, varying from individual to individual in intensity and orientation (underlying attitudes and goals that give rise to the action). According to the Self-determination theory, motivation ranges from amotivation, extrinsic motivation, to intrinsic motivation (Ryan & Deci, 2000). Amotivation is associated with someone being entirely unmotivated because the activity does not produce feelings of competence, does not create any value, and does not feel worthwhile (Hulaj et al., 2020). Extrinsic motivation is associated with forms of regulation that underlie actions that individuals execute as a means to an end, whereas intrinsic motivation is characterized by a genuine interest and passion for an activity (Hulaj et al., 2020). Abdellatif et al. (2018) argued that motivation is a vital characteristic in which several theories contribute. Garris, Ahlers, & Driskell (2002) highlighted the potential of games to positively impact intrinsic motivation. Similarly, Wrzesien & Alcaniz (2010) argued that a game boosts the user's intrinsic motivation where it leads the user to curiosity and desire for challenge. In the field of education, a study conducted by Battistella, Wangenheim & Martina (2017) on design and large-scale evaluation of educational games for teaching sorting algorithms, students recognized positively the motivation provided by the game with most of them being satisfied since the game allowed them to apply knowledge taught prior providing an alternative way to learn.

### ***User Experience***

The International standards on ergonomics of human-system interaction, ISO 9241-210, define user experience as a person's perceptions, emotions, beliefs, preferences, physical and psychological responses, behaviors and accomplishments resulting from the use and/or anticipated use of a product, system or service (ISO, 2019). Similarly, McCarthy & Wright (2004) described user experience as the subjective relationship between user and application which extends beyond the usability of the application and focuses on the outcome that the user gets from interacting with an application when executing a task. Persada (2019) further argued that user experience is concretely represented by user interface (UI) which directly interacts with the users. According to Jakubowski (2015), user experience is regarded as central to the usability of technology in general and is a critical element of computer game development and use in specific circumstances, where an effective user experience will determine digital game acceptability. Bernhaupt (2015) argued that the key objective for any game development is to build a game with the following factors: fun to play, entertaining, providing surprises, challenging, providing aesthetically pleasing experiences, to support social connectedness, and allowing the player to identify with the game. Hence, the user experience design for video games is highly important (Calvillo-Gamez, Cairns & Cox, 2015) to the success of the games. Moizer et al. (2019) argued that with the increasing application of serious games in education and training, a sound user experience is considered an important determinant of user learning.

### ***Learning***

According to Clark et al. (2016), digital games are a promising and capable medium for instruction and learning across contexts and age groups. These games are traditionally associated with the constructivist view on learning as they have interactive environments where players are allowed to experiment and construct meaning out of their cognitive and emotional experiences (Rooney 2012). Under such a view, knowledge is built from within, and sense-making and

understanding are intertwined with our interaction with the environment (Alexiou & Schippers, 2018). According to Buil, Catalán, & Martínez (2018), serious games are defined by clear rules and goals that allow the player to engage with the game and to learn from the experience. Kao, Chiang & Sun (2015) argued that serious games as well as having their own learning goals can be used to underpin the achievement of wider learning goals. Novak, Johnson, Tenenbaum, & Shute, (2016) qualified this by suggesting that game content should be aligned to the curriculum within which it is embedded and the goals of the education setting where the game is used. For gaming to promote effective learning, there is need to have content appropriateness which is concerned with evaluating the external world that the game represents (Peixoto, Resende, & Pádua, 2014). This will enable the transfer of knowledge learnt within the game to real world situations (Petridis et al., 2012). Integration is the other consideration needed for effective learning with gaming. Integration is concerned with the game activity promoting reflection on the knowledge and skills that the game provides to players (Law & Sun, 2012), as well as encouraging integration of knowledge from different areas to support player's decision making (Novak et al., 2018), and develop new knowledge from the game. According to Dzeng, Lin, and Wang (2014), in gaming, feedback received from games is also important because it allows participants to reflect on experiences to allow knowledge to be created and/or synthesized within the game, for application to the real world. It can be important for learning that games provided the participants the opportunity to receive immediate feedback (Qian & Clark, 2016); possibly from the game generated ongoing results (Tsai, Tsai & Lin, 2015). Another important consideration for effective learning to take place with digital games is through encouraging extensibility which describes how all the elements associated with learning from a game can be brought together to promote knowledge and understanding and skills development (Garzotto, 2007). Extensibility is associated with ensuring that game content supports achievement of learning goals (Garzotto, 2007).

### ***Absorption***

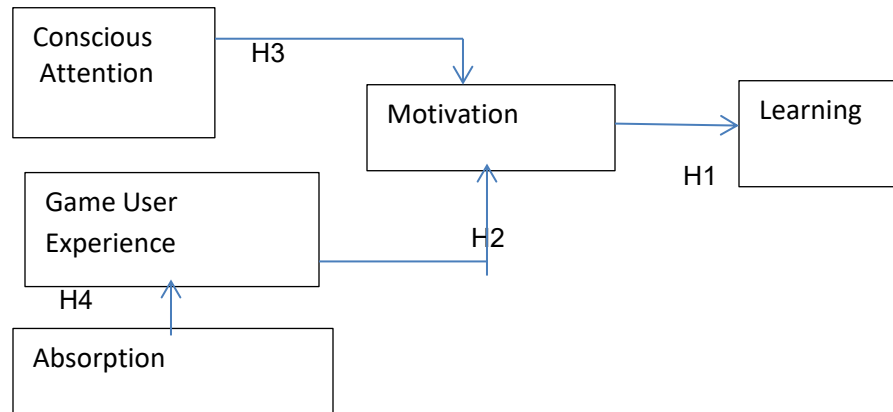
The theoretical basis of the multi-dimensional construct of cognitive absorption is established from flow theory (Csikszentmihalyi, 1975), which describes how people can be so absorbed in an activity that nothing else would seem to matter (Csikszentmihalyi, 1975). Absorption is interpreted as a disposition for having episodes of 'total' attention that fully engage one's representational (that is, perceptual, enactive, imaginative, and ideational) resources (Cole & Hooley, 2013). This state of total engagement induces an altered state of consciousness which is associated with separation of thoughts, feelings, and experiences and affect is less accessible to consciousness (Irwin, 1999; Glicksohn & Avnon, 1997). Roche & Mc Conkey (1990) argued that one's general tendency to become psychologically absorbed can be conceptualized as a trait, while the experience of becoming psychologically absorbed in a specific activity is best viewed as a state. From the digital games perspective, absorption describes a state of deep involvement with the games (Lowry et al., 2013). According to Preston (2017), in this state of absorption, the game player is present, highly immersed, engaged and involved in playing the game thus making absorption central to video game enjoyment. Preston (2017) however argued that sustained absorption in the game world is tied to the development of a player's cognitive skills, and to the game world's perceptual environments, interactive functions, and narratives, including challenges and archetypal characters.

### ***Conscious Attention***

Montemayor & Haladjian (2015) defined conscious attention as the "reportable" form of attention that is part of conscious awareness where the contents of attention are consciously accessible such that one could report detecting this information. According to Montemayor & Haladjian (2015), when one is attending to a particular object, thought or event that they are experiencing, and they can report that they are attending to it, then they are exhibiting their use of conscious attention. Takatalo et al. (2012) argued that conscious attention considers the information available and

guides perceptions of the environment. The conceptual framework for the study is presented in Figure 2 below.

### Conceptual framework



**Figure 2:** The conceptual framework for the study.

### Research hypotheses

H1: There is a positive association between motivation and learning.

H2: There is a positive association between game user experience and motivation.

H3: There is positive association between Conscious attention and motivation.

H4: There is a positive association between absorption and conscious attention.

### Study questions

- 1) How much variance on motivation can be explained by conscious attention and game user interface?
- 2) What is the relationship between motivation and learning during game-based lessons?
- 3) Do you have other wishes for improving computer games?
- 4) Describe briefly what you learned and how you benefited from the course.
- 5) What did you like most about the course and why?

## METHODOLOGY

### Participatory design and mixed research method

A participatory design approach was used to design the digital game for mental health education. Two workshops were organized to develop educational material for teenage mental health lessons. The developed content was modeled and prototyped by researchers into working digital games. This is in line with Torpel (2005) who stated that in the participatory design approach, users participate in all phases of the software solution development, that is, analysis, design, implementation, and evaluation. Designers learn from users who design innovation.

The mixed method research was used to capture quantitative and qualitative data from students in evaluation of the digital game-based lessons. Qualitative data was captured from open-ended questions in the questionnaire and analyzed to generate coherence from students' expressions about the use and the value of the digital game. Quantitative data was captured from the closed-ended questions of the questionnaire and analyzed to determine relationships and regularities that appeared between selected factors.

- **Study site:** The study was conducted in 5 secondary schools of West Nile sub region of Northern Uganda.
- **Study Population:** A total of 218 students were considered for the study population.
- **Study design:** A purposive random sampling approach was adopted for the study.
- **Sample size:** The sample size for the survey was 145 students.
- **Dependent Variables:** The dependent variables were motivation and actual learning.
- **Independent variables:** The independent variables were conscious attention, game user experience, absorption, and motivation.
- **Data collection:** Data were collected from students using a five-point Likert scale questionnaire.
- **Tools:** SPSS version 21 was used for data capture and analysis.

### Demographic characteristics of participants

Most of the students were female (71 or 68.3%), while males accounted for 31.7% (33) of the students. 1.9% or 2 of the students were 15 years old, 33.7% (35) of the students were 16 years old, 41.3% (43) of the students were 17 years old, 9.6% (10) of the students were 18 years old, while 12.5% (13) of the students were 19 years old, and 1 of the students was 20 years old.

Students' classes: 8.7% (9) of the students were from senior one class, 91.3% (95) of the students were from senior three classes. The total number of students who participated in the survey was 104.

Schools: Five secondary schools participated in the implementation of digital games for mental health education. Two schools were girls' schools while the other three were mixed schools.

### FINDINGS – QUANTITATIVE DATA

The questionnaire was designed on a five-point Likert scale (1 indicating an extremely negative rating and 5 an extremely positive rating) to gather responses related to the items. Cronbach alpha was computed for each construct to identify whether the items belonged together within a construct. There are several opinions on acceptable levels of Cronbach alpha. Nunnally (1967) proposed an alpha of 0.80 or higher, while Treacy (1985) suggested a value of 0.7 or higher. For our research the values of Cronbach alpha were above 0.70 on each of the items – Motivation, User Experience, Learning Process, Conscious Attention and Total Absorption - as shown in Table 2 below.

**Table 2:** The Cronbach alpha values table

Item	Cronbach's Alpha
Motivation	0.749
User Experience	0.727
Learning Process	0.757
Conscious Attention	0.755
Total Absorption	0.784



**FINDINGS - Descriptive Statistics**

The tables below present findings in terms of frequencies (**f**), percentages (**%**), the questionnaire scales 1 – for strongly disagree (**SD**), 2 –for disagree (**D**), 3 – for undecided (**N**), 4 – for agree (**A**) and 5 – for strongly agree (**SA**), mean and standard deviation (std dev). Table 3 presents descriptive statistics for motivation.

**Table 3: Motivation**

No.	Item	SD		D		N		A		SA		Mean	Std. Dev.
		f	%	f	%	f	%	f	%	f	%		
	<b>Motivation</b>												
1	It is due to my personal effort that I managed to advance in the game	4	3.8	7	6.7	14	13.5	34	32.7	45	43.3	4.05	1.092
2	I am satisfied because I know I will use the knowledge from the game to protect myself from abuses in life.	0	0.0	0	0.0	1	1.0	25	24.0	78	75.0	4.74	0.462
3	Passing through the game, I felt confident I was learning.	1	1.0	0	0.0	4	3.8	33	31.7	66	63.5	4.57	0.665
4	It was easy to understand the game and start using it as study material	0	0.0	3	2.9	6	5.8	43	41.3	52	50.0	4.38	0.728
5	The game content is connected to other knowledge I already had.	0	0.0	0	0.0	7	6.7	40	38.5	57	54.8	4.48	0.623
6	The way the game works suits my way of learning	0	0.0	1	1	5	4.8	43	41.3	55	52.9	4.46	0.637
7	The game content is relevant to my interests	1	1.0	4	3.8	9	8.7	46	44.2	44	42.3	4.43	0.839
8	The variation (form, content and activities) helped me to keep attention to the game.	0	0.0	3	2.9	4	3.8	53	51.0	44	42.3	4.33	0.689
9	There was something	0	0.0	2	1.9	1	1.0	45	43.3	55	53.8	4.49	0.623

	interesting at the beginning of the game that captured my attention												
10	The game design is attractive	1	1.0	2	1.9	2	1.9	41	39.4	55	53.8	4.47	0.723

Regarding students' motivation to use digital games for learning mental health, on average more than 82% expressed the view that the games were suitable ICT tools for learning. 93% noted that when they accessed the game, they felt confident of learning, 94% said that they were satisfied with the game content as it enhanced their knowledge and skills about drug and substance abuse and hence, they can protect themselves, and 94% said that the game design was attractive. The descriptive statistics for user experience are shown in Table 4 below.

**Table 4: User Experience**

No.	Item	SD		D		N		A		SA		Mean	Std. Dev.
		f	%	f	%	f	%	f	%	f	%		
	<b>User Experience</b>												
1	I had positive feelings on the efficiency of this game.	0	0.0	0	0.0	3	2.9	50	48.1	51	49	4.46	0.556
2	I achieved the goals of the game by applying my knowledge	0	0.0	1	1.0	9	8.7	39	37.5	55	52.9	4.42	0.692
3	I would like to play this game again	0	0.0	0	0.0	3	2.9	33	31.7	68	65.4	4.63	0.543
4	I would recommend this game to my colleagues	0	0.0	0	0.0	3	2.9	42	40.4	59	56.7	4.54	0.556
5	I had fun with the game	2	1.9	2	1.9	3	2.9	46	44.2	51	49	4.37	0.801
6	The game progresses at an adequate pace and does not become monotonous	0	0.0	3	2.9	16	14.4	45	43.3	41	39.4	4.19	0.789
7	The game is appropriately challenging for me, the tasks are not too easy nor too difficult	0	0.0	5	4.8	11	10.6	49	47.1	39	37.5	4.17	0.806
8	The game promotes cooperation/co mpetition	0	0.0	0	0.0	4	3.8	34	32.7	66	63.5	4.60	0.566

	among the students												
9	I had fun with other students	1	1.0	1	1.0	3	2.9	45	43.3	54	51.9	4.44	0.694
10	I was able to interact with others during the game.	0	0.0	0	0.0	6	5.8	43	41.7	54	52.4	4.47	0.6.7
11	I felt myself more in the game context than in the real life, forgetting what me was around	2	1.9	2	1.9	8	7.7	48	46.2	43	41.3	4.63	0.521
12	I did not notice the time pass while playing; when I saw the game had already ended	0	0.0	3	2.9	2	1.9	44	42.3	55	52.9	4.45	0.681
13	I have been fully concentrated on the game.	0	0.0	0	0.0	3	2.9	33	31.7	68	65.4	4.63	0.543

User experience with the game was tested as another factor that could contribute to enhancement of the learning process. 89% of the learners indicated that they had positive feelings about the efficiency of the game, 92% agreed that the game promoted cooperation/competition among the students, 92% agreed that they had fully concentrated on the game, and 94% indicated that they were able to interact with others during the game.

**Table 5: Learning Process**

No.	Item	SD		D		N		A		SA		Mean	Std. Dev.
		f	%	f	%	f	%	f	%	f	%		
	<b>Learning process</b>												
1	The experience with games will contribute to my knowledge and life skills	0	0.0	0	0.0	0	0.0	28	26.9	76	73.1	4.73	0.446
2	The game was efficient for my learning compared with other activities of the course.	0	0.0	2	1.9	8	7.7	48	46.2	46	44.2	4.33	0.703
3	The game contributed to my learning in this course.	0	0.0	0	0.0	2	1.9	30	28.6	72	69.2	4.67	0.511

The learning process using digital games was evaluated using three theoretical constructs. The results indicate that 94% of the students agreed that their experience with the educational games contributed to their knowledge and life skills, 86% expressed that the game was efficient for learning compared to other activities of the course and 92% agreed that the game contributed to learning in the course.

**Table 6: Conscious Attention**

No.	Item	SD		D		N		A		SA		Mean	Std. Dev.
		f	%	f	%	f	%	f	%	f	%		
	<b>Conscious Attention</b>												
1	I want to learn more about this digital game	0	0.0	2	1.9	3	2.9	22	21.2	77	74.0	4.67	0.630
2	I notice information related to this digital game	0	0.0	1	1.0	7	6.7	44	42.3	52	50	4.46	0.622
	I pay a lot of attention to anything about this digital game	0	0.0	1	1.0	4	3.8	45	43.3	54	51.9	4.23	0.779
3	I keep up with things related to this digital game	1	1.0	2	1.9	10	9.6	50	48.1	41	39.4	4.41	0.663
4	Anything related to this digital game grabs my attention	0	0.0	2	1.9	5	4.8	48	46.2	49	47.1	4.38	0.673

Conscious Attention was investigated using four theoretical constructs. The results indicate that 93% of the students expressed that they wanted to learn more about digital games, 84% said they paid a lot of attention to anything related to the digital game, and 87% said that anything related to the game grabbed their attention.

**Table 7: Absorption**

No.	Item	SD		D		N		A		SA		Mean	Std. Dev.
		f	%	f	%	f	%	f	%	f	%		
	<b>Absorption</b>												
1	When I am playing this digital game, I forget everything else around me.	4	3.8	5	4.8	9	8.7	40	38.5	48	42.2	4.14	1.028
2	Time flies when I am playing this digital game	0	0.0	4	3.8	4	3.8	51	49	45	43.3	4.32	0.728

3	I am playing this digital game I get carried away.	1	1.0	3	2.8	6	5.8	53	51	41	39.4	4.25	0.773
4	I feel happy when I am playing this digital game.	0	0.0	0	0.0	3	2.9	27	26.0	74	71.2	4.68	0.526

Absorption was tested as another factor for learning process enhanced with digital games, and the results indicate that 93% of the student's expressed happiness when they were playing the game, while 85% of the students expressed total commitment in game-based lessons.

### Results - Correlation Analysis

The relationships between user experience and motivation, conscious attention and motivation, motivation and learning were investigated using Pearson product-moment correlation coefficients. The results are presented in Table 8 below.

**Table 8: Correlations**

Correlations		1	2	3	4	5
<b>Motivation</b>	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	104				
<b>User Experience</b>	Pearson Correlation	.408**	1			
	Sig. (2-tailed)	.000				
	N	103	103			
<b>Learning</b>	Pearson Correlation	.166	.214*	1		
	Sig. (2-tailed)	.091	.030			
	N	104	103	104		
<b>Conscious Attention</b>	Pearson Correlation	.386**	.316**	.290**	1	
	Sig. (2-tailed)	.000	.001	.003		
	N	104	103	104	104	
<b>Total Absorption</b>	Pearson Correlation	.290**	.268**	.128	.399**	1
	Sig. (2-tailed)	.003	.006	.197	.000	
	N	104	103	104	104	104
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

The above correlation results regarding the study hypotheses are interpreted in Table 9 below.

**Table 9: Correlations and the Study Hypotheses**

Hypotheses	Results	Status
H1	There was weak positive correlation between motivation and learning, $r = 0.166$ , $n = 104$ , $p > 0.001$ , implying the motivation to play digital games during the lesson weakly contributed to learning.	Not supported
H2	There was a moderate positive correlation between game user experience and motivation, $r = 0.408$ , $n = 103$ , $p < 0.001$ , implying that when children gain experience of playing digital games, they become motivated in game-based learning.	Supported
H3	There was a moderate positive correlation between conscious attention and motivation, $r = 0.386$ , $n = 104$ , $p < 0.001$ , this implies that when children concentrate on playing digital games, conscious attention developed motivates them to learn	Supported
H4	There was moderate positive correlation between absorption and conscious attention, $r = 0.399$ , $n = 104$ , $p < 0.001$ , this implies that when children concentrate on game playing with special attention, they absorb the lesson content for effective learning.	Supported

To answer the research question “How much variance on motivation can be explained by Conscious Attention and Game user Experience?” statistical regression analysis was done, and the results are shown in Table 10 below.

**Table 10: Regression Results**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	24.264	3.564		6.807	.000	17.192	31.336
	Conscious Attention	.426	.137	.286	3.108	.002	.154	.698
	User Experience	.180	.052	.318	3.456	.001	.077	.284
Dependent variable: Motivation								
	R	0.490						
	R Square	0.240						
	Adjusted R square	0.225						
	F Statistics	15.769						
	Sig.	0.000						

The above results show that Conscious Attention and the Game User Experience explain 22.5% of the variance in Motivation (Adjusted R square = 0.225). This regression model was significant (sig. < .05).

## FINDINGS – QUALITATIVE DATA

We identified several themes from students' responses for each of the qualitative research questions as shown below.

**Research question 3:** Do you have other wishes for improving computer games?

**Themes:** game-based learning for all students; call for design of more games; adoption of games for classroom lessons; perfect games for learning; and extension of games to mobile devices.

Students' statements are presented on each of the themes as follows:

a) Game-based learning for all students:

*"I wish students are serious taught in computer skills including games for learning."*

*"I wish mental health education games could be taught to all students in the school."*

*"I wish I would be given the opportunity so that I also promote or introduce digital games to my fellow students."*

b) Call for design of more games:

*"I wish more games would be added to the existing ones. I wish all schools could have computers for playing the games to improve on knowledge."*

c) Adoption of games for lessons in classes:

*"I wish teachers should teach the students about computer games."*

*"I want to know much more about computer games."*

*"My wish to improve the game is that there should be a time limit for playing the game."*

*Failure to finish the game within the given time leads to failure. Hence time should not be abundant."*

*"I have wishes to improve on computer games for learning about our lives and improve our skills of using computer games."*

d) Perfect games for learning: students' statements were as follows:

*"No, I don't have other wishes for improving the computer games since the essential requirements are available to suit more of our learning."*

*"This game is already so good that I fail to find ways of improving it but I suggest if pictures or videos were included, it would become more perfect."*

*"No, I don't have other wishes for improving computer games because every material needed is efficient and is in its right position."*

*"According to me things are going on well but let every student get opportunity to play the game."*

- e) Extension of games to mobile devices:

*“Most youths, students and other people are addicted to the use of mobile phones and how I wish some of these games could be posted online for easy access for those who do not have computers.”*

**Research question 4:** Describe briefly what you learned and how you benefited from the course.

**Themes:** causes of mental health problems; good peer group formation; and drug awareness.

- a) Causes of mental health problems:

*“I learned about factors influencing mental health challenges like child abuse and neglect which is common these days.”*

*“I learned about factors influencing mental health problems like child abuse and neglect. Some teenagers face harsh treatment from their parents, relatives, stepmothers/fathers, teachers, etc., leading to trauma, stress, social isolation, low esteem, lack of concentration. If you are such a person, you will be affected by mental health problems.”*

*“I have learned the causes and effects of mental health problems in my community and other different places which has given me consciousness and caution on how to live my life and at the same time influence my friends positively by giving them my own views.”*

- b) Good peer group formation:

*“I have learned how to build good friends who are free from love of drugs and gambling which are harmful to one’s mental health. I learned about factors influencing mental health, for example, child neglect, drug abuse, and bullying.”*

*“I learned about teenage life and living responsibly and safely.”*

*“Learning mental health education on computer games made me to know and learn about causes, effects, preventive measures of mental illness and I was able to apply the other preventive measures on the due course by avoiding bad peer groups, stress and it helps teenagers a lot.”*

*“I learned about the good environment provided which has made me to revise and study hard for bright future and to develop my mental health.”*

- c) Drug awareness:

*“After playing the game, it motivated me to play it again and again enabling me to know more of the things I never knew in my life.”*

*“I learned a lot about mental health, how much drugs can affect someone mentally and I learned that we need parental guidance and love to be mentally healthy.”*

*“I have learned a lot of things, for example, how to handle mental cases, disadvantages of taking drugs, how to handle my personal issues like my feelings, etc.”*



**Research question 5:** What did you like most about the course and why?

**Themes:** source of knowledge and information; digital games with good design and functionalities; game-based learning; and critical thinking.

a) Source of knowledge and information:

*"What I liked most is the knowledge and information from digital games that guide and protect us students."*

*"It teaches me what I had not known and handling certain problems like dealing with opposite sex who are your friends."*

*"I like the idea of the way the mental illness is explained to the teenagers to understand easily and to avoid risking themselves of becoming victims of mental illness. The way the effects of mental illness are explained will not make the teenagers to temper with drugs like khat, opium, cocaine among others."*

*"I like the teaching most because they have helped me a lot to improve on my life and to be on safer side in order to be healthy."*

*"I like games and teachings from the notes given for the students to read. These have taught me a lot, for example, how to conduct myself, how to be responsible, how to be confident and how to be a God-fearing person."*

*"I like the course of drug abuse most because it has taught me about the effects of it, for example, bad peer groups influence you to smoke, eat marijuana, and consume alcohol which disorganizes the normal body functions and causes mental health problems, so I have to avoid and abstain from bad groups."*

b) Digital game with good design and functionalities:

*"I like the way the digital game is played, the way it is designed is so nice, the game has made me feel so happy, and the game gave me courage of studying."*

*"I like the way the game contributed to my learning. The game is well designed."*

*"I liked the way the students were organized and how they played the games."*

*"I liked the game because it helped me to use the computer in a proper way."*

c) Game-based learning:

*"I like the fact that it was fun since it was a computer game, the marks awarded gave me more interest to continue with the game."*

*"I liked playing the digital game most from the course because the game was efficient for my learning compared with other activities of the course."*

*"I like the digital game most because I realized that there are many problems associated with one root cause and corresponding ideas of how to overcome these problems using digital game."*

d) Critical thinking:

*“What I like most from the course is that it builds self-confidence and esteem in one’s lifestyle and it also builds intelligence among the students in the club.”*

*“I like the challenging questions because it made me think more.”*

*“I like the game so much because it makes me to think and think again and this makes my brain active.”*

*The course has inspired me to love my future dream and I am happy that I took the course.”*

## **DISCUSSION**

The evaluation results indicate that the experience acquired by students in digital game-based lessons and their concentration on the lesson activities enhances the overall learning in the mental health education class. The games created an environment where students were able to learn new things. This is in line with the existing theory of motivation by Wrzesien & Alcaniz (2010) who affirmed that games boost the user’s intrinsic motivation where it leads the user to curiosity and desire for challenge. This was expressed in qualitative results by the students demanding more difficult challenges from the game to enable them to do research.

The students expressed that the game content was connected to knowledge they already had. This is in line with the findings of Battistella, Wangenheim & Martina (2017) who acknowledged that on design and large-scale evaluation of educational games for teaching sorting algorithms, students recognized positively the motivation provided by the game through application of their prior knowledge. In their evaluation of the mental game, the students also stated that there was something at the beginning that captured their attention, and this corresponds to the acknowledgement by Garris et al. (2002) that the primary purpose for using games is their assumed motivational appeal. Regarding the experience of learning with the digital mental games, students indicated that they had fun with the game; the game promoted cooperation and competition among them, and they were able to interact with others during the game-based lesson. This is in line with Bernhaupt (2015) who acknowledged that the key objective of any game development is to build a game characterized by fun to play, entertainment, surprises, challenges, pleasing experiences and social connectedness.

Considering actual learning resulting from the learners’ interaction with the games, the students affirmed that their experiences with the games contributed to their knowledge and life skills. This is in line with Clark et al. (2016) who stated that digital games are a promising and capable medium for instruction and learning across contexts and age groups. The students acknowledged that when they played the digital game, they forgot everything else around them and felt happy. This is in line with Preston (2017) who stated that, in the state of absorption, the game player is present, highly immersed, engaged and involved in playing the game.

## **CONCLUSION**

This study has demonstrated that students’ experience and concentration in digital game-based learning influences their motivation to learn new things in mental health education lessons. Motivation further influences actual learning which is demonstrated by acquisition of new knowledge and skills. These findings suggest that digital games should be developed using educational material from an approved syllabus, and the interface design for students’ interaction

should be based on a professional software design approach that is user friendly, to enable effective learning in the classroom.

Integration of digital games for teaching and learning is a study area which researchers and practitioners have not explored in Sub-Saharan Africa. This domain of research is very useful in academia and industry for developing and testing software artifacts for teaching and learning in pre-schools, primary schools, and secondary schools.

Future studies should consider gender differences, socio-economic background of the learners and their age groups to establish the suitability of integrating digital games for teaching and learning in different settings. Future research is also needed to determine learner acceptance of digital game-based learning in different subjects.

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