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## ORIGINAL ARTICLE

# A Validation Study: Evaluating the Impact of Gameful Experience on Sexual and Reproductive Health Education amongst Adolescent Boys

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## ABSTRACT

**Introduction:** Gamification-based learning (GBL) approach has the potential to enhance teaching and learning about reproductive and sexual health education (*ReReki*). There were six games (Let's X-plore, The Red Zone, Message Card for You, Box & Portal, This & That, and Mono*ReReki*) created in *ReReki* module with the element of gamification (e.g.: milestones, rules, guides, points, competition). This study aimed to assess the gameful experience (G-EXP) of *ReReki* among adolescent boys in Sarawak's Southern region, specifically Kota Samarahan and Serian. **Materials and methods:** The questionnaire was subjected to a validation process that included content and face validity (n = 5), exploratory factor analysis (EFA, n = 175), confirmatory factor analysis (CFA, n = 165), and internal reliability. Boys between the ages of 13 and 17 who attend schools in Kota Samarahan and Serian participated in this study. This study used the original 65-items by Hogberg GAMEFULQUEST, which is divided into seven domains (accomplishment, challenge, competition, guided, immersion, playfulness, and social experience). **Results:** The panel experts rated all 35 items and chose six domains in G-EXP questionnaire as "essential" with a minimum 0.99 content validity ratio (CVR). However, the EFA procedure supported only five-factor domains (accomplishment, competition, guidance, playfulness, and social experience) with 32 items. The immersion domain was eliminated. The CFA procedure confirmed only 16 items and five domains, with a model fit of  $\chi^2=198.00$ ,  $df=94$ ,  $p<0.001$ ,  $\chi^2/df=2.11$ , SRMR=0.04, CFI=0.94 and TLI=0.93 and RMSEA=0.08. The Cronbach's alpha for five constructs varied between 0.72 and 0.91. **Conclusion:** This study proposed five domains and 16 items to assess the gameful experience of the *ReReki* module in adolescent boys. To enhance GBL in sexual and reproductive health education, the element of games must include competition, accomplishment, guidance, playfulness, and social experience domains.

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**Keywords:** *ReReki*, Validity, Sexual education, Reproductive, Adolescent, Boys

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## INTRODUCTION

The most recent strategy in an endeavour to include elements of innovation and digital technology in teaching and learning is game-based learning (GBL), often known as gamification. Gamification has various advantages that can assist students at all academic levels to learn more effectively (1), asserts that the gamification strategy motivates students to continually seek knowledge to satiate their curiosity and sense of accomplishment. They are given the chance to make mistakes repeatedly without feeling under pressure. Additionally, it

facilitates positive player interaction and quickens the learning process. Playing was proven to favour problem-solving skills and engagement in task completion (2), in this technique also demonstrates the game method to improve students' academic achievement (3).

Gamification is not a replacement for traditional learning methods (4). These approaches, however, complement one another. As a result, gamification methodology can be used in a variety of contexts, where teachers and students are both motivated by this strategy that stimulates creativity and ingenuity. When gamification is used in the classroom, it naturally raises students' level of focus and motivation. This is so because each engagement is active and gets kids' responses immediately. Students may track their progress on a subject due to the rapid feedback which also motivates

them to fix their errors. To sustain the amount of direct knowledge, the driving element stimulates engagement in activities that modify perceptions and attitudes. Thus, gamification affects distinct ways based on personality traits, specifically gaming attitudes (1).

Since gamification engages emotions, learning becomes more enjoyable. Games have a significant capacity to elicit and support the growth of emotions like curiosity, optimism, pride, or peace (5,6). It also satisfies students' needs at the same time can encourage pupils to accept instruction and learning (1). In addition, gamification can foster engagement and encourage a participatory learning environment which can boost student motivation (7).

Gamification provides ranks so that the learners have the chance to compete with other players or against themselves for higher rankings, better scores, or larger incentives. Even if it is only for fun, it aids in the process of negotiating a fair offer. Learners are encouraged to discuss and propose ideas while honing their critical thinking skills. Compared to conventional techniques, the gamification approach can raise learners' accomplishment scores and help them understand the concept better (8).

Gamification incorporates mechanical game design components which include aspects like points, badges, levels, challenges, and quests among other game elements (9). While dynamically oriented games feature reward, achievement, self-expression, and competition. By utilizing mechanical games, educational practices can transition from conventional learning methods like lectures to more engaging and participatory ones (10). Simply described, gamification is the incorporation of gaming elements into instructional materials with the goal of fostering learning as opposed to merely providing amusement. In short, any learning content that is used with game elements is considered 21<sup>st</sup>-century learning (11).

In this study, gamification is an option for boosting the knowledge (8) of reproductive and sexual health in the Malaysian context where sex education is perceived as taboo (12). *ReReki* sex education module for adolescent boys applied gamification methods in its delivery. This module's learning objectives were to: (i) raise adolescent boys' understanding of sexual and reproductive health, as well as the causes of sexually transmitted infection (STIs) and sexual transmitted disease (STDs); and (ii) improve adolescent boys' capacity to lessen the factors that influence their sexual intention, such as their self-efficacy in engaging in sexual activity, social norms surrounding premarital sex, and permissive attitudes toward it. The *ReReki* module is divided into five major topics using six game-based learning activities. The content of each *ReReki* module was outlined based on the learning objectives and the Theory of Planned

Behaviour constructs. Since the GBL is a feature of 21<sup>st</sup>-century learning (13), this study's objective was to evaluate a set of questionnaires used to gauge boys' gameful experiences in Malaysia.

## MATERIALS AND METHODS

### Study design

A cross-sectional study is a style of research design in which you gather information from a large number of individuals all at once. The Samarahan and Serian divisions of Sarawak, Malaysia, conducted the validation study.

### Study population

This study recruited a total of 340 adolescent boys aged 13 to 17 years old, who attended secondary schools and provided parental/guardian consent forms. This is in view of one third of Malaysian adolescents are engaged in sexual activities before the age of 14, exposing them to unplanned pregnancies and sexually transmitted infections (STIs) due to unsafe sex practices (not using condoms and having multiple partners) (14). Those who could not read in Malay and/or English were excluded from this study.

### Data collection procedure

The adolescent boy participants were recruited through community centers under the Sarawak Village Development and Safety Committee. After receiving sufficient information about the goals and methods of this study through written materials and explanations from the researcher himself, they voluntarily agreed to participate in the study. Participants and their legal guardians both provided written informed consent.

### Measures

The selected questionnaire was adopted from Horgberg GAMEFULQUEST which consists of seven constructs with 65 items (15). Horgberg questionnaire was selected because this questionnaire assessed gameful experiences in traditional and technological settings. In this study, the game-based learning was conducted in traditional setting (face to face approach). The first domain is on accomplishment (nine items), feeling the pressure or desire to perform well and reach their goals and improve. The second domain is a challenge (nine items) with one or more individuals to get a scoring outcome that is desired by all. The third domain is competition (eight items) is experiencing rivalry towards one another. The fourth domain is having guidance (nine items) on what to do and when to do it. Immersion domain (11 items) emphasized how a person can become so engrossed in what they are doing that they become disconnected from their surroundings. The playfulness domain (10 items) is to ensure enjoyable activities motivated by curiosity. Whereby, social experience domain (nine items) where people's involvement is direct or indirect in freely chosen (15). This study used a 7-point Likert

scale since it is more precise and accurately reflects the respondent's perception (16), with a range of 1 (Strongly Disagree) to 7 (Strongly Agree).

### Content validity and face validity

Each item's content validity is assessed to determine if the sample of items appropriately represents the scale in the instrument (17). The existence of constructs and items were assessed, matched, and selected by five-panel experts who are knowledgeable in gamification and sex education. According to Tristan-Lopez (2008), the minimum number of panels should be five or more (18). Each expert scored the appropriateness, accuracy, and ambiguity of each item's content validity before classifying it as "essential," "useful but not essential," or "not necessary." Each item's content validity was determined by applying Lawshe's formula to the Content Validity Ratio (CVR) (19). However, if there are four or fewer experts participating, items with a CVR of at least 0.99 are presented, and only items that received an "essential" evaluation from the expert are kept (19). The CVR value can be calculated using the formula below:

$$CVR = n - (N/2) / (N/2)$$

Where,

CVR = Content validity ratio

n = The quantity of experts who view an item as "essential"

N = The overall number of experts

After verifying content validity, the remaining items underwent a back-to-back translation from English to Malay and then back to English. It is crucial to do this because the questionnaire was initially written in English. Two independent linguists who are proficient in Malay and English both contributed to the translation. The translated version was then sent back to a five-panel of experts to be evaluated for face validity. Face validity, which is often performed by a group of persons with subject-matter expertise, is the subjective evaluation of items in a study instrument or questionnaire (20). Based on the comments made, corrections were made.

### Exploratory Factor Analysis

A sample of 175 adolescent boys were recruited for exploratory factor analysis (EFA) procedure. The sample size for EFA was estimated based on the one item-to-five subject ratio (21). They were selected through community center under Sarawak Village Development and Safety Committee, and their ages varied from 13 to 17. The gameful experience questionnaire adopted from Hogberg to measure the perceived gainfulness of gamification served as the basis for the questionnaire's items on the perception of game-based approaches (15). The items were changed in accordance with the content of the reproductive health for teenage boys (*ReReki*) intervention program. A total of six domains with 35 items related to gameful experiences were adapted

and modified. Based on the content of the *ReReki* intervention program, the items were adjusted.

A decision on the number of elements to be extracted was made based on an eigenvalue of more than 1, a scree plot, and parallel analysis. For the analysis to proceed, the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy must be at least 0.60 and the Bartlett's Test of Sphericity must be significant (p-value 0.05) (22). The principal component with Varimax rotation was then used to do a factor analysis. Questionnaire items with factor loadings of less than 0.5 were eliminated (23,24).

### Confirmatory Factor Analysis

In order to support the measurement model, confirmatory factor analysis (CFA) was tested on a total of six domains and 32 items using Analysis of Moment Structure (AMOS). For this purpose, another new set of 165 adolescent boy samples was obtained based on a five-subject ratio. These indices showed good model fit if the Tucker Lewis Index (TLI) >0.9, comparative fit index (CFI) >0.9, and p >0.05 for the chi-square test (25).

CFA and EFA are two common techniques used in scale development. In adaptation studies, EFA and CFA should be run using a different data set. Thus, this study used two sets of data coming from 175 for EFA and 165 for CFA (26).

### Convergent validity and composite reliability

Convergent validity (CV) measures how well each construct's items correspond to its theoretical underpinnings. Factor loadings >0.5 and average variance extracted (AVE) for each construct >0.5 are two criteria that can be used to generate a CV (24). Meanwhile, if the Composite Reliability (CR) value is at least 0.60, CR has been attained. The AVE and CR formulas are as follows:

$$VE = \frac{\left[ \sum_{i=1}^n \lambda_i^2 \right]}{n}$$

$$CR = \frac{\left[ \sum_{i=1}^n \lambda_i^2 \right]}{\left[ \sum_{i=1}^n \lambda_i^2 \right]^2 + \left[ \sum_{i=1}^n \delta_i^2 \right]}$$

K is each item's factor loading

n is the quantity of items in the model

### Internal reliability

After dimension reduction, the value of Cronbach Alpha was used to assess the internal consistency or reliability of latent constructs (27). Internal reliability for the whole

latent constructs was acceptable if Cronbach Alpha values were more than 0.70 (24). Both EFA and CFA underwent two internal reliability tests.

**Discriminant Validity**

Discriminant validity was examined by heterotrait-monotrait ratio of correlations (HTMT) obtain from JAMOVl software (www.jamovi.org). If the HTMT value is below 0.90, discriminant validity is established between two reflective constructs (28).

**Gamification based-learning for *ReReki***

There were six game types of games created specifically designed for sexual and reproductive health (SRH) for adolescent boys. This game is Let’s X-plore, The Red Zone, Message Card for You, Box & Portal, This & That, and MONOR*eReki*. The Let X-plore, aims to promotes a constructive mindset of accepting change in oneself and choosing to use it for good. In the context of this study, an adolescent boy is motivated to engage in the behaviour by having a positive attitude toward self-change. Participants appropriate sticker and place it on the provided chart to understand the puberty changes. The red zone games aim to educate participants about the locations that should not be touched by anyone, particularly people of different gender. participant will place sticker on body parts that not should not be touched. In another game, Message card for you, participant pick a card randomly and compose a positive message to their friend based on the theme written on the card. The aim is a peer advice to encourage healthy sexual behaviour.

Box & Portals game encourages participant to reflect and learn about risky sexual conduct as well as gender identification and development by using board game concept similar to “snakes and ladders”. This or That game is created to allow participant to understand the complications of risky sexual behaviours. A pair of participants is needed in this Q&A session. Each person picks five questions for the other person to answer. Each correct answer will be given points. MONOR*eReki*, a game that similar to playing Monopoly aims to promote self-efficacy towards sexual abstinence. This game is played by a small group (2-4 people) by throwing dice to move from one station to another stations. If the player landed on the negative station (e.g., watching pornography), points will be deducted and vice versa if the player landed on the positive station.

**Ethical Approval**

To ensure participant safety during research participation, this study will abide by the principles of the Declaration of Helsinki and the Malaysian Good Clinical Practice Guidelines. The collecting of data for this project, which aims to advance and defend individual rights, must take ethics into consideration. Before beginning any study-related activities, the Medical Research and Ethics Committee (MREC) and other pertinent approvals

will provide their ethical permission for this project. The National Medical Research Register (NMRR) is one source of ethical approval [NMRR ID-22-00010-DIT] under the Ministry of Health (MOH), Educational Research Application System (e-RAS) [KPM.600-3/2/3-eras(12839)] under Ministry of Education and Medical Research Ethics Committee (MREC) [UNIMAS/NC-21.02/03-02 Jld.3(85)] under Universiti Malaysia Sarawak (UNIMAS).

**RESULTS**

**Sociodemographic**

The analysis included 175 participants from the EFA stage and 165 from the CFA stage. As shown in Table I, the mean age for EFA and CFA participants are 14.9 years old (SD= 1.32) and 15.35 years old (SD= 1.18) respectively. Overall, the majority of responders for EFA and CFA were Malays, followed by Dayak, Chinese, and other races.

**Table I: Sociodemographic characteristics of respondents.**

Socio-demographic	Exploratory Factor Analysis (n=175)		Confirmatory Factor Analysis (n=165)	
	Frequency (%)	Mean (SD)	Frequency (%)	Mean (SD)
<b>Age</b>				
13	35 (20.0)		18 (10.9)	15.35
14	26 (14.9)	14.96	14 (8.50)	(1.18)
15	50 (28.6)	(1.32)	54 (32.7)	
16	39 (22.3)		51 (30.9)	
17	12 (15.0)		28 (17.0)	
<b>Ethnicity</b>				
Malay	98 (56.0)		87 (52.7)	
Dayak	68 (38.9)		69 (41.8)	
Chinese	7 (4.0)		7 (4.2)	
Others	2 (1.1)		2 (1.2)	
<b>Year:</b>				
Form 1 (Year 7)	35 (20.0)		18 (10.9)	
Form 2 (Year 8)	26 (14.9)		14 (8.50)	
Form 3 (Year 9)	50 (28.6)		54 (32.7)	
Form 4 (Year 10)	39 (22.3)		51 (30.9)	
Form 5 (Year 11)	12 (15.0)		28 (17.0)	

**Result for Content and Face Validity**

The expert panels selected 35 items out of 65 items from the GAMEFULQUEST questionnaire (15). These 35 items were grouped into five factors instead of six factors. The five factors were competition (eight items), accomplishment (six items), guidance (seven items), playfulness (seven items), and social experience (seven items). All 35 items in the Gameful Experience Questionnaire (G-EXP) were rated as “essential” by the five expert panels with a CVR value of 0.99. This indicates that all items can be retained. (19,29,30). Face validity by the expert panel found no jargon words were discovered, although a few phrases need to be altered to improve the understanding of adolescent boys.

### Exploratory Factor Analysis

The EFA was tested on 35 items and retained five domains and 32 items with a total variance explained of 74.92%. These factors included competition (eight items), accomplishment (six items), guidance (seven items), playfulness (six items) and social experience (five items). The total variance explained for each factor were 19.69% for competition, 15.08% for accomplishment, 14.98% for guidance, 14.57% for playfulness and 10.58% for social experience. Each of the 32 items had a commonality of at least 0.5, indicating that it fit well with the other items in its domain (31).

To identify which item corresponds to which components or domains, the rotated component matrix, as shown in Table II, was used. Items with factor loading of at least 0.5 were kept for additional analysis (21). To make sure that only good items are selected for a confirmatory factor analysis step, using a higher cut-off value of 0.5 would be more practical (25).

Three items with factor loadings of less than 0.5 from the exploratory factor analysis were eliminated. The items that were taken out were from accomplishment: (Q18ac)- "Makes me feel like I have clear goals" and (Q20ac)- "Motivates me to progress and get better" and another one item from Guidance construct: (Q35gu)- "Gives me useful feedback so I can adapt". Hence the items were removed from the G-EXP and a cleaner result was obtained with a factor loading of or more than 0.5. There were five (5) structures included in the Scree Plot. This indicates that all 32 of the items in GAMEFULQUEST correspond to the construct, with Eigenvalues that are less than 1.0.

**Table II: Exploratory Factor Analysis on GAMEFULQUEST**

Item	Component				
	1	2	3	4	5
Q24cc	0.79				
Q27cc	0.77				
Q28cc	0.76				
Q26cc	0.74				
Q22cc	0.74				
Q23cc	0.73				
Q25cc	0.57				
Q16ac	0.50				
Q2pl		0.69			
Q19ac		0.67			
Q21ac		0.62			
Q17ac		0.60			
Q4pl		0.60			
Q20ac		0.18*			
Q33gu		0.59			
Q18ac		0.32*			
Q30gu			0.72		

CONTINUE

**Table II: Exploratory Factor Analysis on GAMEFULQUEST (CONT.)**

Item	Component				
	1	2	3	4	5
Q32gu			0.69		
Q31gu			0.65		
Q34gu			0.60		
Q29gu			0.59		
Q10se			0.54		
Q15ac			0.52		
Q35gu			0.40*		
Q5pl				0.75	
Q7pl				0.72	
Q6pl				0.71	
Q11se				0.67	
Q9se				0.64	
Q8se				0.54	
Q14se					0.731
Q3pl					0.674
Q1pl					0.652
Q13se					0.584
Q12se					0.570
Eigenvalues	20.512	2.076	1.395	1.149	1.091
Percent of variance	58.605	5.930	3.986	3.284	3.118

\*Deleted item

### Confirmatory Factor Analysis

The CFA was performed to validate the Gameful Experience Questionnaire (G-EXP) consists of five domains with 32 items. Model fit for the entire constructs and factor loading for each questionnaire item were achieved, with the following values,  $\chi^2 = 198.00$ ,  $df = 94$ ,  $p < 0.001$ ,  $\chi^2/df = 2.11$ ,  $SRMR = 0.04$ ,  $CFI = 0.94$  and  $TLI = 0.93$  and  $RMSEA = 0.08$ . Thus, this questionnaire has achieved the requirement for the assessment of construct validity (23). In this CFA process, 16 questions with a factor loading of less than 0.5 were removed. Therefore, the final retained items were 16 that could achieve the domain, convergent and composite validity of the G-EXP.

### Convergent Validity and Composite Reliability

The Average Variance Extracted (AVE) was determined in order to evaluate the convergent validity of the questionnaire. If the AVE value met the required threshold of at least 0.50, convergence validity was acknowledged. A composite reliability (CR) rating of at least 0.60 indicates that CR has been attained. Table III presents the conclusions.

**Table III: Average Variance Extracted and Convergent Validity for each component in the model**

Construct	Item	Factor loading	CR	AVE
Competition	Q24cc	0.817	0.882	0.653
	Q23cc	0.745		

CONTINUE

**Table III: Average Variance Extracted and Convergent Validity for each component in the model (CONT.)**

Construct	Item	Factor loading	CR	AVE
Competition	Q25cc	0.881	0.882	0.653
	Q16ac	0.783		
Accomplishment	Q17ac	0.967	0.896	0.742
	Q19ac	0.881		
	Q21ac	0.831		
Guidance	Q31gu	0.852	0.890	0.729
	Q32g	0.875		
	Q34g	0.834		
Playfulness	Q6pl	0.567	0.712	0.461*
	Q7pl	0.575		
	Q11se	0.855		
Social Experience	Q13se	0.871	0.777	0.542
	Q14se	0.688		
	Q1pl	0.628		

\* Below 0.5

The AVE value must to meet a criterion of at least 0.50 in order for convergent validity to be accepted. Meanwhile, if the composite dependability score is at least 0.60, CR has been reached (32). In this study, AVE for playfulness (0.461) which are less than 0.50. Thus  $AVE < 0.50$  means, on average item loading is less than 0.7 (25). Item measures of the latent construct are less than ideal since AVE does not convey enough variation for the variables (items/construct) to converge into a single construct. There is more error variance than variance that can be explained. The reasoning is that when an item’s loading is 0.71, its commonality is square loading. But the CR for playfulness (0.712) were greater than 0.60. These show that this questionnaire has fully met the requirement for convergent validity and composite validity for the playfulness domain based on the AVE and CR results (23).

**Discriminant Validity**

According to the results, the Heterotrait-Monotrait (HTMT) ratios of accomplishment, guidance, and competition are acceptable at 0.545 and 0.688, respectively. The guidance, playfulness, and social experience HTMT ratios all fall below the acceptable 0.9 threshold for achievement. The ratios of playfulness and social experience with guidance are also acceptable. The cut-off point for these traits was 0.90, but playfulness and social experience with competition were above it. More than 0.90 was found for the social experience of playfulness (Table IV).

**Table IV: Heterotrait-monotrait (HTMT) ratio of correlations**

Construct	1	2	3	4	5
1 Competition	-				
2 Accomplishment	0.545	-			
3 Guidance	0.688	0.331	-		
4 Playfulness	0.908	0.576	0.580	-	
5 Social Experience	0.950	0.482	0.553	0.924	-

**Internal reliability**

After dimension reduction, the latent domain’s internal consistency or reliability was assessed, and the value of Cronbach Alpha was calculated for each domain. For these 32 items (EFA), the Cronbach Alpha was 0.97, while for the 16 items (CFA), it was 0.90. Table V displays the Cronbach Alpha value for each domain. Internal consistency for the entire latent domain and for each domain was satisfactory because the Cronbach Alpha values were both more than 0.70 (24).

**Table V: Internal Reliability for each domain during EFA and CFA procedures**

Component	Number of items	EFA n=175		CFA n=165	
		Cronbach Alpha	Number of items	Cronbach Alpha	Number of items
Competition	8	0.94	4	0.87	
Accomplishment	6	0.92	3	0.91	
Guidance	7	0.94	3	0.88	
Playfulness	6	0.92	3	0.72	
Social experience	5	0.89	3	0.78	
Overall	32	0.97	16	0.90	

**The final evaluation and the method of evaluating it**

In the final gameful experience questionnaire (G-EXP), there were 16 items grouped into five domains. These domains were competition (4 items), accomplishment (3 items), guidance (3 items), playfulness (3 items), and social experience (3 items). A score were calculated based on the 7-point Likert Scale (1-strongly disagree to 7-strongly agree).

- Competition (total score from 7-28, shows that a higher score corresponds with a higher level of competitiveness)
- Accomplishment (total score from 3-21, indicates the higher the score, the higher immersive experience of accomplishment)
- Guidance (total score from 3-21, shows that the higher the score, the more they thought the service steered them, including helping them)
- Playfulness (total score from 3-21, suggests that the higher the score, the more enjoyable using the service was since they had the ability to develop things, providing opportunity for imagination and creativity)
- Social experience (total score 3-21, The increased presence of other people was sufficient to elicit social sensations (such as feeling responsible while others watch to see if a goal is accomplished).

The domain of “competition” describes the feeling of rivalry among individuals or groups made up of four domains. The factor loadings for each item in the challenge range from 0.74 to 0.88. The domain of “accomplishment” refers to three things: achieving goals, feeling the need for effective performance, and making progress. The accomplishment domain had factor loadings ranging from 0.83 to 0.96. The domain “guidance” describes the experience of receiving

instruction on how to enhance behaviour that consists of three items with factor loadings between 0.83 to 0.87. The domain of “playfulness” is made up of three components that are centered on the sensation of being engaged willingly in enjoyable behaviours that are motivated by imagination or exploration and free from or subject to norms that spontaneously arise includes three components. The factor loadings ranged from 0.56 to 0.85. The ‘Social Experience’ refers to the experience from the direct or indirect presence of people consisting of two items with factor loadings between 0.62 to 0.87. The 16-items G-EXP measuring model, whose final Cronbach alpha is 0.90 overall for the questionnaire, was shown to have acceptable reliability. The 16 items that make up the final set of the G-EXP surveys are listed in Table VI.

**Table VI: Final items after CFA**

Items	Question
Q24cc	Inspires me to compete
Q23cc	Feels like participating in a competition
Q25cc	Makes me strive to be the best
Q16ac	Makes me feel that success comes through accomplishments
Q17ac	Makes me strive to take myself to the next level
Q19ac	Makes me feel like I have clear goals
Q21ac	Makes me push my limits
Q31gu	Gives me the feeling that I have an instructor
Q32gu	Gives me the sense I am getting help to be structured
Q34gu	Gives me useful feedback so I can adapt
Q6pl	Gives me a feeling that I want to know what comes next
Q7pl	Makes me feel like I discover new things
Q1pl	Gives me an overall playful experience
Q11se	Makes me feel like I am socially involved
Q13se	Feels like a social experience
Q14se	Influences me through its social aspects

## DISCUSSION

Overall, the gameful experiences (G-EXP) were successfully validated for GBL in sexual and reproductive targeted Malaysian adolescent boys. The items of G-EXP were adapted from Hogberg’s GAMEFULQUEST questionnaire (15). The present study supported five domains (accomplishment, competition, guided, playfulness, and social experience) with 16 items. While another study who similarly adopted Horgberg GAMEFULQUEST questionnaire reported seven domains (accomplishment, challenge, competition, guided, immersion, playfulness and social experience) with 55 items to facilitate gameful experience among school students (33) and the use of seven domains (accomplishment, challenge, competition, guided, immersion, playfulness and social experience) comprising 56 items to assess the employee’s gaming experience while using a gamified training environment (34).

The smaller number of domains proposed in this study was the result of combined challenges and competition. Seven items made up the domain of competition. The domain of competition and challenges were grouped into one domain as explained during the validation procedure (15). One item from accomplishment domain was cross-loaded to competition domain was added. This item was (g16, “Makes me feel that success comes through accomplishments”). When it comes to games or matches, achievement is the accumulation of points or score that are closely linked to the competition, this item, with a factor loading of 0.52, belongs to the competition domain rather than the achievement domain. Points or scores are the “numerical measure of player success” (35).

For accomplishment and guidance domains, only three out of the seven items were retained to measure accomplishment and guidance experiences. These items are ideal for their respective domains, with acceptable factor loadings values (>0.5). It provides an accurate assessment of a user’s gaming experience, which can subsequently be used to inform research on gamification that is tailored to the needs of users and user modelling (15). Another item from social experience cross-load to playfulness that made three items measure playfulness. The social experience item g24 includes the statement “the game helps me to explore new things” as part of its description. The gamification of education can enhance levels of students’ engagement similar to what games can do, to improve their particular skills and optimize their learning (1).

Another reason was related to immersion experience which was unsuitable in the context of traditional physical game activities, this factor can be more found in many studies concerning online games (36). It is challenging to objectively define, yet it is simple to discern subjectively (37). Virtual reality is well known to be altering how people plays games, but it’s still up for dispute how much internet gaming actually contributes to an atmosphere that’s more immersive and present (38) and remains unclear affects in learning (39). This indicates that immersive component in gameful experience is not suitable for traditional GBL methods (40).

The results of many studies indicate the domains in gamification such as competition, accomplishment, guidance, playfulness and social experience may contribute to enjoyable experience (33). The relationship is high between social experience and playfulness may imply that it’s did contribute to encouragement of interaction between two people (41). However, this study focuses on creating a game-based learning platform that increases the utilization of elements that have a strong link with learning (playfulness and competition). As suggested in educational game design and play, playfulness steering is an emerging strategy



(36). In gamification, there is a strong correlation between guidance and competition. A small amount of guidance in the form of clarifying feedback resulted in higher transfer scores, fewer wrong responses, and a bigger decrease in misconceptions during problem solving (42). In this study, the element milestones, rules, guides, points, competition complete the essential component of gamification which helps on designing GBL in SRH. By adding the gameful components of competition, guidance, playfulness and social experience will make the GBL is more fun and interesting (43).

Due to cross-loading and low factor loadings (<0.5) at the exploratory factor analysis, three of the 35 items were deleted. These items were “*the game motivates me to progress*”, “*I am clear of the purpose of the game*” and “*the game gives me useful feedback*”. Out of the three removed items, two were conceptually designed to represent accomplishment domain, and one was from the guidance domain. This may reflect the clear objective, a clear direction and purpose of how to play the game. In gamification, a clear direction and know what should be done next is the main element (44). In confirmatory factor analysis, 16 out of 32 items were further removed to produce a good model fit. The deleted items park under different domains and has a low factor loading which is competition (four items), guidance (four items), accomplishment (three items), playfulness (three items) and social experience (two items). We can conclude that the domain is influencing each other mutually (45) and the flow of time is subject to influence by factors (46). The one-dimensionality of each item with respect to its associated construct was supported by the study’s five domains with 16 items, each of which had an internal consistency score of 0.90 according to Cronbach’s alpha (47).

Experiences with a game-based approach may help students establish a mindset that values outside-of-school literacy for literacy instruction inside of the classroom, which is something we believe is a long-term developmental aim. We expand on the claim that providing opportunities for literacy play in the classroom is a matter of equality (48) as some students have access to curricula that imaginatively welcomes these learning opportunities while others do not. For instance, studies suggest that African American kids play from a deficit viewpoint (49).

When used effectively, gamification may encourage and engage students to meet their learning objectives. By going through the validity procedure (3 stages) and achieving internal reliability, five domains with 16 items were created. This scale is useful to measure gameful experiences in SRH in traditional GBL setting.

## CONCLUSION

The Gameful Experience Questionnaire (G-EXP),

designed for use with adolescents, was developed and validated according to this study. Competition (four items), accomplishment (three items), guidance (three items), playfulness (three items), and social experience (three items) were all included in the final G-EXP’s five constructions and 16 item list. The G-EXP has strong internal reliability, convergent validity, and psychometric qualities that are satisfactory.

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