ICT for Psychosocial Competency Development

A study conducted in Sri Lanka

By

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Declaration

I, M.A.D.A.L Mudannayake, 2013/IS/030 hereby certify that this dissertation entitled ICT for psychosocial competency development, a study conducted in Sri Lanka, is entirely my own work and it has never been submitted nor is currently been submitted for any other degree.

…….. ……

Date Student's Signature

I, Dr. (Mrs.) T.A. Weerasinghe, certify that I supervised this dissertation entitled ICT for psychosocial competency development, a study conducted in Sri Lanka, conducted by M.A.D.A.L Mudannayake in partial fulfillment of the requirements for the degree of Bachelor of Science Honours in Information Systems.

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Date Signature of Supervisor

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Abstract

Along with the technology development, teenagers have more freedom and opportunities to experience new things and people. Parents are busy with their career and they do not have time to pay concern on dramatic behavioral changes of their teenage children. As a result teenagers are more vulnerable for abuse and health problems in particularly for teenage pregnancy. In order to minimize this issue, Health Organizations have started conducting workshops with the intention of empowering teenagers with knowledge, attitude and safety skills required to prevent pregnancy. However, teenagers seem reluctant to show their interest for studying about sexuality and talk about their issues openly. Therefore, health organizations emphasize the importance of identifying an innovative and personalized strategy to develop psychosocial competencies in teenagers. Since information and communication technology has proven to bring benefits for education, the present study investigated how ICT can be used to reduce the major health problem, teenage pregnancy through psychosocial competence development among teenagers.

Data were gathered through interviews, questionnaires and focused group interviews from a group of female adolescents who received support from professional counselors as well as from professionals at Ministry of Health. The findings imply that psychosocial competencies can be improved though an online intervention than a classroom-based intervention and it suggested that an online learning environment delivering lessons using videos, games and discussions might probably be well accepted by the adolescents and they will be willing to share their issues related to psychosocial competencies and receive advice online.

According to the findings, several paper prototypes were developed. Prototypes were evaluated by the IT professionals and counselors at the Ministry of Health, Sri Lanka and come across with a final paper prototype. Based on that, the online intervention was developed. While developing several brainstorming sessions were held with the doctors, IT professionals and the counselors at the Ministry of Health, Sri Lanka, to evaluate the progress of the online intervention. Then a sample was selected from Henegama Central College, Gampaha, to conduct the online pretest questionnaire.

A true experiment was conducted using a treatment and a comparison group and finally held the online posttest questionnaire. The results of the study informed that adolescents' level of psychosocial competencies can be assessed and supported through an online system. In order to prove these results and to know the perception of the adolescents for the online intervention, a separate interview was conducted. The results of the evaluation interpreted that the online intervention was successful in achieving psychosocial competencies among adolescents. Further analysis of data revealed that the learners' satisfaction and the target objectives can be archived successfully through the use of video, game and discussions.

Keywords— *Psychosocial competency, Teenage pregnancy, Instructional design, gaming principles, Design guidelines*

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Abbreviations

BCC	Behaviour Change Communication
FHB	Family Health Bureau
FWC	Family, Women's and Children's Health
HEB	Health Education Bureau
HEO	Health Education Officer
ICT	Information & Communication Technology
LST	Life Skills Training
RDHSD	Regional Director of Health Services Division
RH	Reproductive Health
MCA	Maternal, newborn, child and adolescent health
MVC	Model-View-Controller
UNFPA	United Nations Population Fund
UNICEF	The United Nations International Children's Emergency Fund
URL	Uniform Resource Locator

Part 1

Chapter 1: Introduction

Chapter 2: Background

Chapter 3: Methodology

Chapter 4: Results and Contributions

Chapter 5: Discussion

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Chapter 7: Concluding Remarks

Chapter 1

Introduction

Adolescents are the most valuable asset in a country. About one fifth (1/5) of world population are teenagers [1]. But today teenagers have more freedom and opportunities to experience new things and people. Parents are busy with their career and they do not have time to pay concern on dramatic behavioural changes of their teenage children.

As a result teenagers are more vulnerable for abuse and health problems in particularly for adolescents' reproductive health problems. According to World Health Organization (WHO) hundreds of teenagers get infected with HIV every week [2]. According to the United Nations Populations Fund (UNFPA) adolescents have experienced in limited and incomplete knowledge on sexual and reproductive health, a small percentage of adolescents have experienced pre marital sex, unprotected sex with sex workers and about 6% of adolescent girls in ages between 15-19 had a baby or were pregnant [3]. These health problems may negatively influence for individuals, families and the whole country as well as school dropouts, stigma, future marriage, education, economy, productivity and they can cause deaths. As a result it leads to collapse adolescents' and their parents' future expectations.

In order to minimize this issue, the World Health Organization has started conducting workshops to empower teenagers with knowledge, attitude and safety skills related for prevention of teenage pregnancy. Also health organizations have taken initiatives to improve quality and access to youth friendly health programs and services [3]. These initiatives aim to build health workforce capacity to effectively and efficiently respond youth health issues and to expand and strengthen physical and mental health including sexual and reproductive health education of adolescents at school level [4]. World Health Organization stated that psychosocial competencies and attitudes are more important than knowledge for adolescents to face day to day problems [6].

However, according to The United Nations Children's Fund (UNICEF) psychosocial competencies are essential for adolescents to face challenges effectively that meet in their day to day life [5]. A study conducted by Alubo et al. [6], Magnani et al. [7] and Hattie et al. [8] signifies that psychosocial competencies are a major component in reducing adolescents' health problems. Further the United Nations Populations Fund (UNFPA) has identified that

empowering psychosocial competencies as a behaviour change communication strategy is important to adopt and maintain the desirable behaviours among adolescents in the area of sexual and reproductive health [3]. Based on their findings UNFPA reports that use of ICT based intervention to develop psychosocial competencies among adolescents will be more beneficial than a traditional intervention [3].

Since ICT has rapidly been brought to use in various areas including teaching and learning, it has been globally accepted as a component of education [9]. Online interventions can be accessed by all learners at anytime irrespective of their locations. Also it will be a solution for the problem of addressing individual learning differences and time limitation to conduct the psychosocial competencies development programs at school level. Therefore, the health organizations emphasize the importance of identifying an interactive and innovative strategy to develop psychosocial competencies in teenagers to reduce reproductive health problems. Since information and communication technology has proven to bring benefits for education and many other fields, we were motivated to develop an ICT based psychosocial competency development tool to assess teenagers' level of psychosocial competencies and support them solving their psychosocial issues.

1.1. Problem Definition

According to the World Health Organization (WHO), the health problems that can threat to the adolescents' physical, social and mental health are drug usage, sexual harassment, violations, risky behaviours, pre-marital sex, teenage pregnancy, HIV/AIDS/sexual transmitted deceases, stress and suicides [10]. Those problems may cause to school dropouts, psychological disorders, attempting suicides, poverty, physical, mental and social consequences among adolescents [11]. Among adolescents' health problems, teenage pregnancy is taken as the main concern in Sri Lanka since it has an increasing trend or stagnation in the percentages within recent years [10]. According to the statistics from Family Health Bureau, percentages of teenage pregnancy within five years are representing in the following table and the graphical view of the percentages is displayed in the Table 1.1 and Figure 1.1.

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Percentage	**6.5**	**6.1**	**6.0**	**5.3**	**4.9**	**5.2**

Table 1.1: Statistics of teenage pregnancy in Sri Lanka

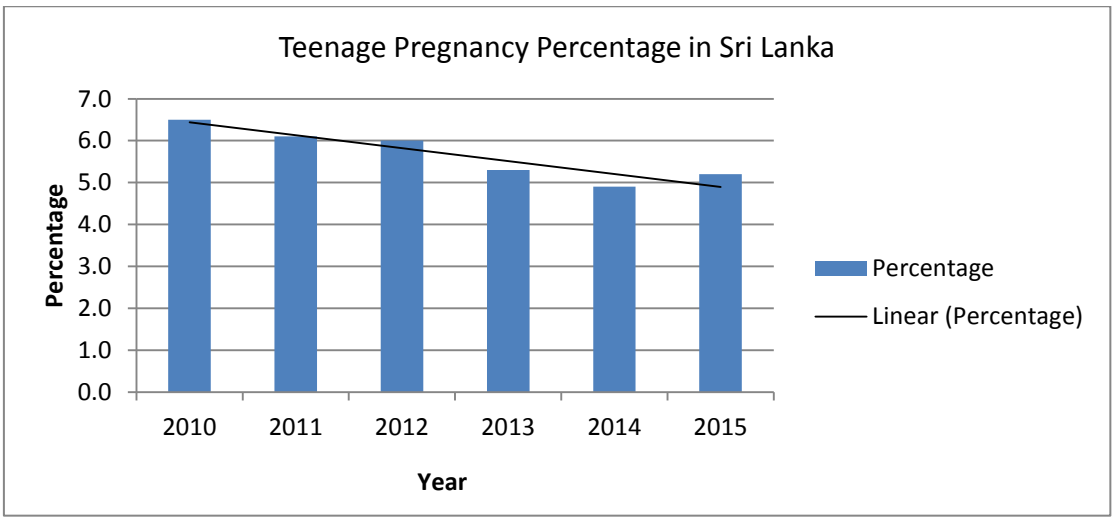


Figure1.1: Teenage pregnancy percentages in Sri Lanka

1.1.1. Adolescents' Fertility Rate

In order to get a clear idea of the increasing trend of teenage pregnancy, adolescent fertility rate is considered (See Figure 1.2). The adolescent fertility rate is defined as the number of births per 1000 women ages between 15 to 19. Though there was a decline in the trend over years from 1963, there is an increase from 1975. The increment in the years from 2006 to 2012 was from 28 to 36 per 1000 women ages between 15-19 (See Figure 1.2). This has grabbed the attention of the Ministry of Health and made them interested in finding a long-term solution for this problem.

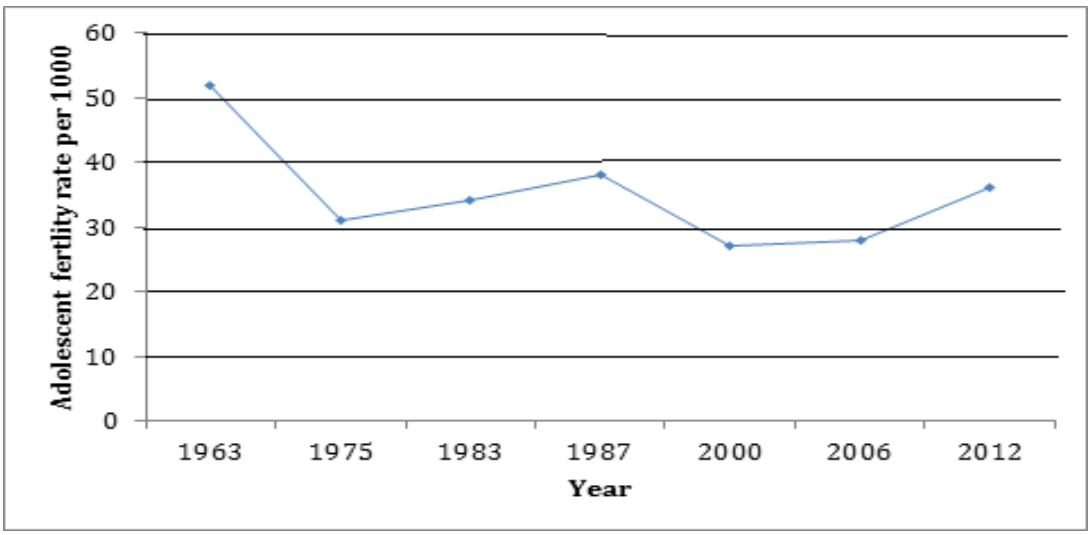


Figure 1.2: Adolescents' fertility rate

1.1.2. Solution

To find a long term solution within the Sri Lankan context, a research was conducted by Family Health Bureau (FHB), Sri Lanka in 2015 with the guidance of The United Nations Populations Fund (UNFPA) to identify the health problems among adolescents between ages 10-19 [3]. This was conducted among 25 districts in Sri Lanka and found out the importance of promoting and empowering of psychosocial competencies to reduce those identified adolescents' health problems. The major findings of the above research are mentioned below.

- 70% of the selected population had a positive perception about psychosocial competencies.
- But 28% of the selected population had not an aim for their future. From that 68% of the adolescents think according to the traditional way and their expectation were solid.
- Only 24% stated that they have alternatives if they failed to achieve their expected goal.
- The major psychosocial competencies that **lack among** adolescents are **Problem solving, Creative thinking and Coping with stress effectively.**
- Only 10% of the selected population believed that having a good character is essential for the success.
- 75% of the selected population stated that they are in stress.
- 24% of the adolescent boys and 10% of the adolescent girls between ages 17-19, who are still schooling are addicted to alcohol. According to the adolescents' ideas, this happened due to curiosity and peer influence.
- Even if there is a subject called psychosocial competencies in the school, this research identified that the knowledge of the usage of the life skills between ages 14-19 is very low and 70% of the adolescents do not have the knowledge regarding to reproductive health.
- Only 25% of the selected population had the correct knowledge regarding to teenage pregnancy.
- 14% of adolescent boys and 2% adolescent girls between ages 14-19 are addicted to sexual activities with the opposite gender.
- 14% of the selected population between ages 10-14 had the experience of violations and sexual harassments.

- The findings further stated that the teaching of the psychosocial competencies seems to be deemphasized in schools due to syllabus revision and there is not a particular tool to measure the status of the life skills among adolescents.

Based on the research findings, Ministry of Health in Sri Lanka indicated that promoting and empowering self-control, positive interrelationships and healthy behaviours is a must to reduce the adolescents' health problems in Sri Lanka. As identified by those organizations, both psychosocial competencies and knowledge should be addressed similarly in reducing the identified health problems. Further this research indicated that the current psychosocial competency development program at school level is not sufficient and needed an interactive intervention to empower the adolescents with psychosocial competencies.

1.1.3. Suggested Intervention

An intervention is a combination of program elements or strategies to create behaviour changes or to improve health status among individuals or an entire population. Therefore based on the research findings United Nations Population Fund (UNFPA) indicated that use of ICT based intervention to develop psychosocial competencies among adolescents' will be more beneficial than a traditional intervention [3].

ICT has rapidly been brought to use in various areas including teaching and learning [9]. Moreover, it has been globally accepted as a component of education. Online interventions can be accessed by all learners at anytime irrespective of their locations. Also it will be a solution for the problem of addressing individual learning differences and time limitation to conduct the psychosocial competencies development programs at school level.

1.1.4. Research questions

Considering the research findings of the Ministry of Health, the current research attempt to introduce an appropriate ICT based intervention to support the class room based psychosocial competencies development program to make it more effective. However, it is not clear how ICT should be used to develop psychosocial competencies among adolescents. Therefore present research aimed to answer:

"*How can ICT be used to support development of psychosocial competencies*?".

In order to answer the main question we need to answer the below sub questions to identify and attempt to discuss how the ICT tool should be developed. According to the findings of Ministry of health, there are different types of psychosocial competencies that should be addressed in an ICT-based intervention. In order to develop an ICT based intervention we should know the essential psychosocial competencies that should immediately be addressed:

1. What psychosocial competencies are essential and should immediately be addressed?

Once we identified the essential psychosocial competencies that should be addressed immediately among adolescents, we need to investigate more about technologies as there are different methods of delivering e Learning content to people. This consideration raises another question:

2. What is the most effective approach of delivering the content to adolescents?

After developing the ICT based intervention we need to clarify whether the ICT based learning intervention is more effective in developing psychosocial competencies than the traditional classroom based face to face teaching. This consideration raised one more question:

3. Whether the ICT based learning intervention is more effective than the traditional method of classroom based face to face teaching?

Finding solutions to above questions can shed light on what technologies can be used more effectively in an interactive way to deliver identified psychosocial competencies. However, the answers do not provide an adequate guidance about the instructional design to design the eLearning content. Therefore this thesis further attempt to present the sets of adopted instructional design principles for the design of the eLearning content based on the answers of the above questions.

1.2. Hypothesis

The null hypothesis of this study is: psychosocial competencies can be developed through classroom based intervention than using an ICT based intervention. The alternate hypothesis is: psychosocial competencies can be developed successfully by using an ICT based intervention, rather than the classroom based intervention.

1.3. Research approach

This research study is conducted with the primary objective of introducing an ICT based intervention to support the existing psychosocial competency development program conducted by the Ministry of Health, Sri Lanka. The software design is carried out to meet the Ministry of Health's and learners' goals and needs. The study is carried out by using experimental research method.

Firstly the literature review was done in order to answer the sub questions. Then the requirements need to gather to design the tool. Based on the requirements the tool needs to be designed. Then the designed tool needs to be reviewed by the professionals of the Ministry of Health and the adolescents. Based on their comments the design needs to be improved and have to develop the online prototype. The online prototype needs to be reviewed again by the Ministry of Health and the adolescents. Based on that, the online prototype needs to be improved. After that a sample need to be selected by conducting an online pretest questionnaire and a true experiment need to be conducted using a treatment and a comparison group. The online intervention will only give for the treatment group while having the class room based program for the comparison group. Finally the online posttest questionnaire will be conducted for both groups and gather the results and conduct another interview for treatment group to clarify their perception towards the effectiveness of the replacement of the class room based program with the ICT program. Finally the results need to be evaluated.

1.4. Methods and Techniques

The study methods include focus group discussions, interviews and brainstorming sessions. Focus group discussions were conducted mainly with adolescents to gather data related to student learning preferences, learning needs, styles and attitude towards the online environments. The set of questions to conduct the focus group discussions were prepared based on the data gathered from the doctors (professional student counsellors) and some medical reports at the Ministry of Health, Sri Lanka. Interviews were conducted with experts in the Ministry of Health to gather the requirements for the online tool and did debriefings using techniques such as brainstorming sessions with the experts in the Ministry of Health.

1.5. Delimitations

The present research deals with the psychosocial competencies that are specifically related to the reduction of the teenage pregnancy. Therefore the research does not consider the whole set of the psychosocial competencies. The data gathering related to the focus group discussions are done with the female adolescents ages between 15- 19. That has been selected according to the World Health organization (WHO) definitions of the age limitations about adolescents [4]. The present research deals with Sinhala students as this is conducted as a pilot test. Therefore the language used for the software is Sinhala. The software has been designed and developed considering the requirements of the Ministry of Health, Sri Lanka and preferences of learners (adolescents) as well as according to the learning theories. Therefore the outcomes of this research are best applicable on future designs and developments of the online tools aiming to support development of psychosocial competencies in Sri Lankan context.

1.6. Outline of the Thesis

This thesis consisted of two major parts as Part 1 and Part 2.

Part 1

Part 1 refers to the work reported in the papers attached to Part 2 and provides an introduction to the thesis. This part includes four chapters.

Chapter 1 introduces the thesis by describing the considerations associated with designing for an online environment to enhance psychosocial competencies of adolescents. The chapter presents the research problems and describes the context of the study, the research approach and the outline of the thesis.

Chapter 2 presents theoretical background of the research and information related to the instructional design principles that inspired the research. Moreover, it provides a literature review about the existing technologies that can be used to design the online environment. Further information regarding these analyses is reported in Chapter 3.

Chapter 3 presents the methodology chapter of the thesis. It describes the research design, methods and techniques that were used to conduct the research.

Chapter 4 presents the outcomes of the research and the conclusion including discussion of these outcomes by relating them to the findings of the similar studies are discussed.

Part 2

Part 2 composed of two conference papers which published based on the two major findings of the research.

Paper I

Mudannayake, M.A.D.A.L, Weerasinghe, T.A. (2017) ICT for psychosocial competence development among adolescents, *The International Conference on Global Education and E – Learning 2017 (GLOBED2017)*, ISSN 2602-85731 online, Vol. 1, pp.*9-18*

Paper 1 describes analysis of existing technologies used to develop learning content of the online programme in this thesis. It provides the background information on what technologies that can be used effectively to deliver learning content to learners.

My contribution to this paper was the review of the literature, preparing the design diagrams, and leading the writing process.

Paper II

Mudannayake, M.A.D.A.L, Weerasinghe, T.A. (2017) female adolescents' willingness to share psychosocial issue online and receive advice, *10th International Conference of Education, Research and Innovation (ICERI2017)*, Seville-Spain, pp.8429-8433.

This paper further discusses the willingness of adolescents for the identified technologies that discussed in the Paper I.

My contribution to this paper was conducting focus group interviews with adolescents to identify their willingness, review of literature and leading the writing process.

Chapter 2

Background

Today using of information and communication technology in delivering learning programmes has become a common practice. Information and communication technology has rapidly been brought to use in various areas including teaching and learning [9]. Moreover, it has been globally accepted as a component of education. Online interventions can be accessed by all learners at anytime irrespective of their locations. An online programme provides opportunities for learners to learn by interacting with the learning materials, evaluate learners' skills and it will be a solution for the problem of addressing individual learning differences and time limitation to conduct the learning programs at school level.

2.1. Psychosocial Competencies

Psychosocial competencies enable an individual to develop adoptive and positive behaviour. They are psychological and interpersonal abilities that assist in individual to make informed decisions and develop coping and self management skills to lead a productive and healthy life [13]. The literature regarding to psychosocial competencies reports on what are the psychosocial competencies that need to be addressed on adolescents. The United Nations International Children's Emergency Fund (UNICEF) reports that decision making, problem solving, creative thinking, critical thinking, effective communication, effective interpersonal relationships, self-awareness, coping with stress, coping with emotions and empathy are the psychosocial competencies that should be within adolescents to cope with day to day life problems effectively [12].

2.2. Different Approaches to Deliver eLearning Content

Learners can have different learning styles and preferences. Learning styles reveals how an individual can learn more efficiently. Learning preferences reveal the individual preferred mode of learning. Based on that researchers found out different technologies that can be used to deliver eLearning content in an effective way. The identified technologies from the literatures were mainly categorized in to five instructional methods as video based learning, audio based

learning, game based learning, image based learning and text based learning and discussion based learning (See Table 2.1).

instructional method	Technology	Example
Video based learning	Video sharing sites	Teensource.org [31]
	Vodcasts	The Midwest Teen Sex Show [34]
Game based learning	Online game	RePlay: Finding Zoe [35]
		Serious digital games like Prepare, The Romance Game, SISTAS, and It's Your Game [36]
Images and text based learning	Web sites	Youthline at http://www.youthline.ca
		QYouth Resource at http://qyouthresources.org/
		WebMD at http://www.webmd.com
		Sex,etc at https://sexetc.org/
Audio based learning	Podcasts	Sex Really: The Show [28]
		Podcasts at CDC [31]
		Planned Parenthood Online's Speaking of Sex [32]
Discussion (Q&A) based learning	Short Message Service (SMS) technology	Mobile for Reproductive Health (m4RH) [24]
		SexINFO [25]
		Hookup [26]

Table 2.1: Instructional methods, technologies and examples

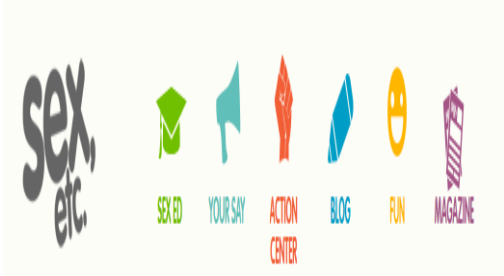
There were some technological examples that can be classified under two or more instructional methods (See Table 2.2).

instructional method	Technology	Example
Video and Discussion (Q&A) based learning	A film based intervention	If I Were Jack [38]
	Online therapy intervention	MoodGYM [37]
Audio, video and Discussion (Q&A) based learning	Widgets and Apps	Sexpert [28]
		AIDS.gov [29]
		RH Reality Check (Rewire) [29]
	Web-based social networking sites (SnSs)	Sex,etc MySpace profile [28]

Table 2.2: Combined instructional methods and technological examples

The above identified technologies and their examples (See Table 2.1 and Table 2.2) are tabulated as below with a detail description (See Table 2.3)

Technique	Why choose this technology	Intervention Example	Functionality	Features	Evidence
Short Message Service (SMS) technology	Preliminary data has shown that SMS can be used successfully to increase knowledge around reproductive health issues. Ability to promote short term behavior change for sexual and reproductive health. Most commonly used mobile app worldwide, fast and highly reliable, known to be opened and read in short time after delivery.	Mobile for Reproductive Health (m4RH) [25]	Free text messaging service on contraceptive methods, HIV and STI prevention, sex and pregnancy, and puberty that users in Kenya and Tanzania can access via mobile phones by the general public. Detailed stories about user experiences about family planning options were send to users every 2-3 days to keep users engaged. 	Easy to use and implement Reaching a wider audience with valuable information. The m4RH messages were developed using evidence-based content. Detailed stories about user experiences about family planning options.	The intervention group showed a 13% improvement in knowledge and behaviour compared to the control group
		SexINFO [26]	A text messaging service that delivers messages about sexual health. 	Users can send text "SEXINFO" to a designated number from any wireless phone. Then they receive information on sexually transmitted infections, HIV and referrals for in person consultation.	From the evaluation identified that the usage of the service has been greater than expected, and an initial evaluation to assess the impact of SEXINFO sexual health services among at risk adolescents has had expected results.
		Hookup [27]	A SMS service that provided weekly advices for the	Learners received weekly advices and educational news related to	A survey was conducted with Hookup

	Feasible		adolescents about reproductive health. 	on reproductive health and free clinic services when they texted the word "HOOKUP" to a phone number.	subscribers (N=2477) and identified that a total of 832 (33.6%) subscribers responded to the initial question and 481 (20%) answered all four questions of the survey. Also 90% reported having made some positive change since subscribing to Hookup.
Web-based social networking sites (SnSs)	In recent years social networking sites (SNSs) have grown rapidly in popularity. Have interactive functions. Offer a novel environment to deliver health promotion messages such as to aware, educate and service provision related to reproductive health.	Sex,etc MySpace profile [2]	A web based SnSs that provide sexual and reproductive health knowledge to the public. Mainly targeted for adolescents and this is written by teens, for teens. 	Has an information centre about sexual health stories, FAQ and resources. Sex terms (like a dictionary to know about terms related to reproductive health) Videos on reproductive health Forums to ask questions related to reproductive health problems Polls to answer the questions and after submitting can see percentage of others votes as well. Way to find locations of health centers A communication tool that suggest some ideas that how to start a conversation with a parent, partner, health care provider, friend or trusted adult. A way to see the rights on the state regarding to sex. A way to share teens ideas about their own incidence or make a voice regarding to the reproductive health issues and can share their ideas on their SnSs.	Over half (58%) of Internet using teens reported that they are going online to search for information about health and 40% had used the Internet to look specifically for sexual health information. Fewer (21%) had sought specific information about accessing sexual health services in their communities. But regarding SnSs specifically, a recent study found declining use of MySpace in a sample of over 1,400 adolescents followed over a period of 2 years.

				A blog about sexual health news A game to arrange the steps correctly regarding to condom usage and finally they play a demo of the steps. Can get magazines by subscribing via online or using mail. There is a way to contact if have questions.	
Widgets and Apps	Despite the security issues widgets are a very important are for the modern androids and smart phones and tabs. Therefore it can be used to disseminate information regarding to the reproductive health. App is an innovative way to reach clientele and to disseminate timely, educational	Sexpert [29]	Test and disseminate knowledge about reproductive health among adolescents.	This is a Facebook app which includes a blog, a toolkit, and a petition to sign and pass around. Also has a sex education quiz to test the learners knowledge	Not yet evaluated
		AIDS.gov [30]	This helps adolescents to do a zip code search for an HIV testing site or to get in-depth information about HIV/AIDS and reproductive health. 	Description about HIV basics such as HIV prevention/ HIV testing etc.) Digital tools such as social media (Facebook, Twitter, Instagram, YouTube) Events such as awareness about dates Has a blog Used widget based technology	New HIV diagnoses decreased by 7 percent The death rate dropped by about 30 percent Knowledge of serostatus, linkage to care, and viral suppression all increased Disparities in HIV diagnoses for Black females decreased Viral suppression increased among youth, people who inject drugs, and transgender women
		RH Reality Check (Rewire) [30]	Disseminate news about sexual and reproductive health of adolescents. 	Used widget based technology Has You Tube channel, podcasts, photos, GIFs Has a Twitter site and a Facebook page Has news, editorials, a blog, article archives	Experts identified that RH Reality Check serves as a think tank for the reproductive rights, justice and health movements and expand the public voice and media coverage for sexual and reproductive health and rights.

	information. Therefore apps can be used to disseminate reproductive health information.			A way to subscribe email to get news and reports about reproductive health. Daily publications providing news, commentary as well as analysis on sexual and reproductive health. Provides a forum for ideas and opinions.	
Video sharing sites	Surveys identified that 63% of online teens like to watch online videos	Teensource.org [31]	A video sharing website that contained information on healthy and responsible sexual lifestyles for adolescents. 	Has a YouTube Channel which delivered videos and testimonials on different themes related to life goals, choices that adolescents made and thoughts about teenage pregnancy. Has social media sites Has videos Has descriptions about STDs, Relationships, birth control Has a blog and public can contribute to that blog. Have testimonials by young teenagers related to their life goals and thoughts about teen pregnancy. Has a music video that focuses on “choices” young women make.	16,547 people have liked the Facebook page and 16,414 people have following the page. 4,961 views in the You Tube channel. But not yet evaluated regarding to the reduction of reproductive health problems.
Podcasts and vodcasts technology	Podcasts are convenient and easy to consume Podcasting is a time-efficient form of communication	Sex Really: The Show [29]	A podcast an episodic series of digital audio files implemented to prevent teenage and unplanned pregnancy among adolescents.	Podcasts are updated every two weeks Those podcasts are about 7-8 minutes long In the podcasts, a person explains about the reproductive health topics such as how to take control of sexual health, STD, When to End a Relationship etc. and for all podcasts the subtitles are available.	Not yet evaluated
		Podcasts at CDC [32]	An audio/video podcasts series about health problems such as teen pregnancy, chronic diseases, women health etc.	We can browse podcasts related to a particular health problem.	Not yet evaluated

				Anyone can save or download the audio/video file for later usage. In the teen pregnancy audio podcast, talk about that having a child during the teen years comes at a high cost to the young mother, her child, and the community and talk about tips to help break the cycle of teen pregnancy.	
		Planned Parenthood Online's Speaking of Sex [33]	An award winning podcast and video cast that explored issues related to sexuality and reproductive health.	This includes a wide range of topics such as relationships, birth control, contraception and an interview with a consultant about reproductive health etc. This is available as a free subscription from Apple iTunes as well as via direct download from Planned Parenthood.	Won the Webby Award and the Webby People's Voice Award. Have good customer reviews about the topics in the pod casts. But this not done any evaluation to see the podcast was help in reducing reproductive health problems.
		The Midwest Teen Sex Show [34]	A humour-based video podcast used to provide reproductive health information to the adolescents.	Have a series of video podcasts The episodes are normally three to five minutes long. Have humour based videos	36,978 views but not evaluated
Online game	99% of adolescent boys and 94% of adolescent girls willing to play games on a console, computer, portable gaming device, or cell phone It can be used as study guide	RePlay: Finding Zoe [35]	This is a video game that used to promote healthy relationships and to make youth aware about consequences of unhealthy relationships and challenges in adolescents' life. 	It centers on a group of kids and they search for a friend called Zoe, who is believed to be in an abusive relationship. Players have to find Zoe's diary, in which she chronicles her boyfriend's transformation from perfect to controlling, suspicious, and abusive. While playing the players have to face a survey that contained multiple choice questions regarding the player own relationships.	The intervention group showed a 25% reduction in gender violence.
		Serious digital games like Prepare, The	Promoting sexual healthy behavior.	A form of organized play, using a digital device and they are intended to be both entertaining and educational.	Serious digital games had positive effects on healthy lifestyles and their determinants.

	or as a learning supplement to promote safer behaviors as well as to teach collaboration, critical thinking, and deductive skills	Romance Game, SISTAS, and It's Your Game [36]		Promoting healthy lifestyles	Games developed with participatory design were more effective in changing behavioral, knowledge, attitudes, social norms, self-efficacy, skills, and perceived environmental barriers or facilitators when they included users in design elements on game dynamics (beta=.215, 95% CI .075 to .356, *P*<.01) and, more specifically, as an informant (beta=.235, 95% CI .079 to .329, *P*<.01). This study found that adolescent users preferred serious games to traditional educational approaches, such as classroom teaching.
Online therapy intervention	Improved access to evidence-based treatments for patients as well as cost-effectiveness compared to face-to-face treatment	MoodGYM [37]	An online, self directed therapy, implemented to prevent and reduce the symptoms of anxiety and depression among adolescents. 	Need to register It take a cost for registration It presents structured exercises to try as well as it teaches concepts and users are told to "Learn cognitive behaviour therapy skills for preventing and coping with depression".	This produced a significantly faster rate of decline in depressive symptoms over the trial period than the control condition. The effect size was not significant immediately after the intervention and was moderate and significant 20 weeks after the intervention.
A film based intervention	Interactive	If I Were Jack [38]	A film based intervention aimed to increase adolescents' intentions to avoid unintended pregnancy and address gender inequalities in sex education.	The film was a fictional story of 16-year old boy called Jack who has just found out that his girlfriend is pregnant. At the end of the film the learners needed to answer the question "What you would do if you were Jack?" and it discussed about the consequences of unintended pregnancy on current life and future goals of	Not yet evaluated

				adolescents.	
Web-based technology (Web sites)	Content can be delivered easily Accessible	Youthline at http://www.youthline.ca QYouth Resource at http://qyouthresources.org/ WebMD at http://www.webmd.com, Sex,etc at https://sexetc.org/'	All are websites that contained news and information about reproductive health problems.	They provided range of services such as medical and counseling support.	Research shows mixed results about the effectiveness of suicide prevention strategies. As well as identified that Screening and assessment methods have been found to be effective in identifying at risk youth while presenting them with little risk.
Surveillance technology	Can be used to evaluate the effectiveness f the interventions	SPECTRUM [40]	Modular software was implemented to examine the consequences of current trends and future interventions in reproductive health among adolescents.	This software projected the consequences of the HIV/AIDS including estimates of the number of people living with HIV/AIDS, the number of new infections, the number of people who have died due to HIV/AIDS.	This study showed 72% adolescents had gone online for health or medical information

Table 2.3: Detail description of the technologies and examples

2.3. Designing of the Online Environment

Learners have different learning styles and preferences. Researchers have categorized learning styles different perspectives. For example Myer-Briggs's type indicator assesses psychological preferences and classified learners into four categories extroverts/introverts, sensors/intuitors, thinkers/feelers and judgers/perceivers [14]. Kolb's learning style inventory described the approach of experimental learning and identified four learning styles: accommodating, assimilating, converging, and diverging [15]. Peter and Mumford developed the learning style questionnaire to identify learning style preferences. It categorized learners into four groups: activists, theorists, reflectors, and pragmatists [15]. As Peter and Mumford model is more reliable than the other models, it was decided to use in the study reported in the thesis [15]. Instructional design principles and guidelines are prepared based on learning theories instructional design theories and implications from design practices. Therefore the online environment discussed in this thesis was designed following basic sets of design principles and guidelines.

2.3.1. Instructional Design Principles and Guidelines

Educational literature recognizes that there are several instructional principles essential to encourage learning with ICT, such as contextual learning, active learning, social learning and reflective learning [17]. Instructional design principles are mainly derived from learning theories. However, design principles lack information related to factors such as task, context and technology. On the other hand, instructional design guidelines are more specific and context independent [17]. According to the study discussed in this thesis, the improvements are primarily inspired by two sets of design principles. "Gagne's nine events of instructions" and "Merrill's first principles of instruction". They have been widely used and appreciated for their usefulness in designing learning environments: for example Driscoll reports that Gagne's theory is widely used by the instructional designers in designing instructions [18]. Cropper, Bentley and Schroder report that award winning courses tend to use Merrill's nine events of instructions [19].

2.3.2.Gagne's Nine Events of Instruction

Robert Gagne identified a series of events which follow a systematic instructional design process that share the behaviorist approach to learning [20]. They are used as principles leading to effective design of learning environments. Gagne's nine events of instructions are :(1) Gain attention, (2) Inform learners of objectives, (3) Stimulate recall of prior learning, (4) Present the content, (5) Provide learning guidance, (6) Elicit performance, (7) Provide feedback, (8) Assess performance and (9) Enhance retention and transfer [20].

The above events imply the importance of having pre defined learning objectives, providing guidance for activities and providing feedback by assessing the performance. Gagne's Nine Events of Instruction can help build the framework with which to prepare and deliver instructional content. Gagne's nine events of instructions were chosen for the present study as it is focusing on the outcomes or behaviors of instruction or training. However, Merrill's instructional design theory and principles incorporate constructivist theories [21]. Therefore in the present study, the Merrill's first principles were chosen to be used along with Gagne's design principles.

2.3.3.Merrill's First Principles of Instruction

Many current instructional models suggest that the most effective learning environments are those which are problem-based and involve the student in four distinct phases of learning: (1) activation of prior experience, (2) demonstration of skills, (3) application of skills, and (4) integration or these skills into real world activities [21]. Merrill's first principles of instruction are supported by the perspectives of the three main types of learning theories: behavioral, cognitive, and constructivist [21]. Merrill prescribes that learning is promoted when (1) learners are engaged in solving real-world problems, (2) existing knowledge is activated as a foundation for new information, (3) new knowledge is demonstrated to the learner, (4) the learner applies new knowledge, and (5) new knowledge is integrated into the learner's world [21]. These five principles promote effective, efficient and engaging learning for the learners.

The first principle on the list defines a problem centered learning context, while other items define four phases of effective instruction as activation, demonstration, application and integration that are applicable in any kind of instructional design setting [21]. Merrill implies that problems should be authentic, real world, and, if possible, personal and identifies that

showing learners the task or problem they will be able to solve is more effective than stating abstract learning objectives [21]. According to Merrill, the first principles of instruction more specifically guide designing learning activities of real world tasks [21].

After designing the online environment following the design principles and guidelines, an evaluation should be conducted to determine the effectiveness of the online learning tool. Since the present study focusing on building a game as a part of the online intervention, the principles regarding to the gaming theories were further reviewed.

2.4. Instructional Design Principles for Games

For thousands of years playing games were considered an interesting method to pass the time, to relax, to get away from boredom, and offer solace [22]. From 1950s gaming started drawing attention as a suitable and viable approach for studying and handling the complex social issues of that time [22]. Nowadays we play on-line multi-media, massively multi-player on-line games from our home computers through the Internet. Rapid advances in information and communication technology and computer science have introduced a rich environment for the design and use of games [22]. Therefore online games are using wide spread for learning and entertainment [22].

Lapper and Malone suggest four factors to inform game design: (1) game must introduce challenges in a way that the learner feels continually challenged, where the difficulty of the challenges are increasing with the learner skills, (2) games must arouse cognitive and sensory curiosity, there must be sufficiently rich and powerful visual semiotics, audio information and interactions, (3) games should impart a feeling of being in control by providing immediate casual feedback, and (4) games should be fantasy to simulate the learner [23].

McGonigal identifies four defining traits of a game: (1) goal, which focuses players' attention, continually orients their participation, and provides a sense of purpose, (2) rules, which impose artificial constraints to push players to explore previously uncharted possibility spaces and unleash creativity and foster strategic thinking, (3) feedback system, which tells players how close they are to achieving the goal, (4) voluntary participation, which ensures that intentionally stressful and challenging work is experienced as safe and pleasurable activity[24]. McGonigal identified the micro level game layer that focusing on problem solving and on learning facts and skills (See Figure 2.1) [24]

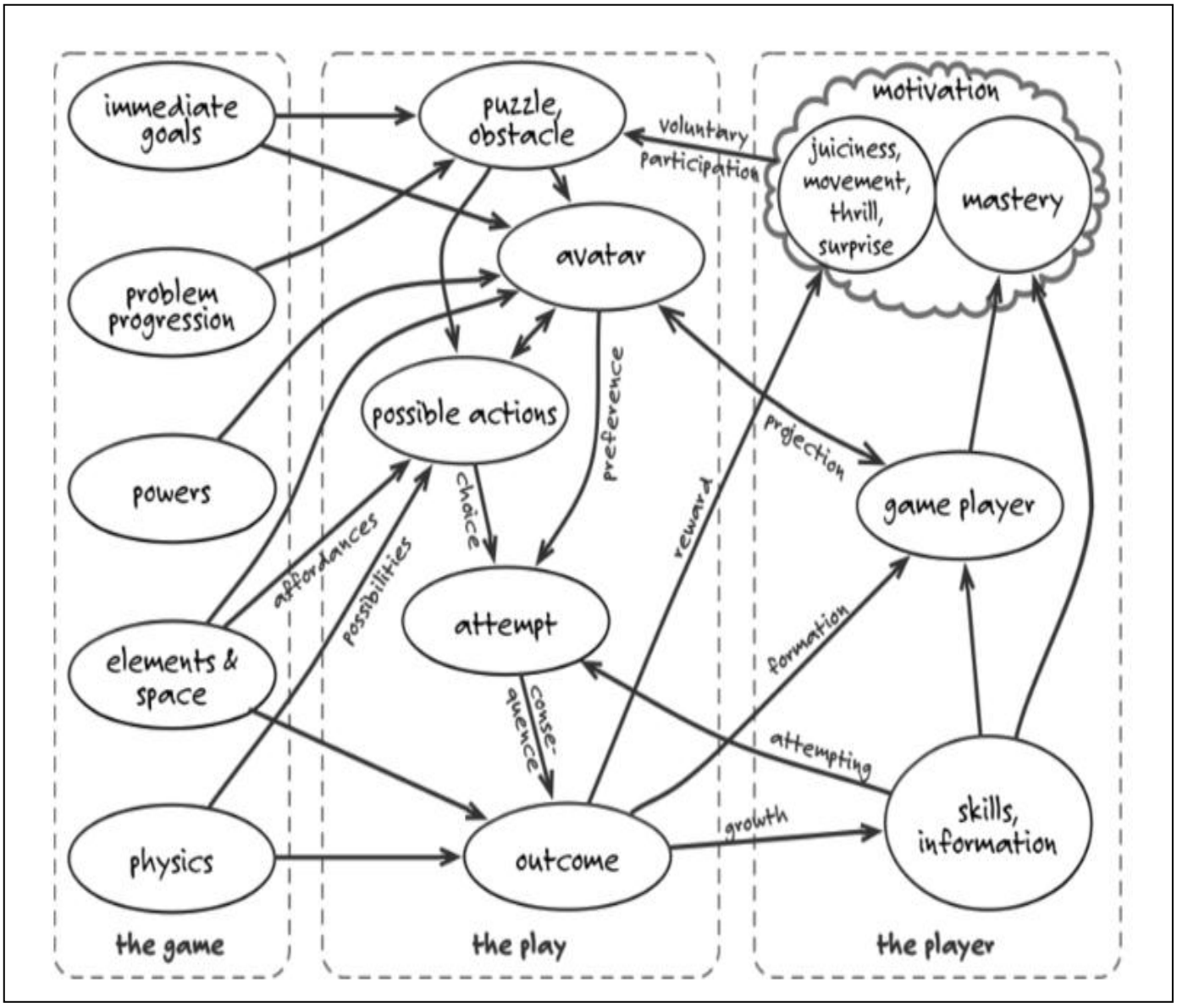


Figure 2.1: the micro level game layer, focusing on problem solving and on learning facts and skills (adopted from [24])

After designing the online learning tool following the instructional design principles and guidelines, an evaluation should be conducted to determine the effectiveness of the online learning tool. On the other hand, having conducted an evaluation to find what sort of design features can lead learners for better engaging in meaningful learning, the design principles and guideline can be further improved.

Chapter 3

Methodology

The research reported in this thesis is conducted in real environments under real settings. Accordingly, the research, mainly studies whether the online environment is suitable and effective than the traditional classroom teaching method. The thesis presents the design of the online intervention and its components that were developed basically following the instructional design principles.

3.1. Author's role

The author of this thesis played multiple roles during the research. During the data gathering, the author served as the main instructional designer, content developer and the main researcher. By doing multiple work, helped the author of this thesis to design the content and the test to evaluate learners in the same quality. However, playing multiple roles such as main researcher, instructional designer, content developer might have led to the risk becoming of biased. Therefore the author had to take several measures to reduce the risk of bias in interpreting results.

For instance, the author selected students with the help of the professional counselors, explained them the reason behind the data collection and informed them that the Ministry of Health, needed their support to develop an effective online intervention for the psychosocial competency program. Further, the author ensured that the learners' personal data would not be disclosed to anybody and would be kept anonymous. From that the author motivated the students to reveal their own ideas related to the design of online intervention. During the whole research the author acts as the main researcher and the author act as a designer and a developer when designing and developing of the online intervention.

3.2. Research Design

The research was carried out in five major steps (See Figure 3.1). The intervention was designed adhering to the instructional design principles (See pp. 18-21).

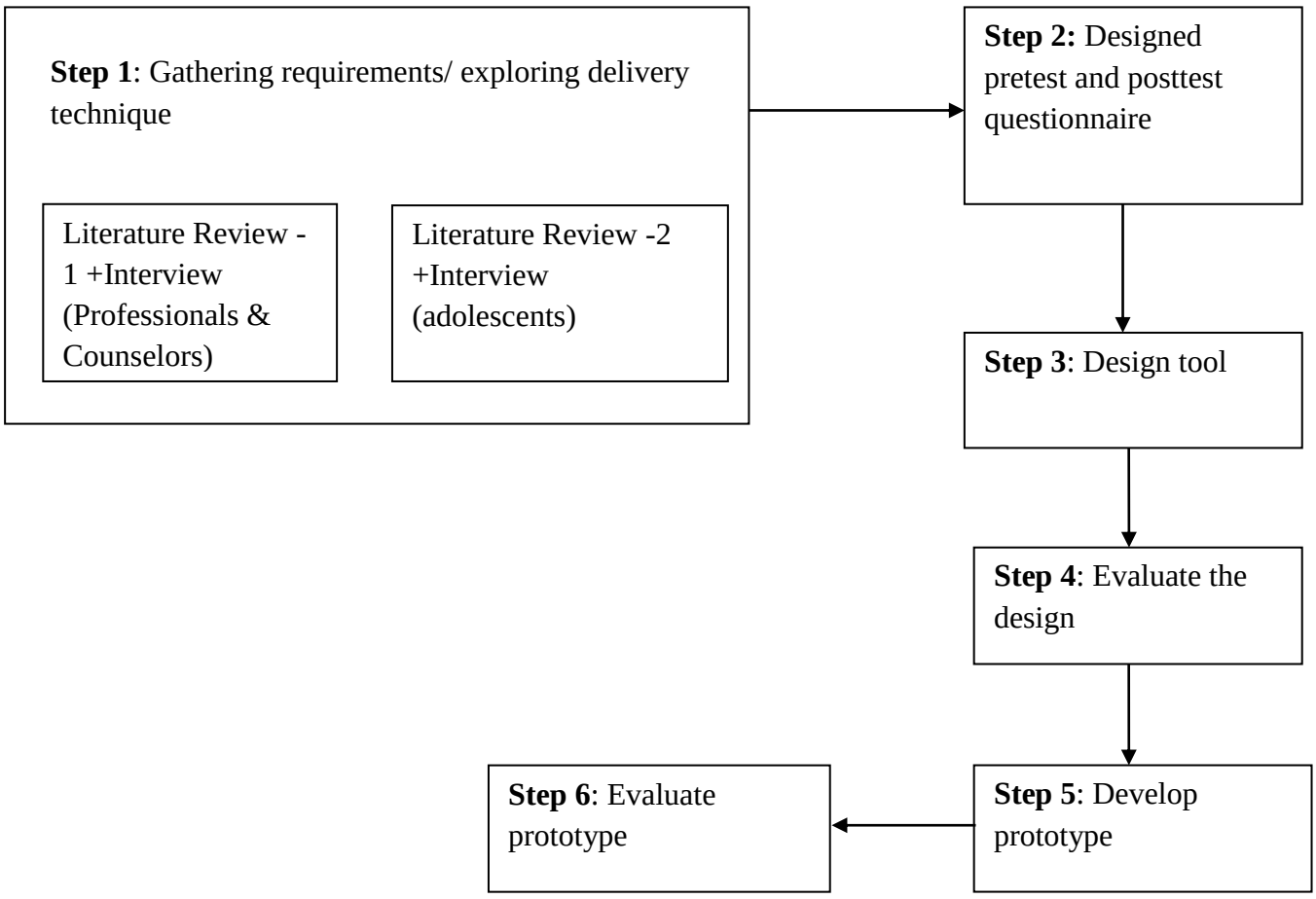


Figure 3.1: Methodology of the research

Literature review and the focus group interviews were done mainly to gather requirements and to explore the delivery technique on the online content. In order to answer the sub questions (see pp.6) literature review-1 was done to identify the immediate psychosocial competencies that needed to be addressed among adolescents and the literature review -2 was conducted to identify the most effective ICT based approach to deliver the online content (Step 1). The set of questions to conduct the interview (See Figure 3.2) was prepared based on the data gathered from the doctors (professional student counsellors) and some medical reports at the Ministry of Health, Sri Lanka. There were questions such as "*Have you heard about psychosocial competencies before?","What are psychosocial competencies?", and "Do you like to know (more) about psychosocial competencies online?*" (See Figure 3.2 for the complete questionnaire). The questionnaire was properly evaluated by a professional counsellor and it was used to gather data at the interviews under his recommendation. Notes were taken during the focus group interviews and data were analysed quantitatively and qualitatively.

1. ඔබ ජීවන නිපුණතා ගැන අසා තිබේද?
2. අසා තිබේ නම් ඒ කොහේදීද?
3. ජීවන නිපුණතා පිළිබඳව දැනුවත් වීම සිදුවූයේ කාගෙන්ද?
4. එසේ නම් ජීවන නිපුණතා යනු මොනවාද?
5. ඔබ දන්නා ජීවන නිපුණතා කිහිපයක් නම් කරන්න?
6. ඔබ පරිසණක භාවිතය පිළිබඳව දැනුම් ලබා තිබේද?
7. තිබේ නම් එය භාවිතා කරන්නේ කුමන කටයුත්තක් සඳහාද?
8. ඔබ අන්තර්ජාලය හරහා ප්‍රජනක සෞඛ්‍ය ගැටළු සාකච්ඡා කිරීමට කැමතිද?
9. අන්තර්ජාලය හරහා ඔබ සතු ජීවන නිපුණතා මට්ටම් දැන ගැනීමට කැමතිද?
10. මෙහි ප්‍රශ්ණ අසන ආකාරය පිළිබඳව ඔබගේ අදහස කුමක්ද?
11. එය වෙනස් විය යුතු නම් ඒ කෙසේද?
12. මෙම අන්තර්ජාල ක්‍රියාකාරකම් පිළිබඳව ඔබගේ අදහස කුමක්ද?
13. ඒ තුළින් ජීවන නිපුණතා වර්ධනය වේ යැයි සිතන්නේද?
14. එය වෙනස් විය යුතු නම් ඒ කෙසේද?

Figure 3.2: questions prepared for the focus group interview

In the 12th question, the adolescents were asked about their preferences for the identified technologies and instructional methods from the literature review (See pp.11-12).

Based on the information gathered from the Step 1, the online pretest and the posttest questionnaire were designed (Step 2). The online questionnaire was prepared (see Figure 3.3) based on the questionnaires provided by the Ministry of Health, Sri Lanka and it consists of 11 questions with audio (voice-cuts). The questionnaire was given to the participants who were willing to get their psychosocial competencies measured online.

Figure 3.3: A screenshot of online questionnaire

While designing the questionnaire, the design for the online intervention was prepared according to the instructional design principles (Step 3). There were several design workshops to design the intervention accurately. The paper prototypes of the design were evaluated an expert panel at the Ministry of Health as shown in the figure 3.4. The final, proposed paper prototypes that were evaluated by the professionals at the Ministry of Health are represented in the Figures 3.5- 3.9.

Figure 3.4: Evaluation panel of the paper prototype

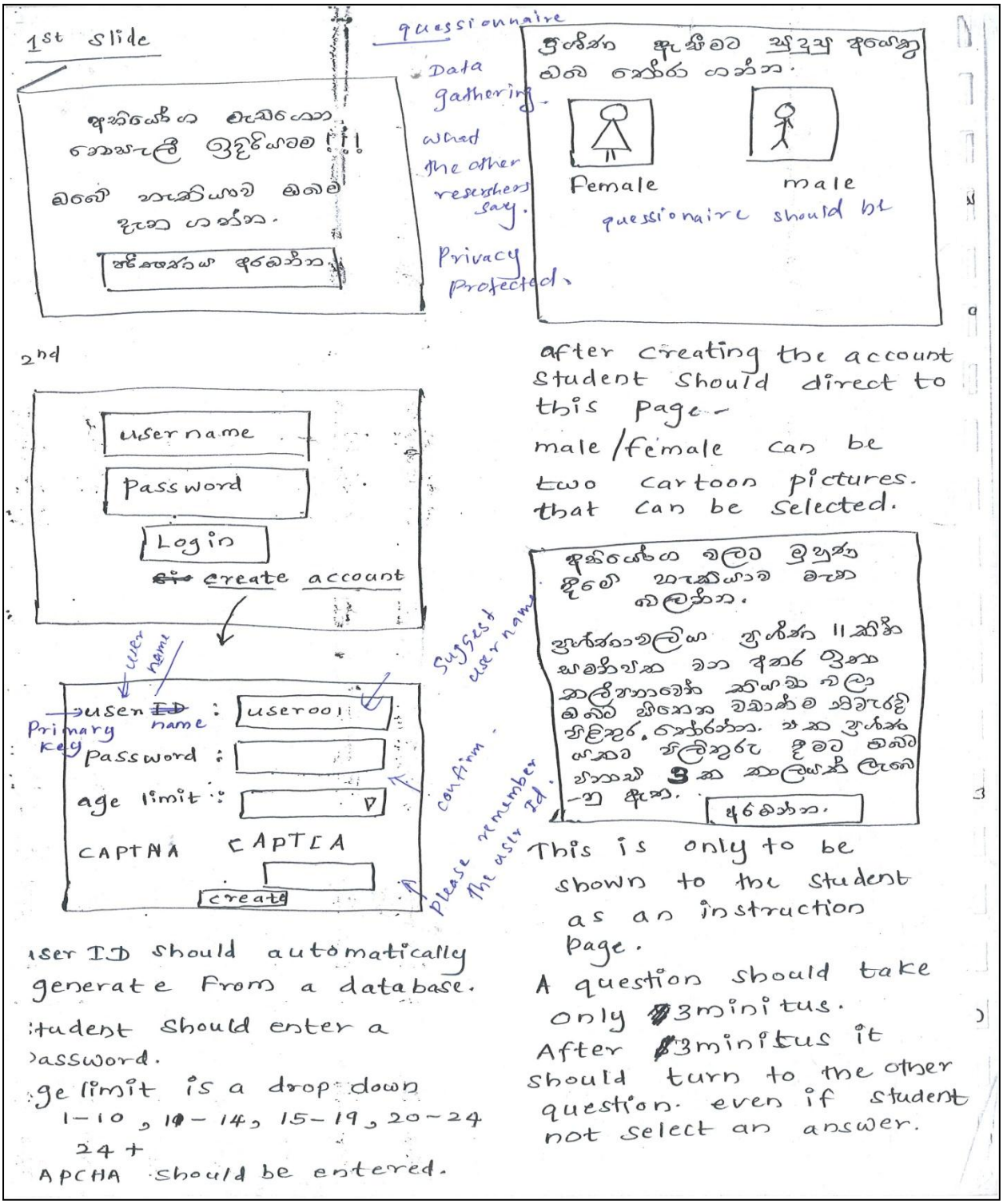


Figure 3.5: Paper prototype view 1

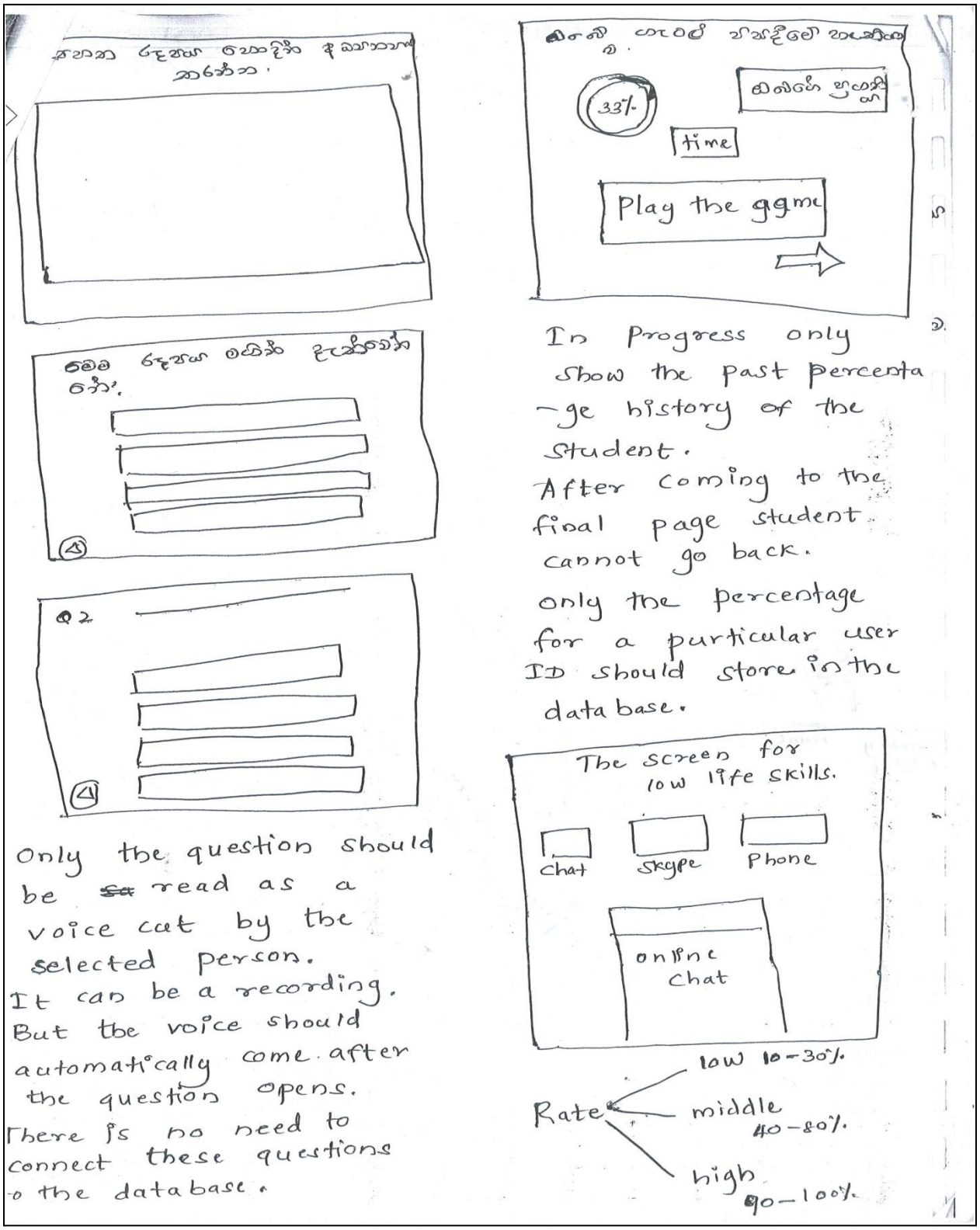


Figure 3.6: Paper prototype view 2

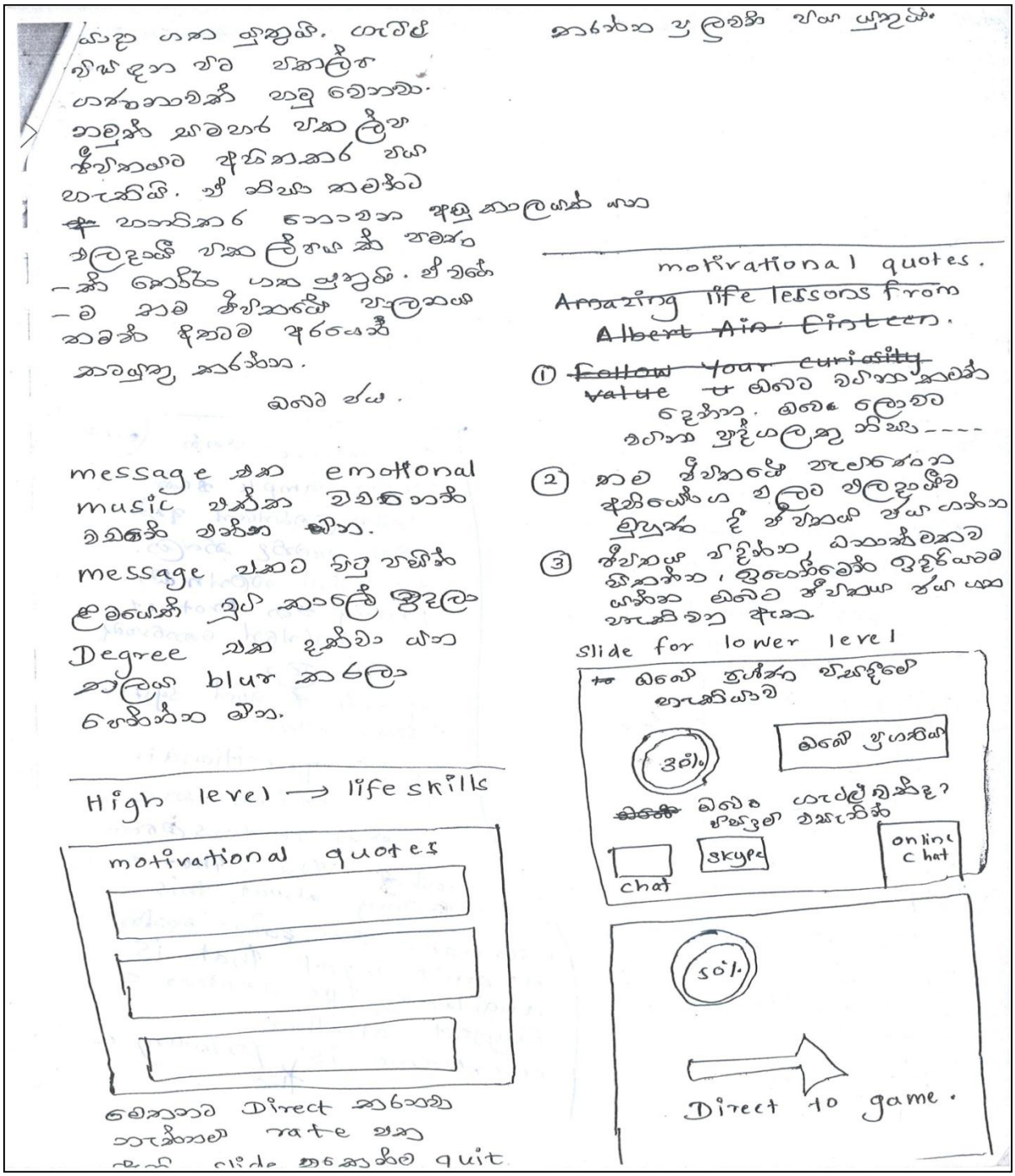


Figure 3.7: Paper prototype view 3

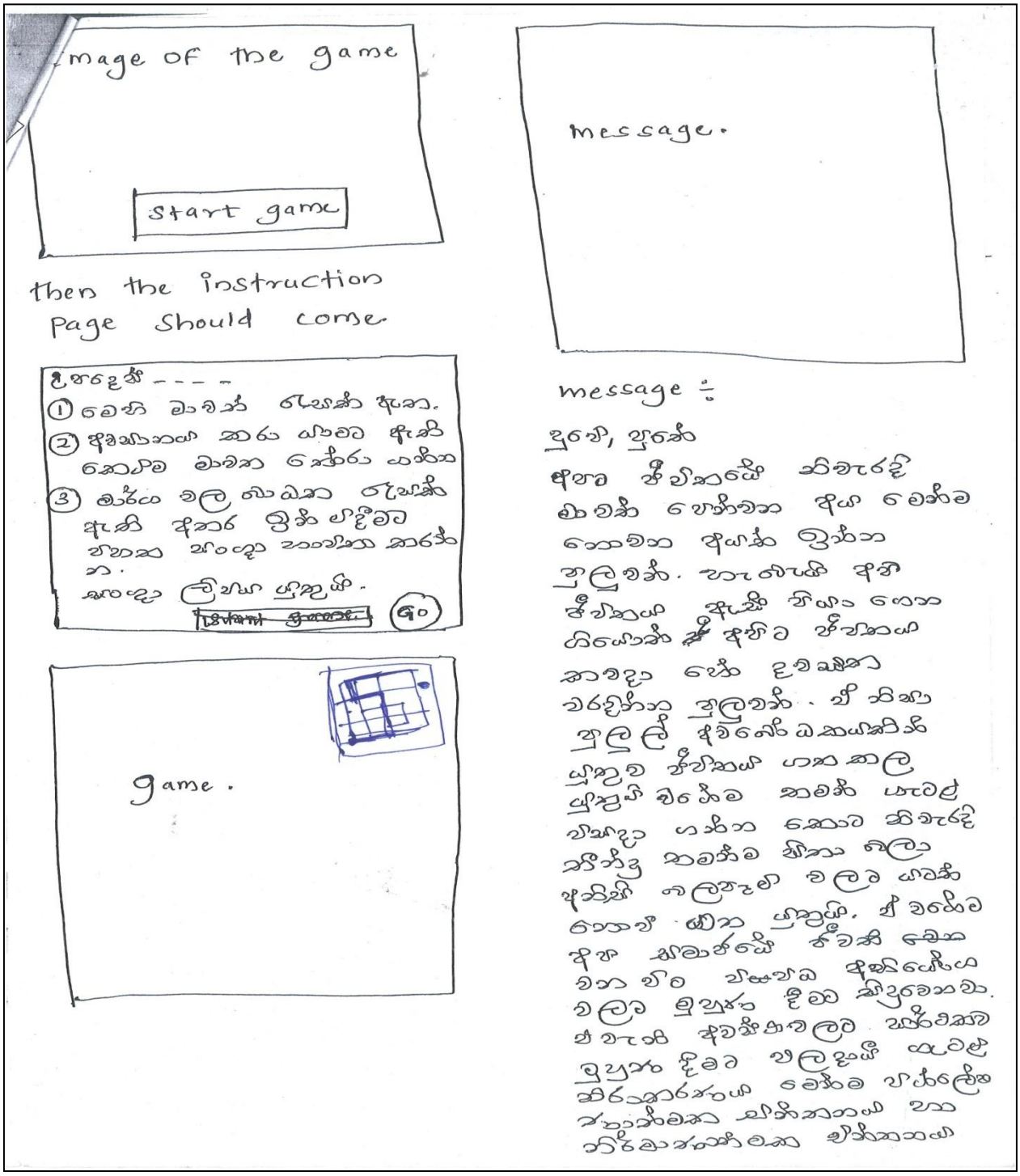


Figure 3.8: Paper prototype view 4

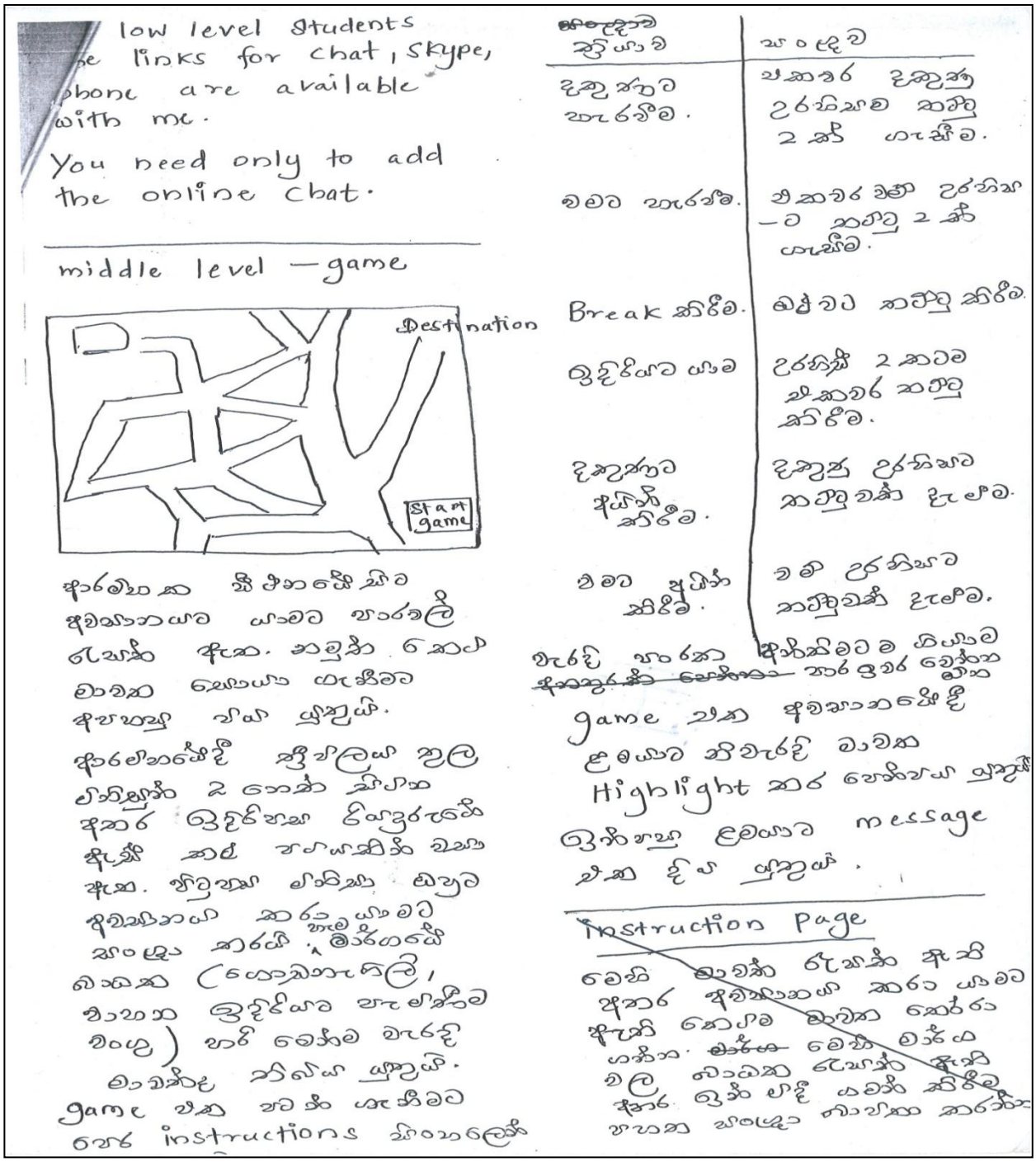


Figure 3.9: Paper prototype view 5

Based on the paper prototypes the design for the online program was prepared. After designing the online intervention, it was evaluated by the professionals at Ministry of Health and the same group of adolescents who participated for the focus group interviews at the requirement gathering stage for further improvements (See Figure 3.10) (Step 4).

Figure 3.10: Evaluation panel of the design

The design of the online game and the video was prepared according to the instructional design principles (See pp.18-21)

After the design stage the online program was developed. After developing the program, it was presented to the professionals, assistant counselors at Ministry of Health and for the same group of adolescents who participated for the prototype evaluation for further improvements (See Figures 3.11). The questionnaire used for the prototype evaluation shown in the Figure 3.12. The set of questions used for the evaluation were prepared with the guidance of the assistant counsellors at Ministry of Health.

Figure 3.11: Evaluation panel of the developed prototype

Prototype evaluation

මෙම අන්තර්ජාල tool එක පිළිබඳව ඔබ සිතන්නේ කුමක්ද?

මෙහි අකුරු වල ප්‍රමාණය පිළිබඳව ඔබ සිතන්නේ කුමක්ද?

මෙහි වර්ණ ගැළපීම පිළිබඳව ඔබ සිතන්නේ කුමක්ද?

මෙහි ඉවත් විය යුතු features තිබෙද?

මෙයට තව එකතු විය යුතු features තිබෙ නම් ඒ මොනවාද?

අන්තර්ජාල game/video එක පිළිබඳව ඔබ සිතන්නේ කුමක්ද?

ඔබට තව අදහස් තිබෙ නම් පවසන්න

Figure 3.12: Questionnaire used for the prototype evaluation

Finally the evaluation of the research was done in order to clarify whether the online intervention is suitable to replace the class room based psychosocial competency development program (Step 5). The evaluation (Step 5) was carried out in five steps (See Figure 3.13).

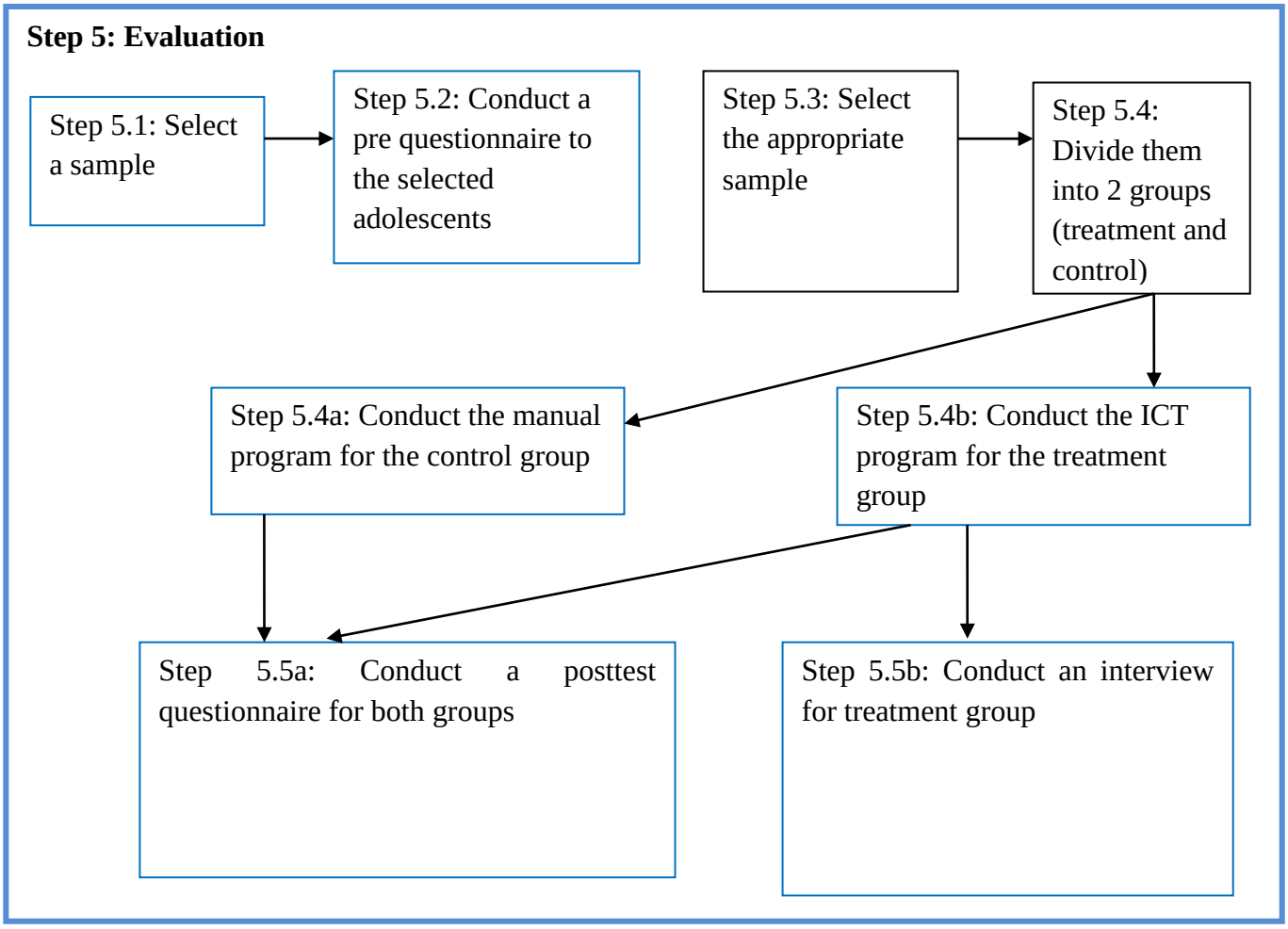


Figure 3.13: Methodology for the evaluation

Firstly a sample of 60 students was selected from the school, Henegama Central College, Gampaha, with the consent from the parents in order to conduct the evaluation (Step 5.1). This school was selected for the study as Ministry of Health already started to conduct training of the psychosocial competencies for the students, following their schedules. The method used to select the sample is described below.

Systematic random sampling was used to select the adolescents. A list of 120 female adolescents between ages 15-19, received from the principal that selected with the support of the school counselor. 12 members for each group selected to conduct the pretest questionnaire as the optimal number for an effective data gathering is 12. With the time limitation and the facilities available in the school, 60 female adolescents were selected as the sample (See Figure 3.14). For the selection, systematic random sampling method was used.

3.2.1. Selection procedure of the sample for the evaluation

The equation to select a random sample is: ***kth* member= N/n**

K = every k^{th} member of the population N=Population n=sample size

kth member= 120/60 =2

As the *k= 2* the sample was selected by one after other as highlighted in the Figure 3.14. As a result of that, a random sample of 60 students was selected is shown in the Figure 3.14.The highlighted adolescents were selected as the sample for the study.

1	**13**	**25**	**37**	**49**	**61**	**73**	**85**	**97**	**109**
2	14	26	38	50	62	74	86	98	110
3	**15**	**27**	**39**	**51**	**63**	**75**	**87**	**99**	**111**
4	16	28	40	52	64	76	88	100	112
5	**17**	**29**	**41**	**53**	**65**	**77**	**89**	**101**	**113**
6	18	30	42	54	66	78	90	102	114
7	**19**	**31**	**43**	**55**	**67**	**79**	**91**	**103**	**115**
8	20	32	44	56	68	80	92	104	116
9	**21**	**33**	**45**	**57**	**69**	**81**	**93**	**105**	**117**
10	22	34	46	58	70	82	94	106	118
11	**23**	**35**	**47**	**59**	**71**	**83**	**95**	**107**	**119**
12	24	36	48	60	72	84	96	108	120

Figure 3.14: Systematic random sample selected for the evaluation

Before giving the online pretest questionnaire, the adolescents were given the information (an introductory session was conducted) about the pretest questionnaire. Then the students were grouped in to 5 groups (12 per each). For the purpose of the pretest the web site was temporary host and the computers in the school was prepared to conduct the pretest. Then the online pretest questionnaire was conducted with the selected sample of students (Step 5.2).

Based on the level of marks of the pretest, the sample of was grouped into three categories: beginner, intermediate, and expert. Beginners are the adolescents who scored marks less than 30% and experts are the adolescents who score more than 80%. Intermediates scored in between 30% and 80% for the online questionnaire. These grouping levels were decided based on the information provided by the counselors at the Ministry of Health. According to the information provided by the ministry, only the adolescents in the intermediate group should

better be provided with an online learning content and adolescents who scored less than 30% should be immediately directed to a professional counselor for personal advice [4].

Therefore after conducting the pretest the appropriate sample (intermediate level) was selected to conduct the research study (Step 5.3).

The selected intermediate level sample then divided as the treatment and control group (Step 5.4). As there were 48 students out of 60 got the results between 30-80, it made easier to divide the sample randomly in to two equal groups (24 per each group). After dividing the sample the class room based program was conducted for the control group while conducting the ICT program for the treatment group (Step 5.4a and Step 5.4b).

Then a posttest was conducted to access adolescents' improvement in the skills of problem solving and creative thinking (Step 5.5a) and a separate interview was conducted to investigate adolescents' perception towards the effectiveness of the ICT based learning intervention (Step 5.5b).

3.3. Ethical considerations

The school for the research study was selected with the permission of the regional educational department at Gampaha and got the permission from the principal of the Henegama Central College, Gampaha. Before selecting the sample the consent from the parents were taken. The students were informed about the program including what was expected from the participants and the reasons for conducting it. The students' willingness to participate for the program was inquired. The students were assured that they could remain anonymous and were informed of their right to discontinue participation at any time.

The interviews with the professionals and the assistant counselors at Ministry of Health were held with the permission from the director of Family Health Bureau and the director of the Health Education Bureau.

Chapter 4

Implementation, Results and Contributions

The findings, results and the contribution of the present research are discussed with respect to the out puts of the present study of this thesis and other contributions of the research process. Having presented the findings and results, this chapter attempts to answer the two sub questions: What psychosocial competencies are essential and should immediately be addressed? (Q1) and What is the most effective approach of delivering the content to adolescents? (Q2) in order to answer the main research question: *How can ICT be used to support development of psychosocial competencies*?".

4.1. Psychosocial competencies needed to address among adolescents (Q1)

According to the literature there are ten essential psychosocial competencies needed to be addressed among adolescents. (1) Decision making, (2) Problem solving, (3) Creative thinking, (4) Critical thinking, (5) Effective communication, (6) Effective interpersonal relationships, (7) Self-awareness, (8) Coping with stress, (9) Coping with emotions, and (10) Empathy. From the interviews had with the professionals and counselors at Ministry of Health two psychosocial competencies were derived out of ten in order to meet the identified reproductive health problem, Teenage pregnancy. Those were (1) Problem solving and (2) Creative thinking.

4.2. Approaches of delivering the online content (Q2)

Q2 is answered refereeing to the out puts reported in paper II. According to the results of the analysis of data collected at focus group interviews informed that 90% liked to share their information and discuss their psychosocial issues online (Table 4.1). The remaining 10% did not respond and remained silent.

Item	**Rate**
Already know about psychosocial competencies	100%
Like to learn about psychosocial competencies online	90%

Like to get the level of psychosocial competencies assessed online	100%
Feel OK to discuss your issues related to psychosocial competencies online?	80%
Do you like to receive counseling support online?	50%

Table 4.1: willingness to learn, share issues and receive advice

However, when online questionnaire was given, all the subjects were willing to attempt the online questionnaire. They were satisfied about the online questionnaire. After attempting it, they reported that they like to learn about psychosocial competencies online.

From the literature, five main instructional methods were found as: (1) Video, (2) Game, (3) Images and text, (4) Audio, and (5) Discussion (Q&A) to deliver the eLearning content. Among them video, game and discussions were identified as the most effective delivery methods to deliver online content. Further in order to design the online information system to support the adolescents to overcome their psychosocial issues a set of questions regarding appropriate instructional method were raised at the interview. 80% of them expressed their willingness to study through online games and all informed that they would like to learn through videos (See Table 4.2). It also proved that video, game and discussion are the most effective delivery methods to deliver eLearning content.

instructional method	Preference
Video	100%
Game	80%
Images and text	40%
Audio	30%
Discussion (Q&A)	100%

Table 4.2: Preference for instructional method

This finding complies with the result of Péter et al.[41] who reported that video based learning is more effective than traditional methods of teaching and learning. Also, game based learning has been considered effective for creating and maintaining learners' motivation throughout the lesson [42] and discussion based learning has been found as an effective method to engage learners in deep and meaningful learning [43]. Incorporating these findings of the contemporary research, the results of the present study informs that online learning environments that are designed to support adolescents developing knowledge and skills related to psychosocial competencies may better be designed with videos, games and discussions. Based on the findings of literature, professionals and the adolescents' perceptions, the online intervention was designed with guidance of the assistant counsellors at Ministry of Health (See Figure 4.1).

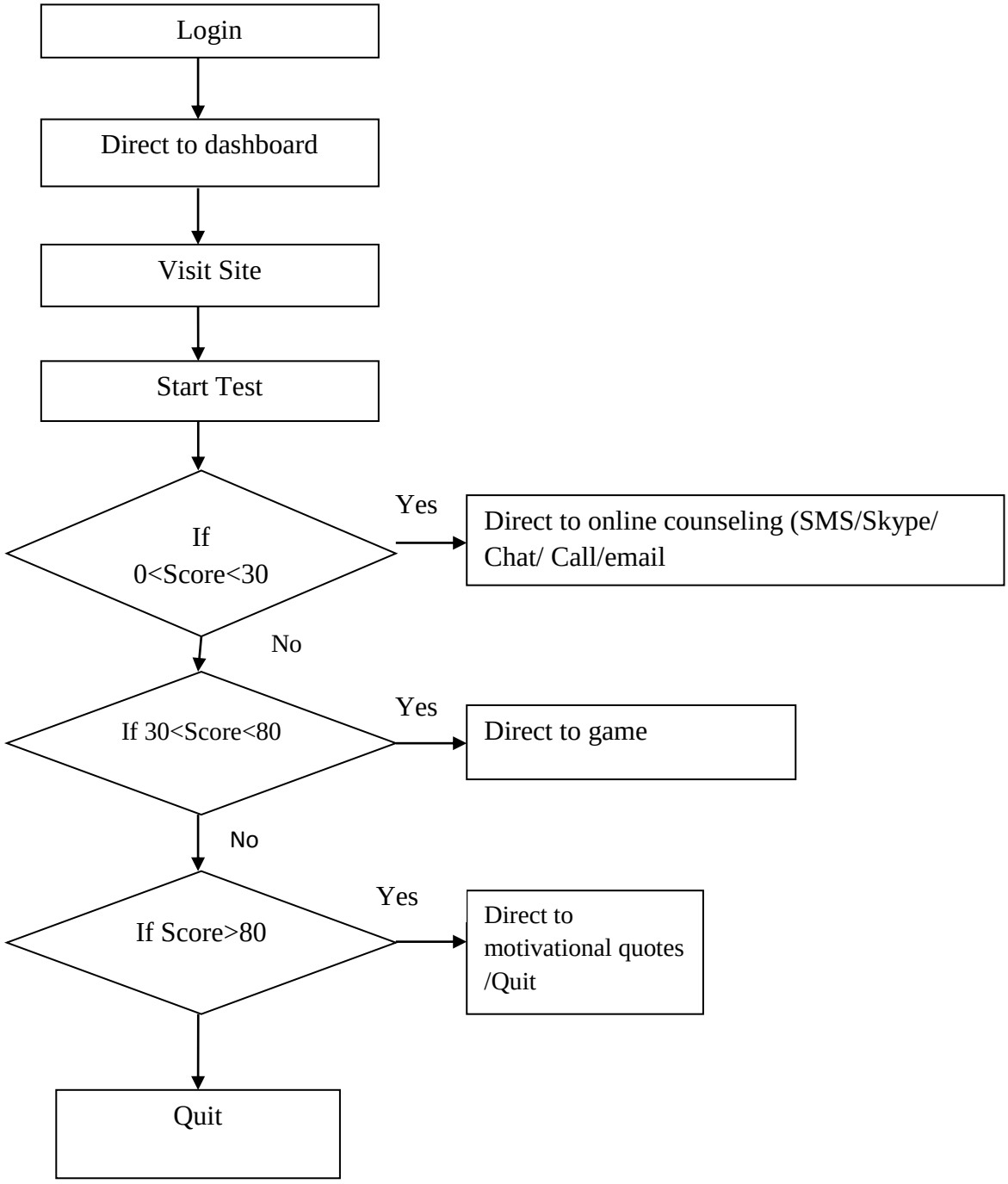


Figure 4.1: Design of the online intervention

The design of the online game was prepared according to the literature, instructional game design principles and with the guidance of the assistant counsellors at Ministry of Health (See Figure 4.2).

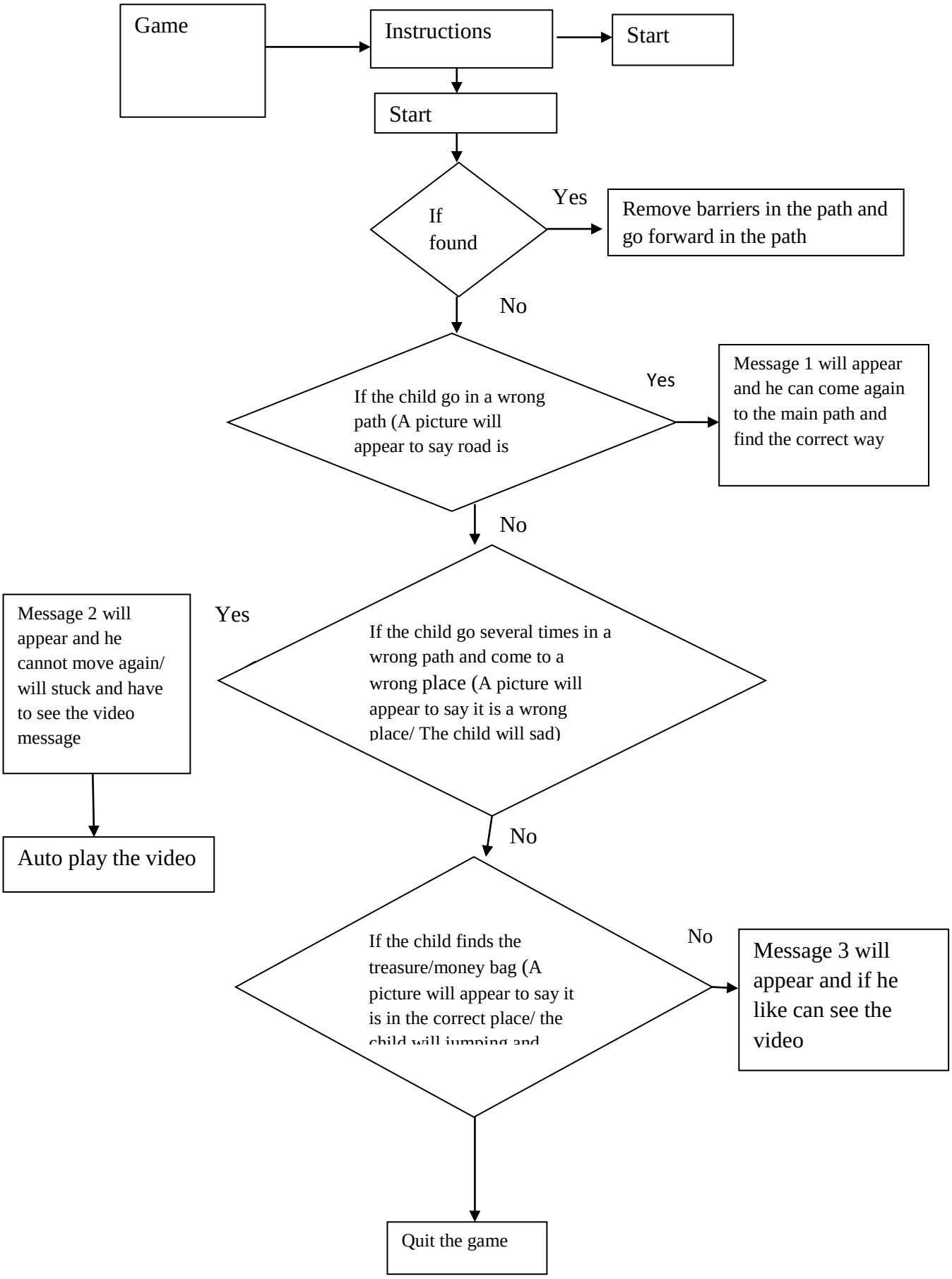


Figure 4.2: Design of the game

Refer Figure 4.15.for Message 1, Figure 4.16 for Message 2 and Figure 4.17 for Message 3. The design of the video interface was also designed according to the instructional design principles and the design prepared for the interface of the video is shown in the Figure 4.3.

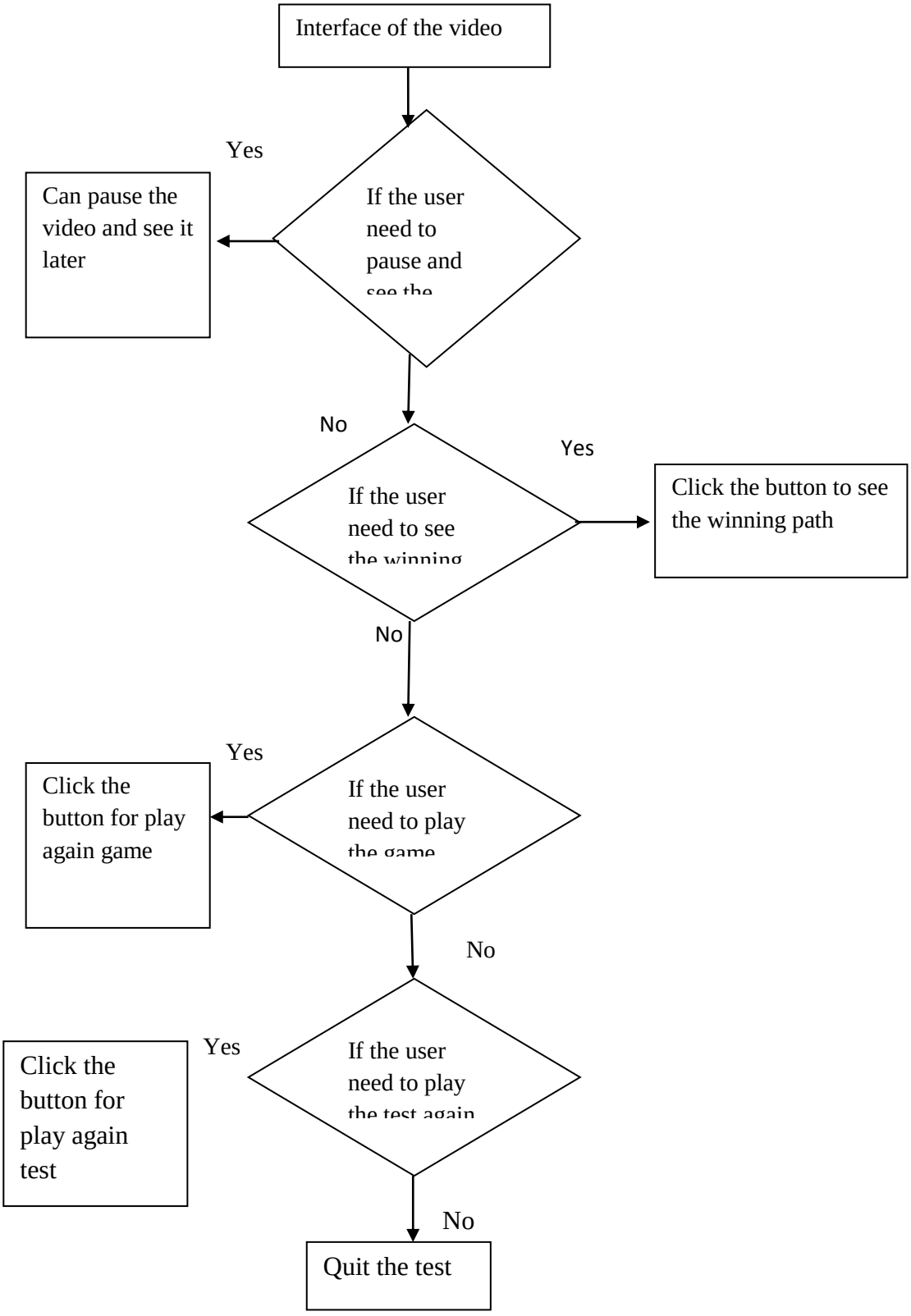


Figure 4.3: Design of the video

Based on the findings, the online intervention was developed according to the set of instructional design principles that were based on two design principles: Gagne's nine events of instructions and Merrill's first principles. As well as the game design principles and the author's experience in online cause designing learned at the university were used in designing and developing the online content. The main screenshots of the developed prototype is shown in the Figure 4.4- 4.21.

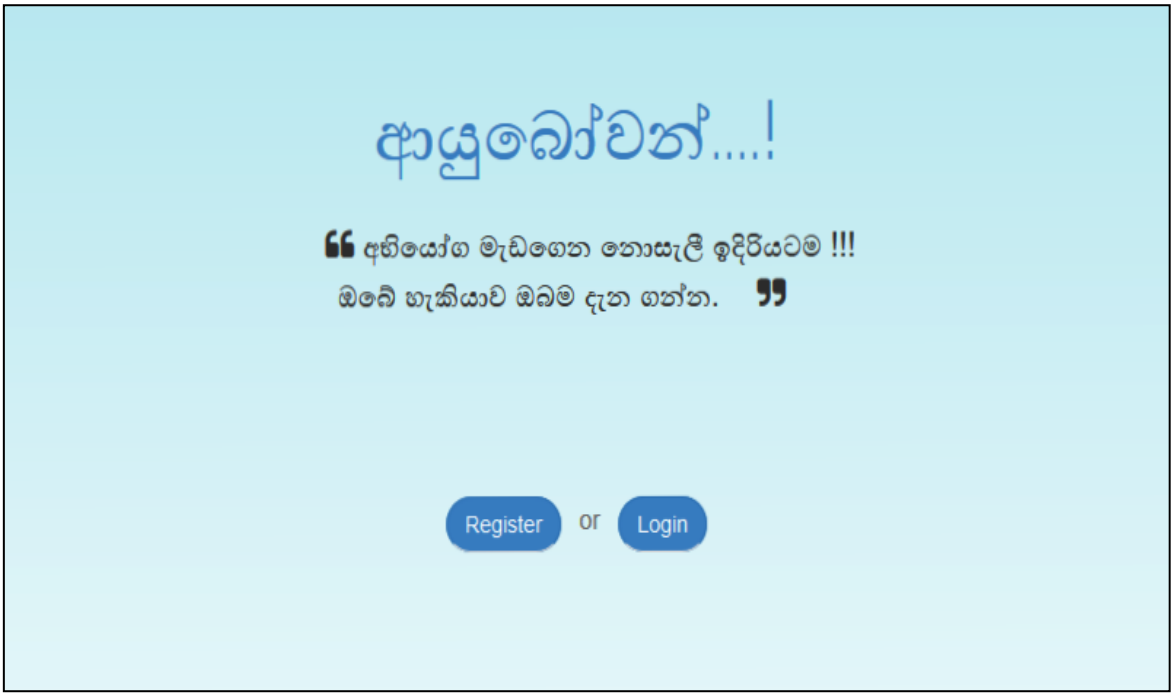


Figure 4.4: Screenshot of the starting interface

Firstly the user will be directed to this interface when she/he clicks the Uniform Resource Locator (URL) of the site. The user needs to register before moving ahead or the user can log in to the site if they have credentials (See Figure 4.4).

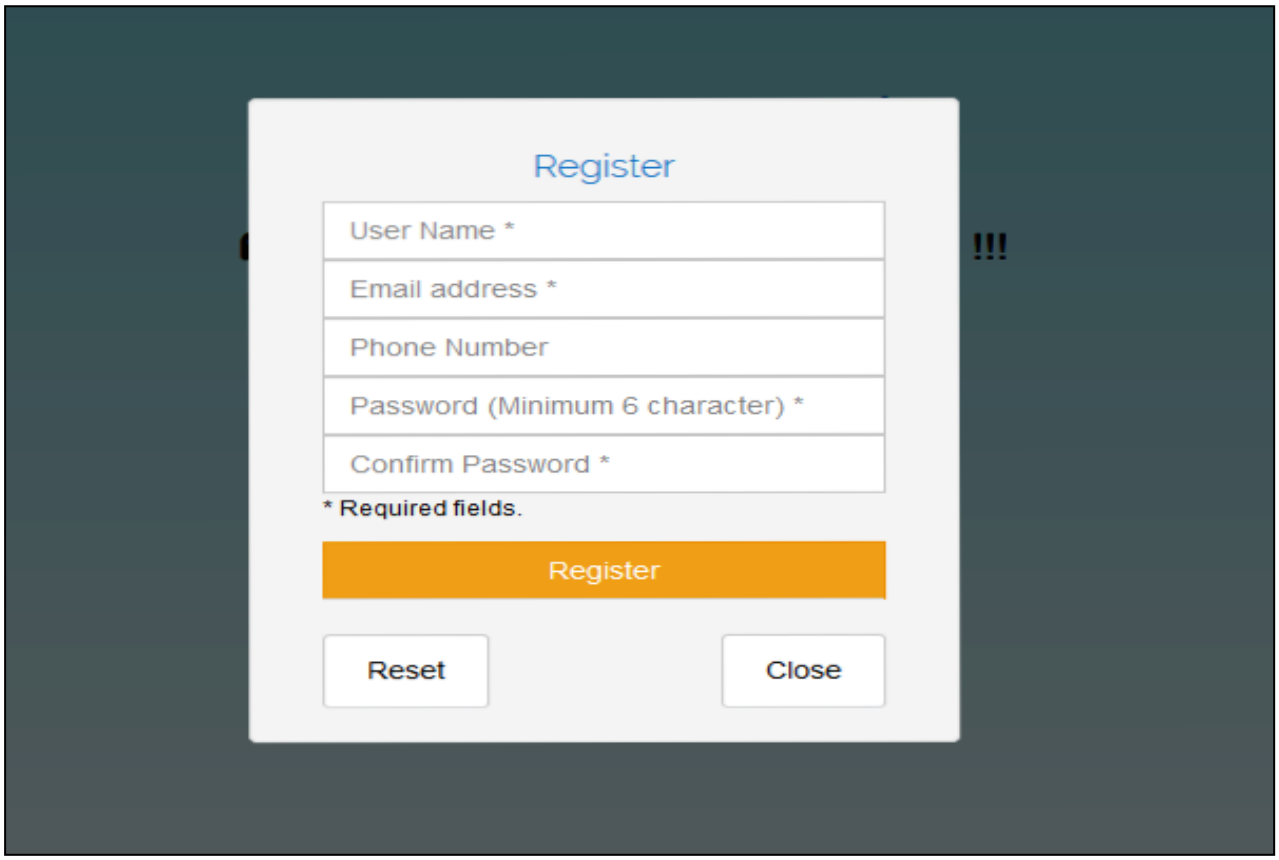


Figure 4.5: Screenshot shows when clicks register

The user needs to input a username, email address, phone number and a password when registering for the site. Login credentials were taken because the students asked that they need to keep their privacy from others as well as they asked for a separate account for each, to see their history. By creating a separate account for each learner, will help the Ministry of Health, to track the progress (See Figure 4.5).

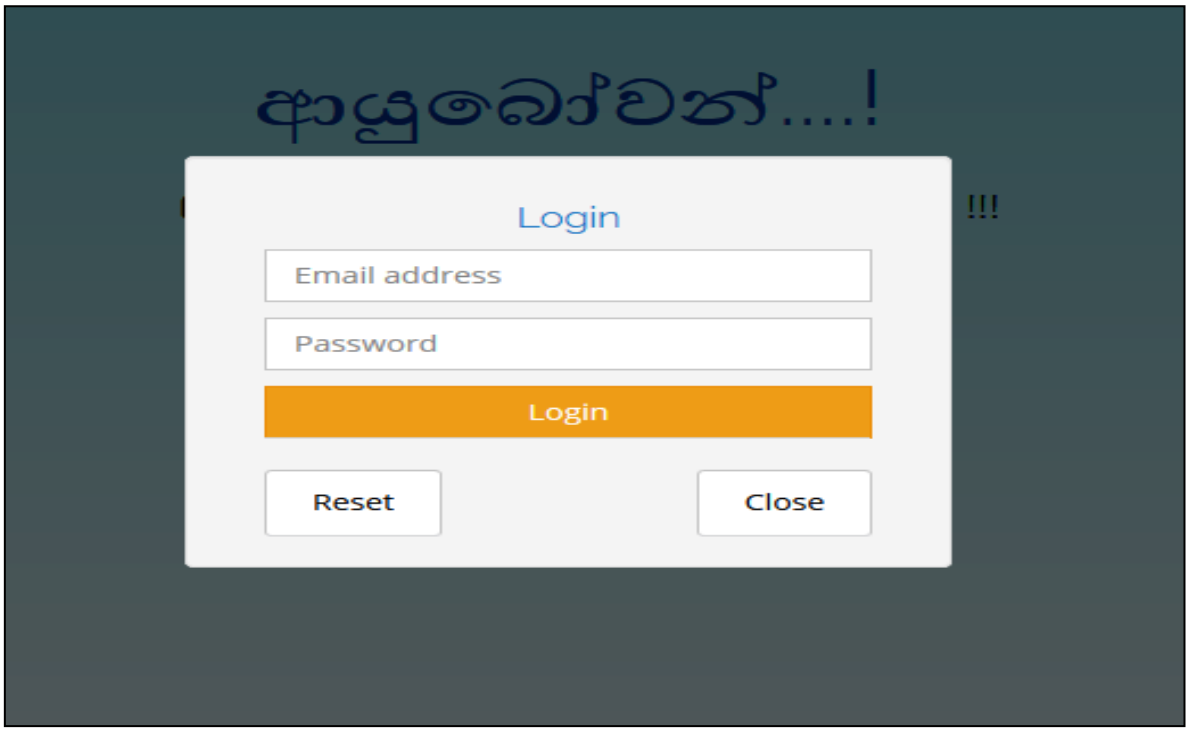


Figure 4.6: Screenshot of the login page

If the learner is already registered, then he/she can log into site by using credentials (See Figure 4.6).

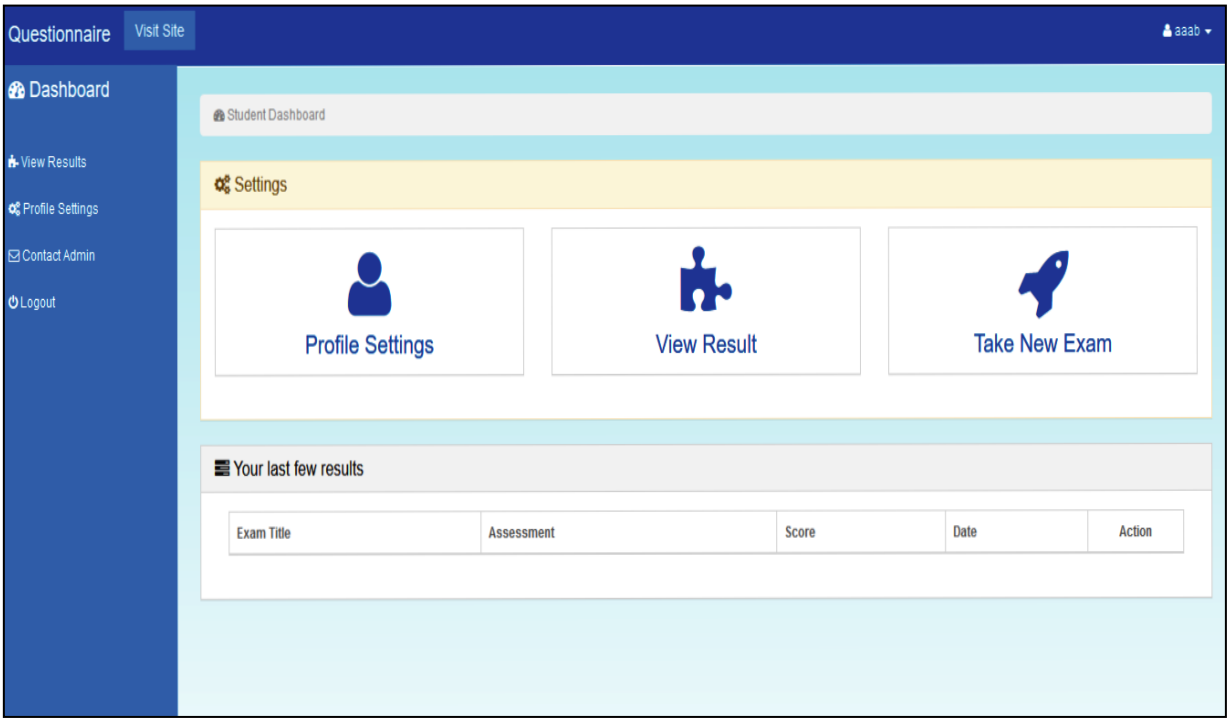


Figure 4.7: Screenshot of the dashboard of a registered user

After login, the learner will direct to the dashboard of his/her account. There are sections to view previous results, edit profile settings and to contact admin if the learner has a problem (See Figure 4.7).

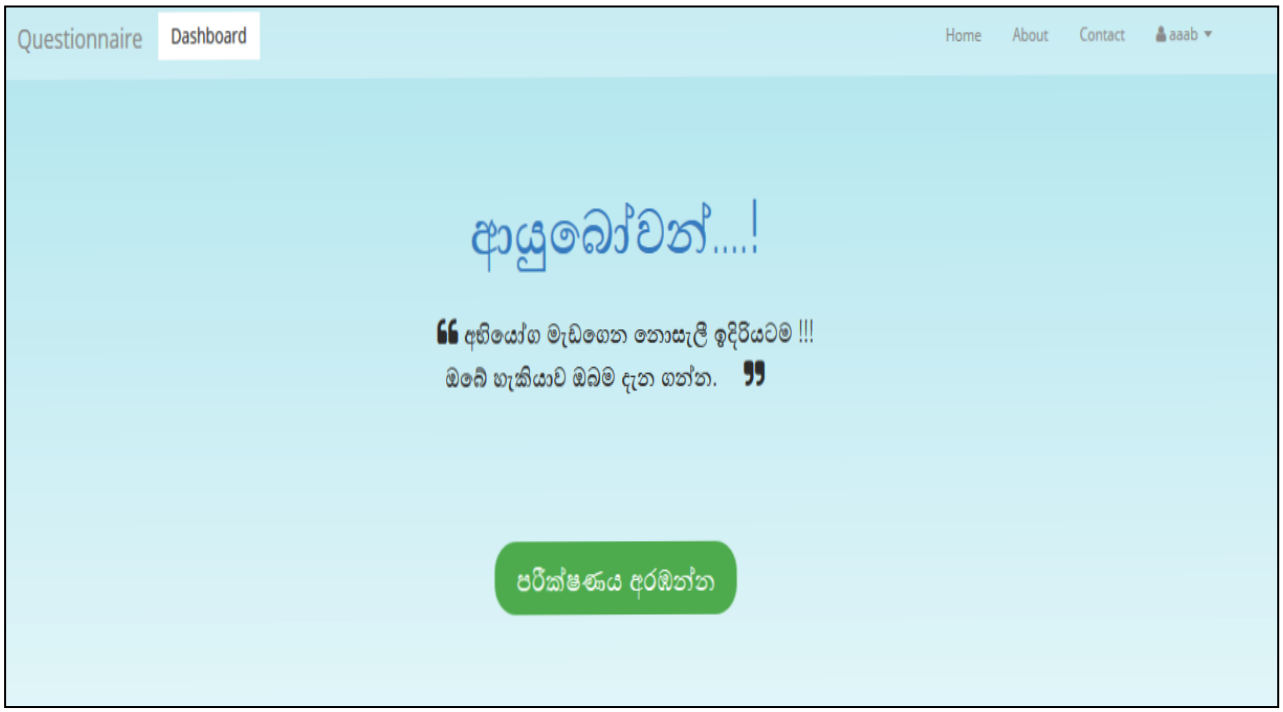


Figure 4.8: Screenshot of the main page of the site

Then the learner can visit the site to start the questionnaire (See Figure 4.8). Before starting the questionnaire, a set of instructions will be given to the user (See Figure 4.9).

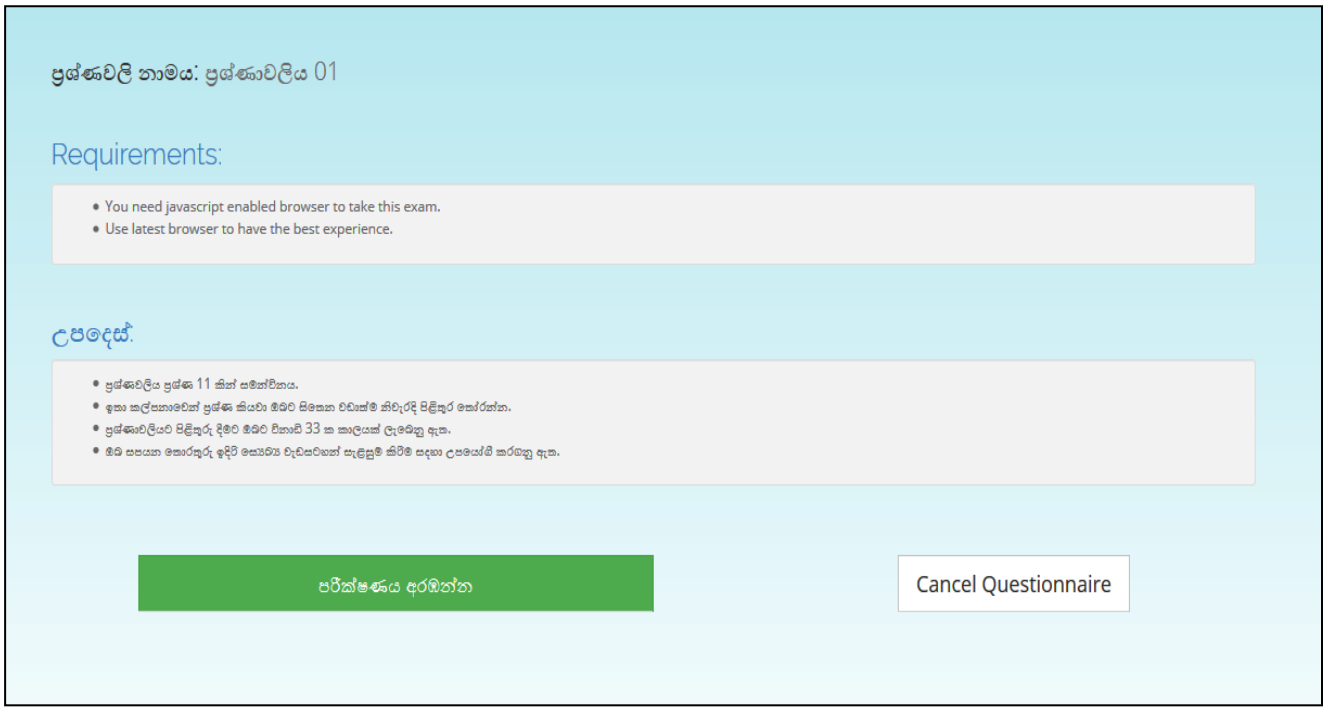


Figure 4.9: Screenshot of the instruction page

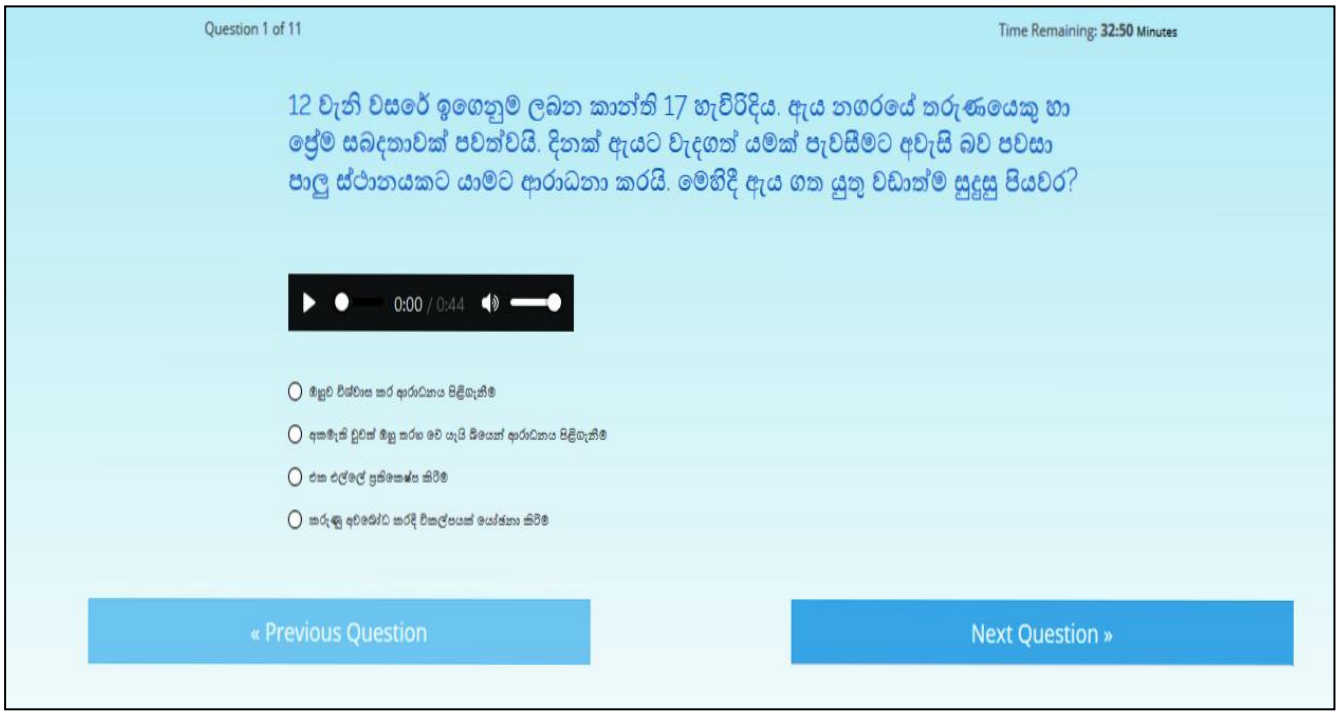


Figure 4.10: Screenshot of the online questionnaire

Online questionnaire consists of 11 questions. It will display as random questions for the learner (See Figure 4.10).

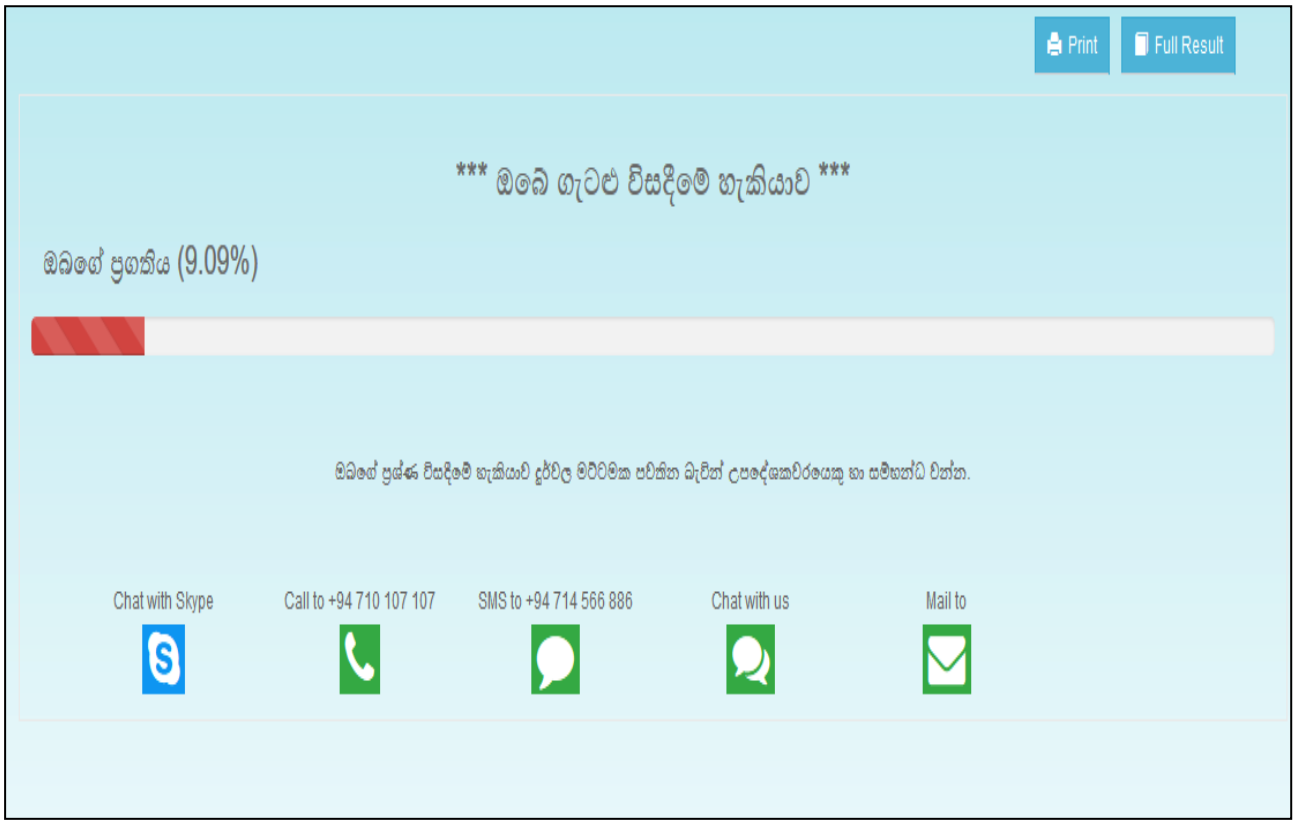


Figure 4.11: Screenshot of the interface that appear for the beginner level

Beginner level adolescents are directed to an online counsellor. The learner can use Skype, call, SMS, chat or email techniques to contact the counsellor. Learner can print the result or can view the results history of him/her (See 4.11).

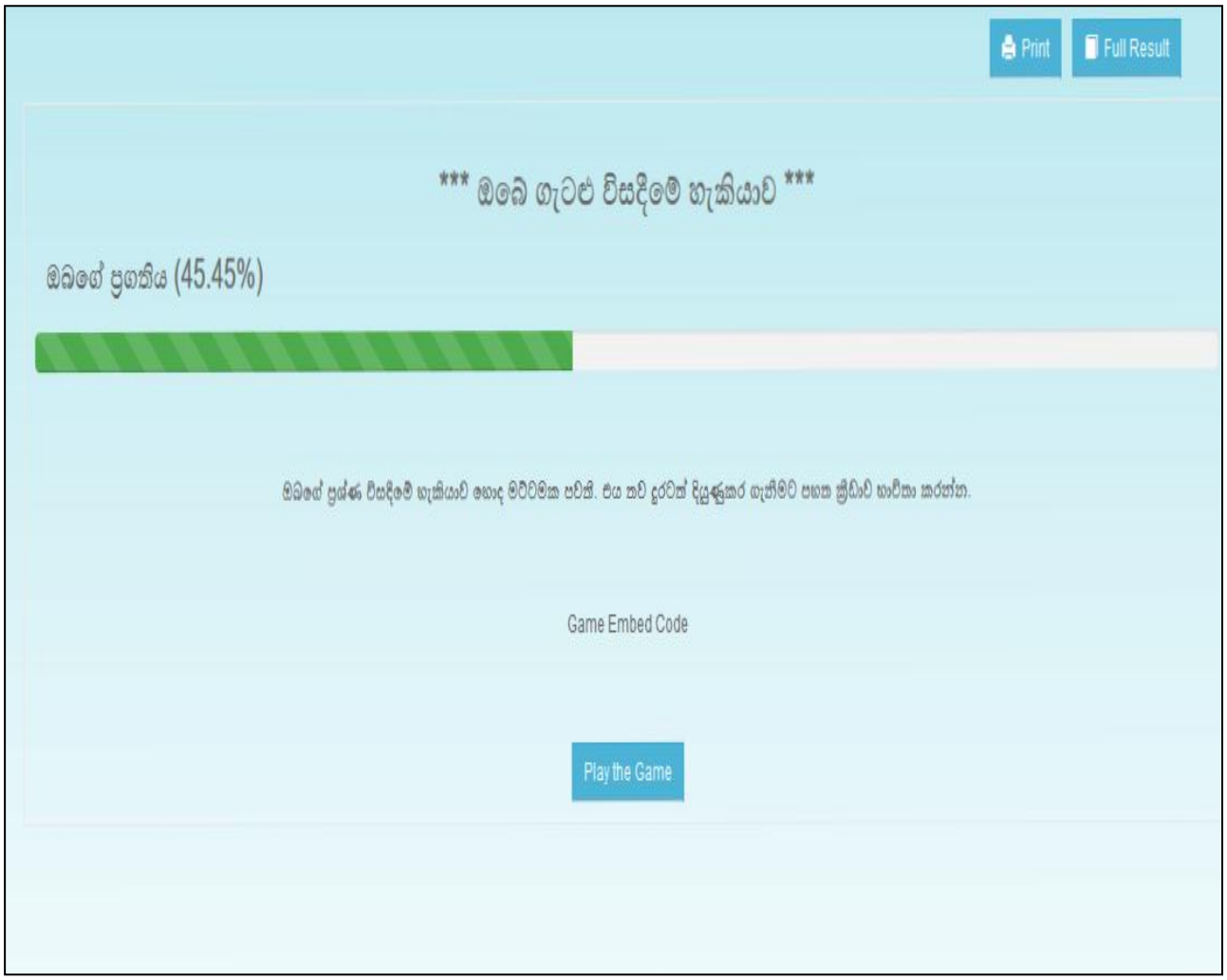


Figure 4.12: Screenshot of the interface that appear for the intermediate level

Intermediate level adolescents are directed to an online game. As the beginners, the intermediate level learners can print the result or can view the results history of him/her (See Figure 4.12).

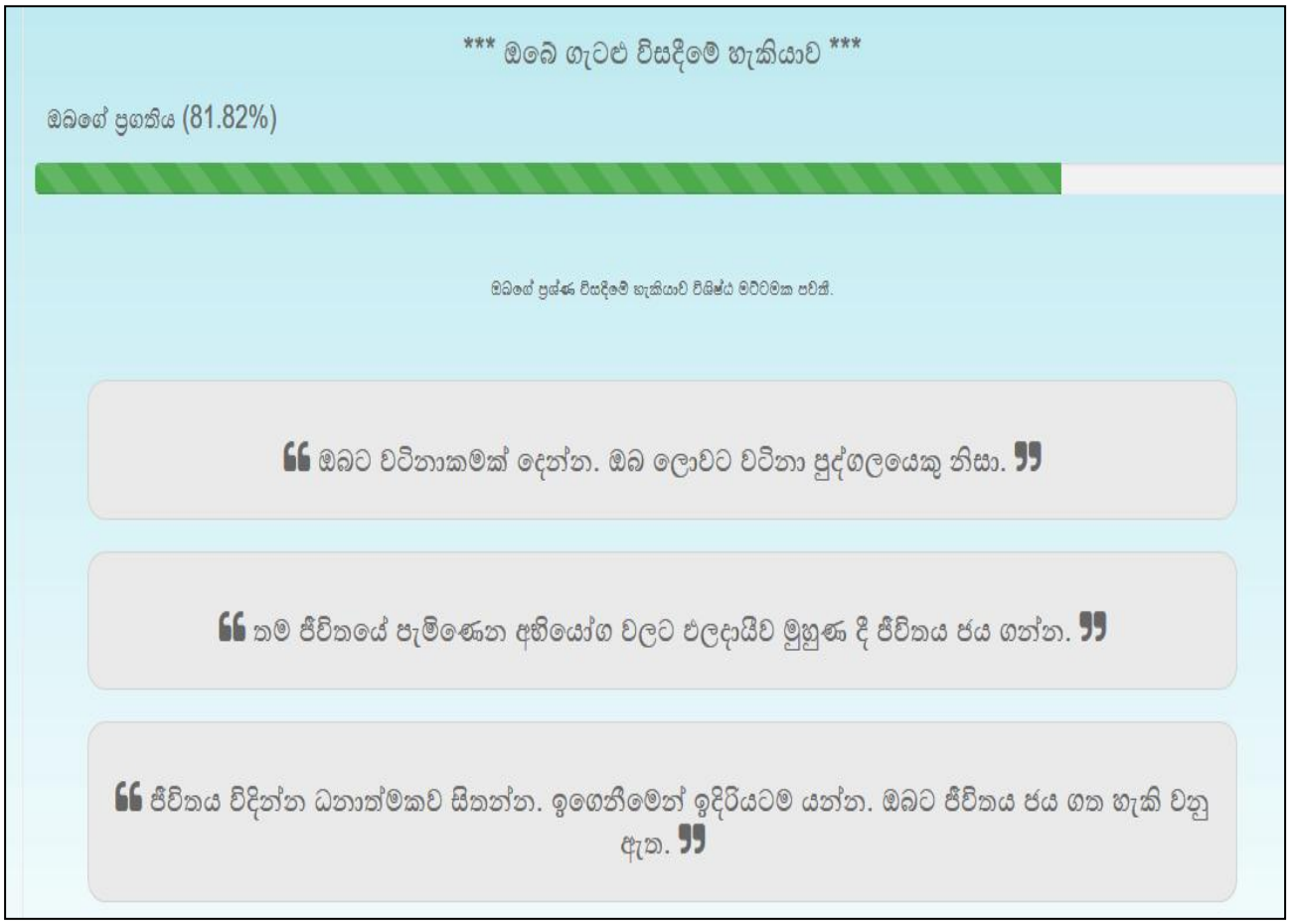


Figure 4.13: Screenshot of the interface that appear for the expert level

Expert level adolescents are directed to an online game. As the beginners and intermediate level, the expert level learners can print the result or can view the results history of him/her. These motivational quotes were selected with the guidance of the professional counselors at the Ministry of Health, Sri Lanka (See Figure 4.13).

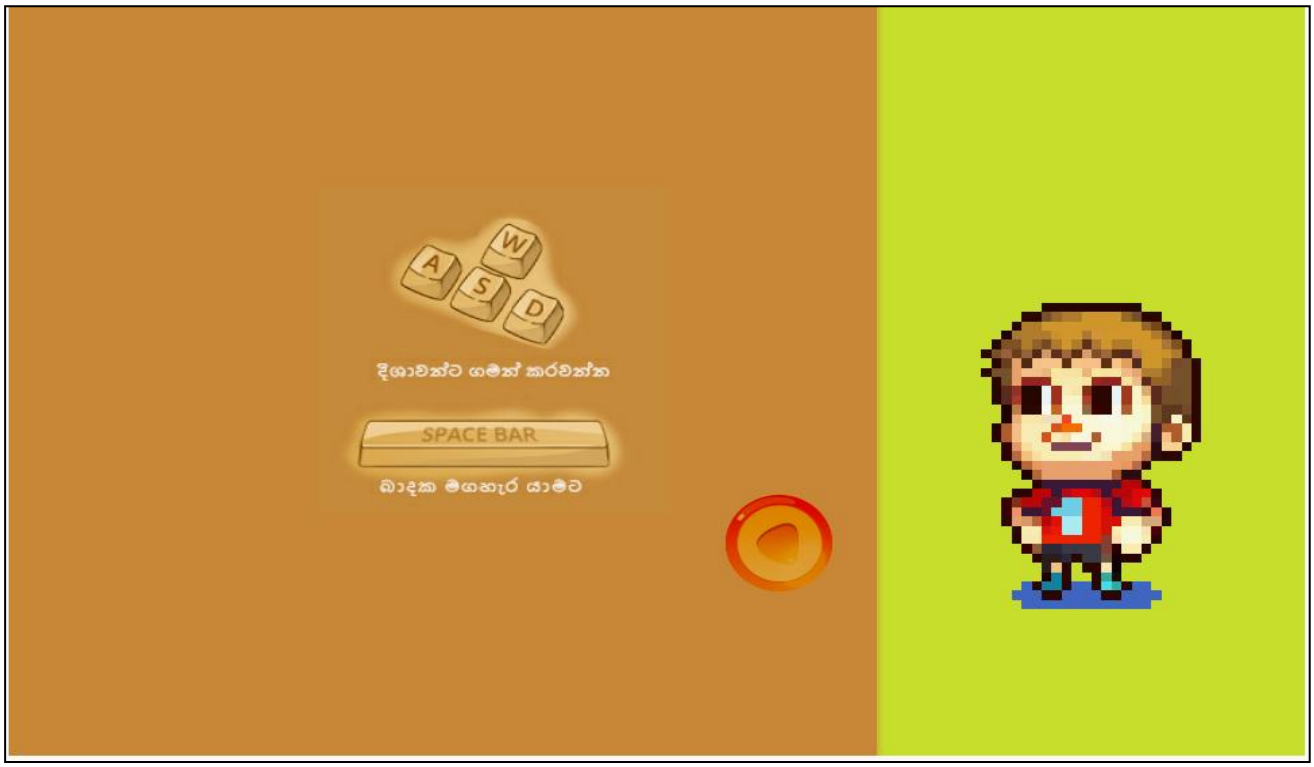


Figure 4.14: Screenshot of the instruction interface for the game

The instructions for the learner to play the game are given as above (See Figure 4.14).

Figure 4.15: Screenshot of the interface that appear when the player went to a wrong place (Message 1)

Only the intermediate level learners are directed to the online game. When the learner goes in an incorrect path the message 1 is displayed. When the learner goes in a wrong path, the learner will give another opportunity to come again to the main path and can find the way (See

Figure 4.15).

Figure 4.16: Screenshot of the interface that appear when the player went to a wrong path (Message 2)

When the learner goes in a wrong path and come to a wrong place the message 2 is displayed as the above interface. The learner will not give another opportunity to find the correct path and will automatically direct to the video message. After seen the video message, the learner can see the correct path or can play the game again (See Figure 4.16).

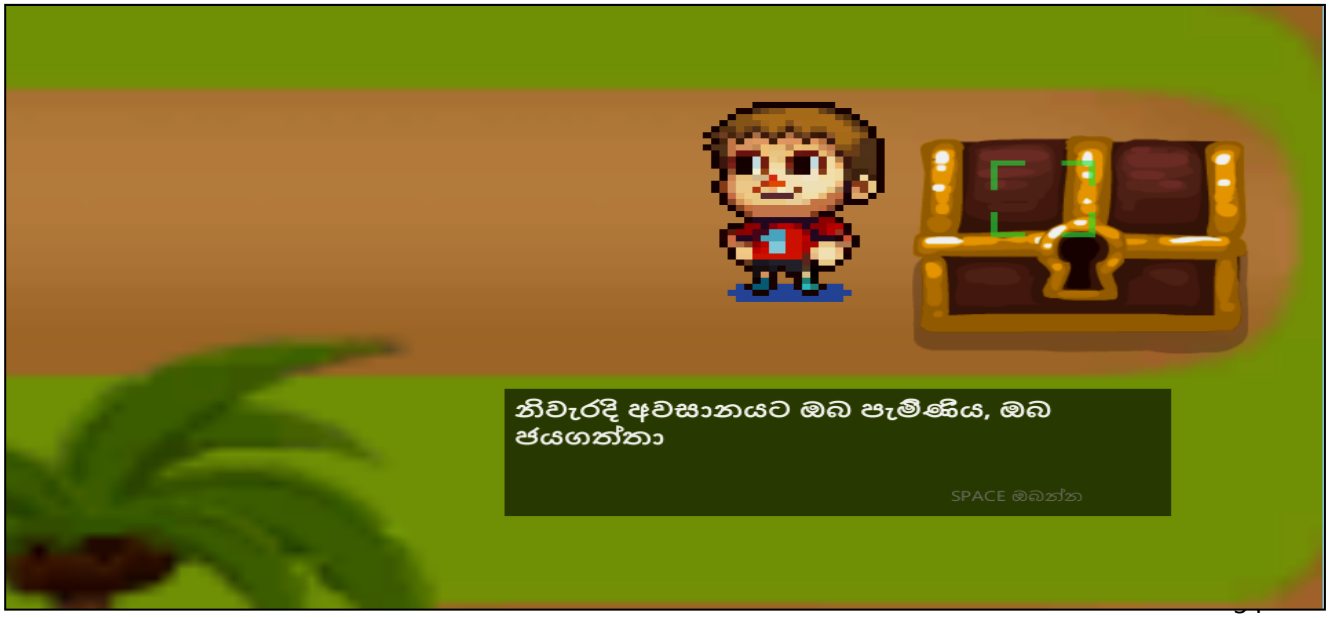


Figure 4.17: Screenshot of the interface that appear when the player went the correct place (Message 3)

When the learner finds the correct path the message 3 is displayed as above (See Figure 4.17). This learner also will automatically direct to the video message. After seen the video message, the learner can play the game again if he/she needs (See Figure 4.17).

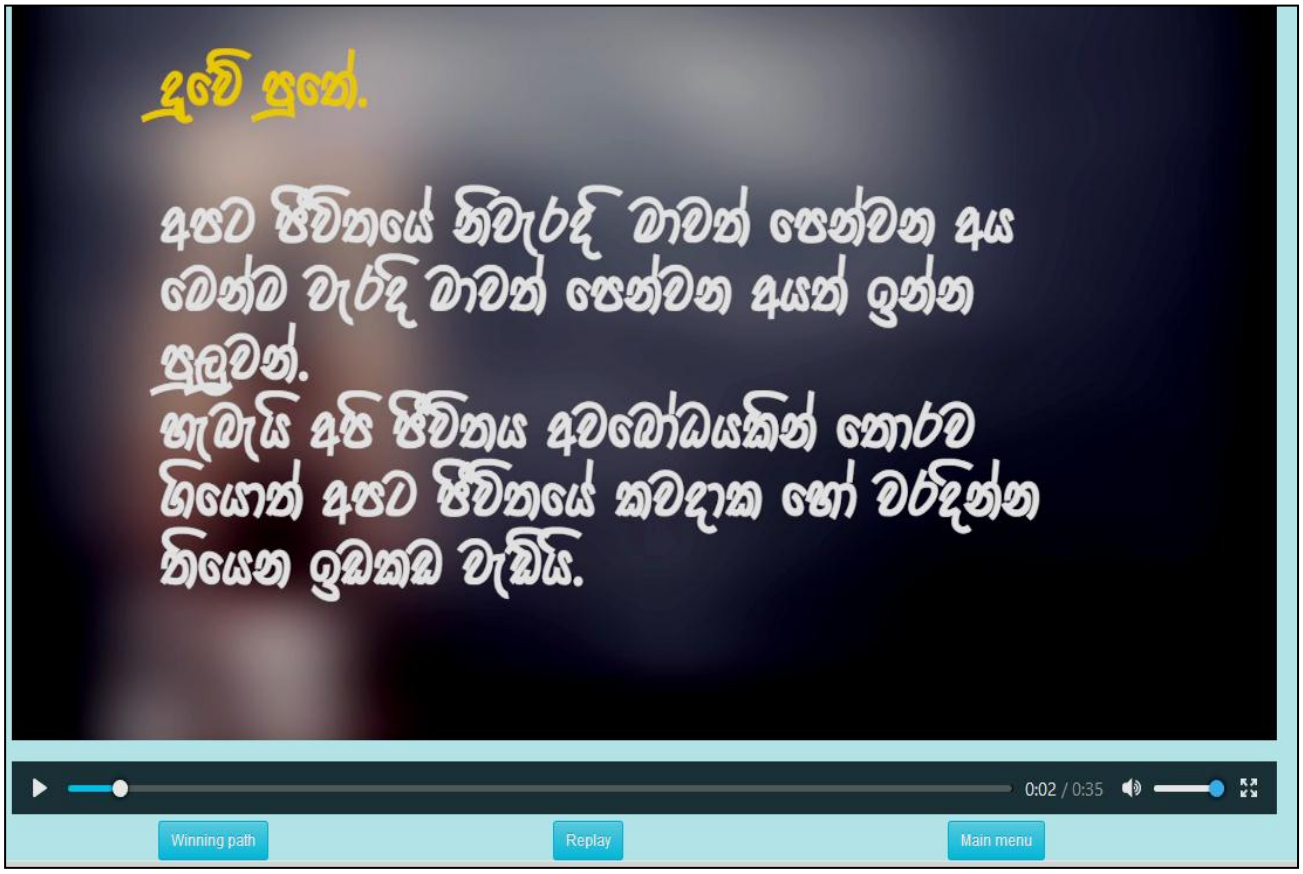


Figure 4.18: Screenshot of the interface of the video message (This message will continue)

After playing the game the intermediate level learners are directed to a video message that will give an advice for the adolescents. This interface consists three buttons at the bottom to see the winning path, to replay the game and to go to the main menu or the questionnaire (See Figure 4.18).

Figure 4.19: Screenshot of the winning path

This is the correct path of a winner. This path can be seen by clicking the button "Winning path" that display the bottom of the video message (See Figure 4.19).

Figure 4.20: Screenshot of the end of the program

This interface comes at the end of the video message (See Figure 4.20).

There is a separate account for the administrator to handle this ICT based intervention (See Figure 4.21). The admin will be a member of the IT department at Ministry of Health, Sri Lanka. Administrator can view users, add users, activate/inactivate users, banned users, view exams, create exams and view results of the users.

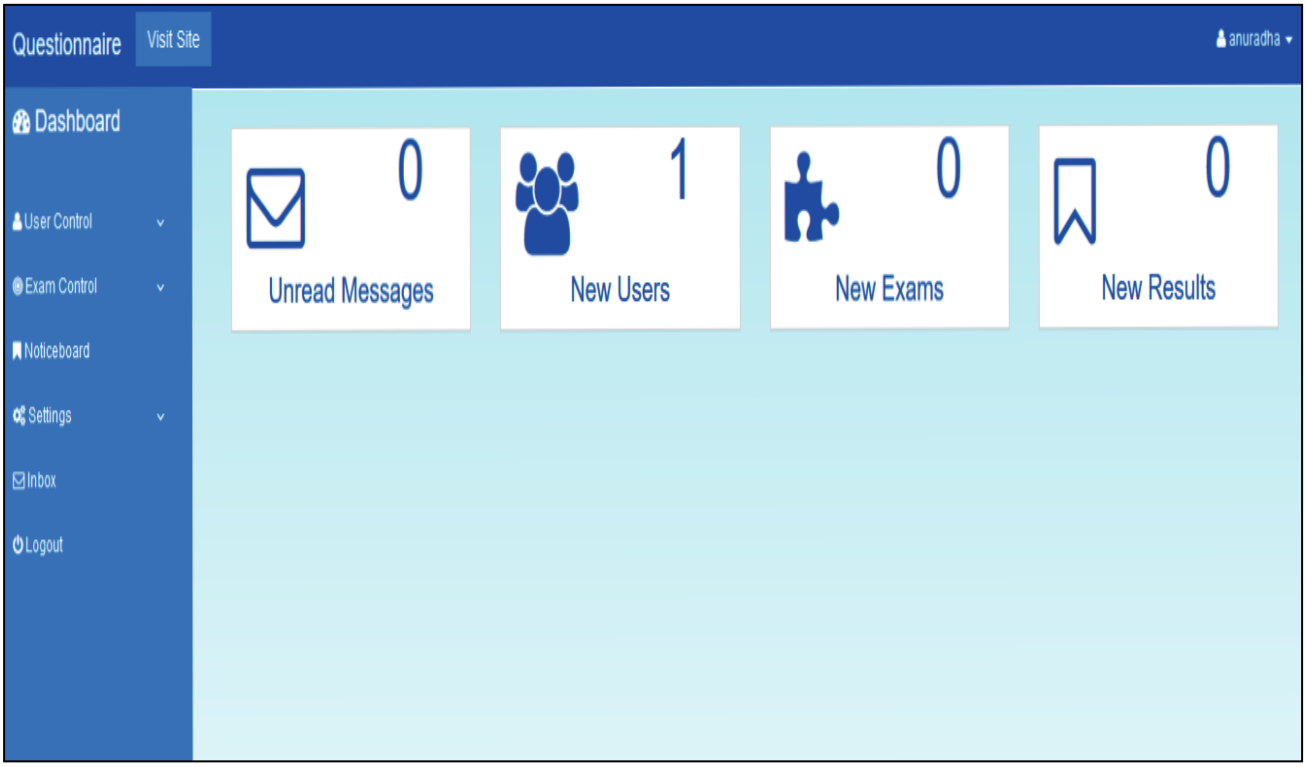


Figure 4.21: Screenshot of the admin interface

4.2.1. Technologies used

CodeIgniter MVC Framework

CodeIgniter MVC (Model-View-Controller) framework was used for the development of the ICT based intervention (except the game and the video). MVC is a software approach that helps to separate application logic from presentation (See Figure 4.22) [46]. The Model represents the data structures and it contains functions that help to retrieve, insert and update information in the database. The View represents the information that is presented to the user. The Controller behaves as an intermediary between the Model, the View, and other resources that is needed to process the HTTP request to generate a web page [46].

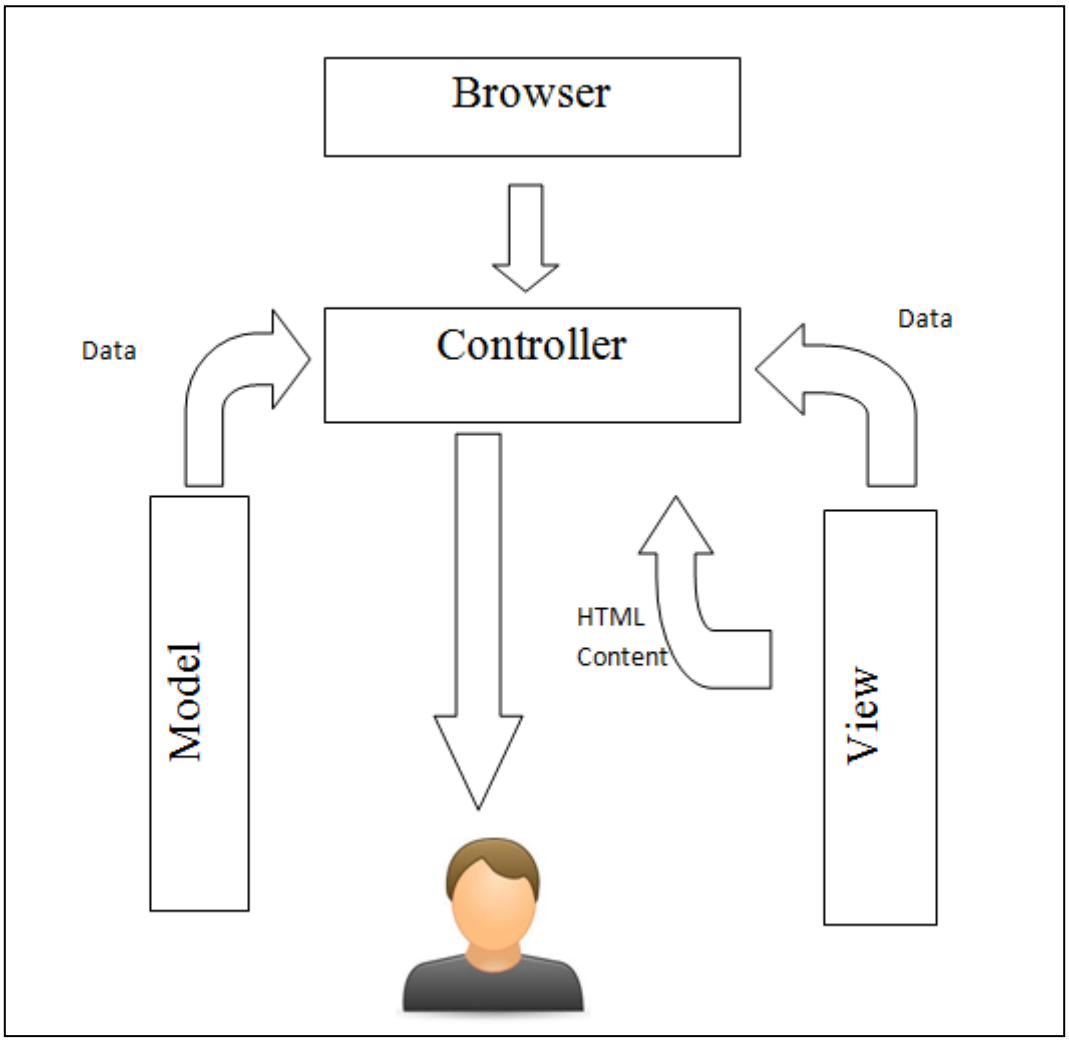


Figure 4.22: MVC framework [46]

UNITY game engine

UNITY was used to develop the online game. UNITY is a game development cross platform game engine that is used to build high quality 2D and 3D games.

Adobe after effects

Adobe after effects was used to create the video message. Adobe after effects is a digital visual effects and a composing application that can be used to create motion graphics.

4.3. Effectiveness of the ICT based learning intervention (Q3)

Effectiveness had been determined by comparing the findings of the pretest and the posttest results.

4.3.1. Pretest and the posttest questionnaire

After selecting the sample the pretest questionnaire was conducted. The results taken from the pretest is shown in the Table 4.3. After the pretest the appropriate sample was selected by eliminating the beginner and expert level (highlighted in yellow colour). Then the selected sample was divided randomly into two groups as treatment and control group. Then as mentioned in the methodology chapter (See pp.22-35) the class room based program was conducted for the control group and the ICT program was conducted for the treatment group. The results of the posttest conducted for treatment (highlighted in light blue) and control (highlighted in light red) groups are shown the Table: 4.3. To see the complete results set, see the appendix.

Student	Pretest results	Treatment group posttest results	Control group posttest results
St1	36.36%	54.55%	
St2	72.73%		72.73%
St3	27.27%		
St4	45.45%	90.91%	
St5	54.55%	100%	
St6	27.27%		
St7	63.64%	100%	
St8	27.27%		
St9	72.73%	90.91%	
St10	54.55%	100%	
St11	36.36%	54.55%	
St12	90.91%		100%
St13	81.82%		
St14	45.45%		
St15	63.64%	100%	

St16	54.55%	72.73%	
St17	72.73%		72.73%
St18	54.55%	72.73%	
St19	9.09%		
St20	72.73%	90.91%	
St21	9.09%		
St22	54.55%		72.73%
St23	72.73%	100%	
St24	45.45%		72.73%
St25	27.27%		
St26	63.64%	100%	
St27	27.27%		
St28	72.73%		100%
St29	45.45%		90.91%
St30	54.55%	72.73%	
St31	72.73%		100%
St32	63.64%		90.91%
St33	45.45%		90.91%
St34	45.45%	72.73%	
St35	54.55%		72.73%
St36	54.55%		90.91%
St37	54.55%		
St38	45.45%		90.91%
St39	63.64%	90.91%	
St40	45.45%		72.73%
St41	54.55%	100%	
St42	63.64%		90.91%
St43	63.64%	90.91%	
St44	63.64%		72.73%
St45	72.73%	100%	
St46	45.45%		90.91%
St47	72.73%		72.73%
St48	54.55%	90.91%	
St49	63.64%		72.73%

St50	27.27%		
St51	45.45%		90.91%
St52	45.45%		72.73%
St53	54.55%	100%	
St54	63.64%	100%	
St55	45.45%		54.55%
St56	54.55%	90.91%	
St57	45.45%		54.55%
St58	27.27%		
St59	54.55%		54.55%
St60	63.64%	90.91%	

Table 4.3: Statistics of pretest and the posttest

Then the results were compared to identify whether the online intervention was effective or not. The results were graphically represented for easy identification of the results. The graphical representation of the comparison of pretest and posttest results in the treatment group represented in the Figure 4.23.

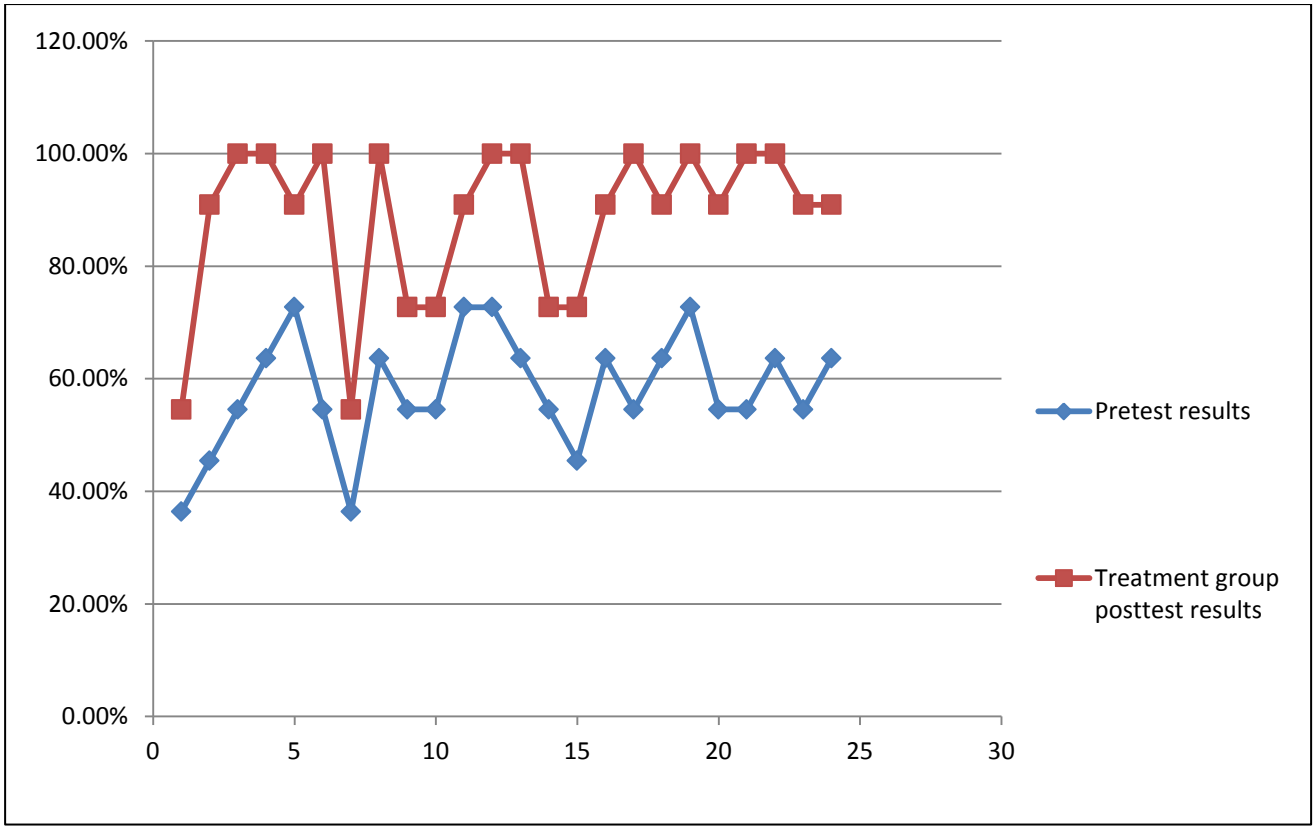


Figure 4.23: Graphical representation of the pretest and posttest results of treatment group

The graphical representation of the comparison of pretest and posttest results in the control group represented in the Figure 4.24.

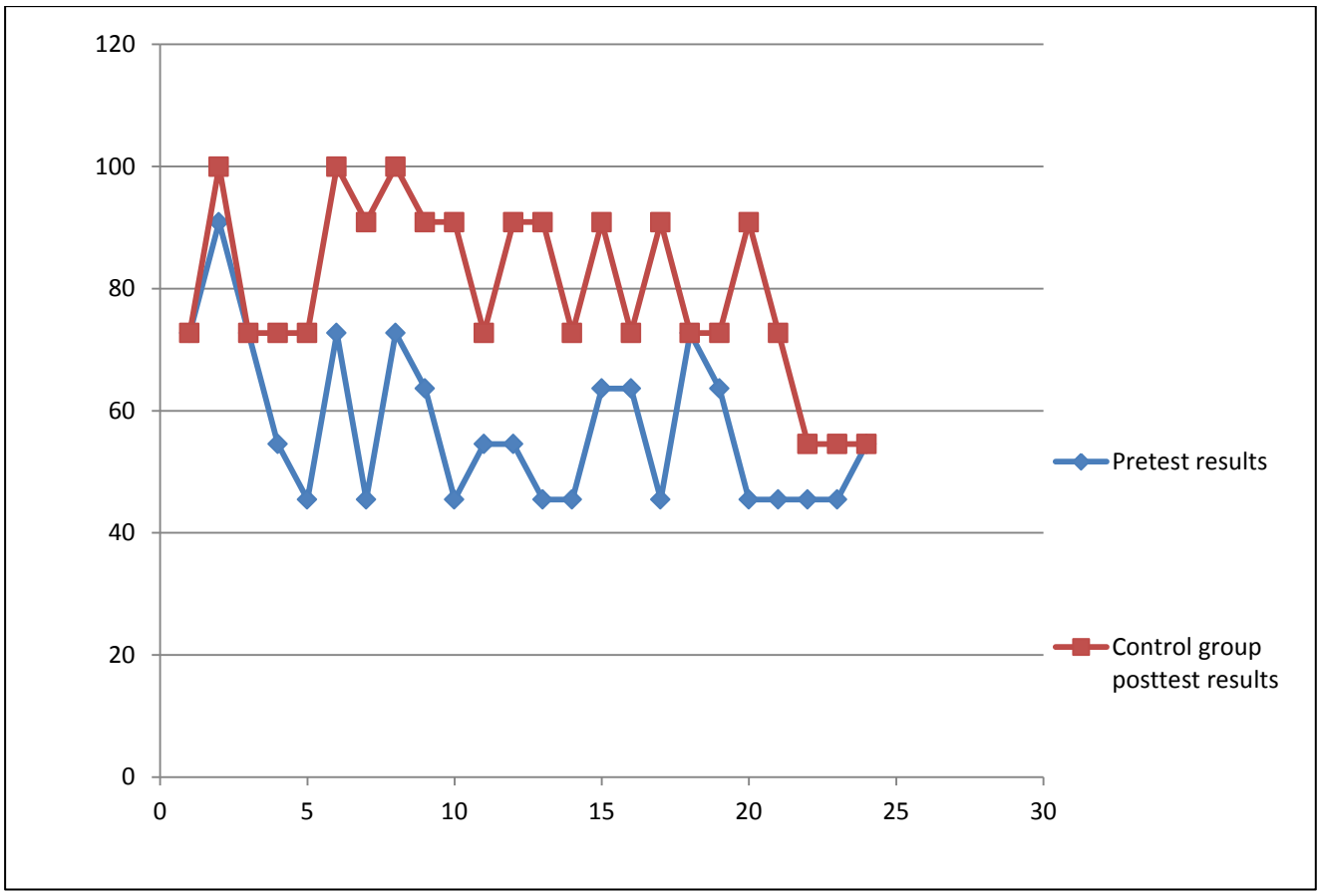


Figure 4.24: Graphical representation of the pretest and posttest results of control group

Mean of the treatment group before conducting the ICT based learning intervention = 57.9570%

Mean of the treatment group after conducting the ICT based learning intervention = 88.6375%

Mean of the control group before conducting the classroom based teaching program= 57.58%

Mean of the control group after conducting the classroom based teaching program = 79.93%

Gap between the means of the ICT based intervention group = 32.6805%

Gap between the means of the classroom based intervention group = 22.35%

Graphical representation of the mean difference is shown in the Figure 4.25.

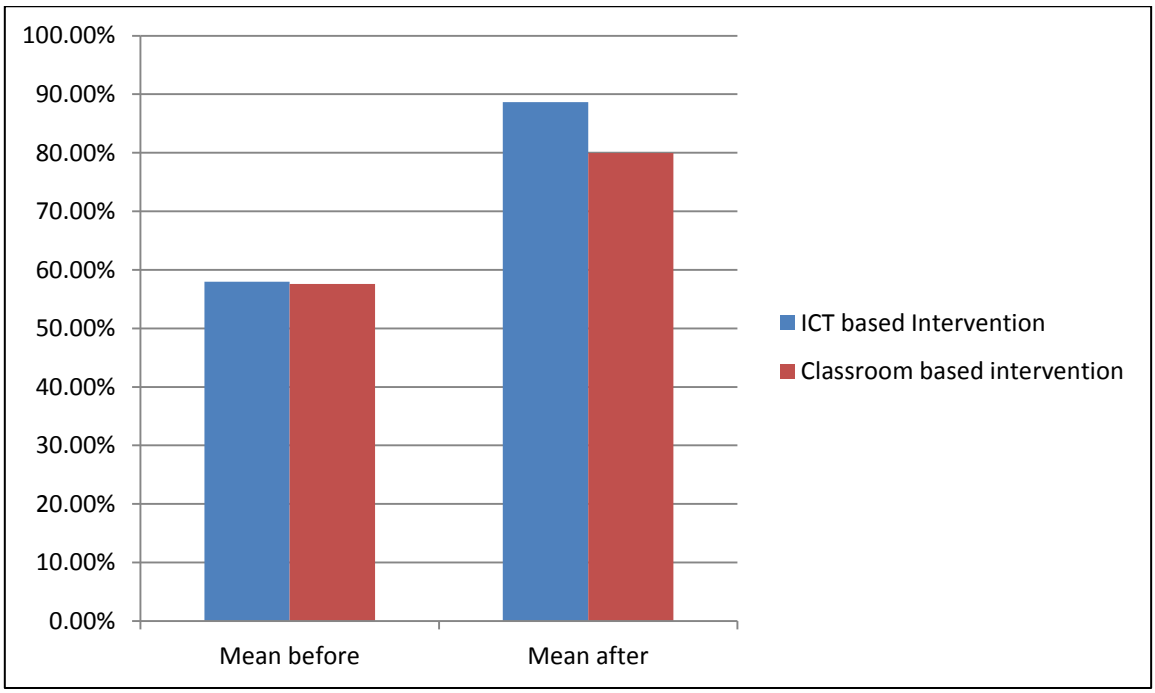


Figure 4.25: graphical representation of the mean before conducting the intervention and the mean, after conducting the intervention

According to the Figure 4.25:

Mean of the treatment group after conducting the ICT based learning intervention	>	Mean of the control group after conducting the classroom based teaching program

After conducting the analysis of the data, a significance test/ T-Test was done to identify the significance difference of the results.

P value of the treatment group in scientific notation: 4.72772E-11

P value of the control group in scientific notation : 8.61778E-07

P value helps to understand the significance of the results. In here the treatment and the control groups have a large difference between p values as well as the p values are small (less than 0.05). Therefore the null hypothesis is rejected and the alternate can be accepted.

Then the effect size was calculated to determine if the differences between the control and treatment groups are both statistically significant.

$$\textit{Effect size} = \frac{\textit{Mean difference of the treatment and control groups}}{\textit{Standard deviation of the control group}}$$

Effect size = 8.71/14.17857 = **0.614307**

According to the definition [45], if the effect size between 0 to 0.3 is a small effect size, if the effect size is between 0.3 and 0.6, it is a moderate effect size and an effect size bigger than 0.6 is a large effect size. As the effect size of this study is greater than 0.6, it has a large effect size. Therefore this study is statistically significant [45].

According to the results the online intervention is more effective than the class room based program. Further in order to prove these results as well as to know the perception of the adolescents for the online intervention a separate interview was conducted. The main questions raised at the interview represented in the table (See Table 4.3).

Item	**Rate**
Like to get the level of psychosocial competencies assessed online	100%
Like to learn psychosocial competencies through a game	100%
Feel OK to discuss your issues related to psychosocial competencies online?	80%
Is the online intervention is better than the classroom based method	100%

Table 4.4: Main questions raised at the final interview

All the students show their willingness to access their psychosocial competency online. This understanding will help indeed to the development of the online learning environments for Sri Lankan adolescents.

Chapter 5

Discussion

The research aimed at answering two questions: What psychosocial competencies are essential and should immediately be addressed? (Q1) and what is the most effective approach of delivering the content to adolescents? (Q2) in order to answer the main research question: *How can ICT be used to support development of psychosocial competencies in order to reduce teenage pregnancy among adolescent*s?".

The results of the evaluation of an online intervention could be interpreted as that the online intervention was successful in achieving psychosocial competencies among adolescents. Further analysis of data revealed that the learners' satisfaction and the target objectives can be archived successfully through the use of video, game and discussions. This finding complies with the result of Péter et al.[18] who reported that video based learning is more effective than traditional methods of teaching and learning. Also, game based learning has been considered effective for creating and maintaining learners' motivation throughout the lesson [19] and discussion based learning has been found as an effective method to engage learners in deep and meaningful learning [20]. Also all the subjects were willing to attempt the online questionnaire. After attempting it, they reported that they like to learn about psychosocial competencies online. This finding is supported by Pedrana et al. [28] who conducted research usingMySpace and reported that over half (58%) of Internet using teens went and were willing to go online to search for information about health and 40% used the internet to look for sexual health information [44].

According to the analysis of the results, it implies that online interventions more effective as learning intervention than a classroom based face to face teaching method. The analysis of data revealed that effectiveness of teaching can be improved through the use of an interactive content.

Chapter 6

Limitations

Data for the study were collected by conducting brainstorming sessions, interviews, literature and focus group discussions. Some limitations occur when allocating the time to collect data from Ministry of Health and schools.

6.1. Data collection

The sample for the data collection was selected from the Henegama Central College, Gampaha. This school was selected for the study as Ministry of Health already started to conduct training of the psychosocial competencies for the students, following their schedules. But there were some barriers when selecting sample and the time to conduct the program as students had assignments and exam in the data collection period of this study. However the difficulties were minimized by the author by contacting the principal and class teachers of the school.

The professionals who participated for the design of the program are distance people. They are from different provinces in the country. Also, many of them have to come during their working hours. Problems occurred when allocating time for conducting the design workshops. However they willingly participated in the research study.

6.2. Pretest questionnaire

Some students who participated in the study did not have a proper knowledge on using the computers. Before conducting the program we trained the students to use the computer for the research purpose. Some of the computers that were used for the study had occurred troubleshooting problems. That cause to waste time that allocated for the study. However, the data collection was done in a proper way by managing all the difficulties. A school from the urban area was selected due to lack of computer labs in the rural areas. But the study was conducted as there was an opportunity to build Mahindodaya Labs and give free Wi-Fi in the future by the government.

As the analysis of data implies that psychosocial competencies can be improved among adolescents effectively than the class room based face to face teaching method, this product can be expand to address other psychosocial competencies to reduce other reproductive health problems

such as sexual harassment, drug usage, risky behaviours, sexual transmitted diseases, stress and suicides. The affordability problem will decrease when the computer labs build by the government in the rural areas of the country.

Chapter 7

Conclusion and future works

The research reported in the thesis attempt to develop an effective ICT based intervention for the class room based psychosocial competency development program with the aim of reducing teenage pregnancy problem within Sri Lanka. The research was guided by the research question of "*How can ICT be used to support development of psychosocial competencies*?". The research was carried out with a group of adolescents, professionals and assistant counselors. The findings implied that online intervention is more beneficial when it has instructional methods like video based learning, game based learning and discussions based learning. The reduction of teenage pregnancy needs to observe for a long term period to identify whether the improvement of psychosocial competency has an effect on it.

The marketing of this product will be done through social media, posters and through the website of Ministry of Health. The product will be integrated to the main web site of Ministry of Health, Sri Lanka. The results from the analysis will be beneficial for other eLearning applications build in the Sri Lankan or Asian context. As well as this product can be expanded to address the other psychosocial competencies align with the adolescents health problems. This ICT based intervention can be developed in other languages such as English and Tamil to cope with the Muslim, Burger and Tamil adolescents within Sri Lanka.

References

[1] S.Shariati, N. Fakuri, M. Omidi (2014)" *The Relationship between Identity Styles to happiness and mental Health of Students, Journal of Behavioral sciences in Asia*" 2(12): 86-97, [Online] Available:https://www.researchgate.net/publication/269697200_The_Relationship_between_Identity_Styles_to_Happiness_And_Mental_Health_of_Students. [Accessed: 16- Mar- 2017].

[2] *Estimating the size of populations at risk for HIV: issues and methods*. Arlington, VA: Family Health International, UNAIDS, WHO, 2002.

[3] *Behavior change communication strategy on reproductive health in Sri Lanka*, Ministry of Health, HEO, FHB, UNFPA, 2015

[4] *Yowun sawukkya*, 1st ed. Ministry of health, WHO, UNFPA, 2002, pp. 1-38.

[5] *JeewanaNipunatha,* FHB, UNICEF, 2005

[6] O. Alobo, *The challenges of adolescent sexulity and reproductive health in Nigeria*. 1999/2000, pp. 12-19.

[7] R. Magnani, K. MacIntyre, A.M. Karim, L. Brown, P. Hutchinson, *The impact of life skills education on adolescent sexual risk behaviors in KwaZulu-Natal, South Africa*, Vol. 803, pp 738-729, 2005, [Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/15780784 [Accessed: 10- Apr- 2017].

[8] J. Hattie, J. Biggs, N. Purdie, *Effects of Learning Skills Interventions on Student Learning: A Meta-Analysis*, Vol. 308, pp. 113-236, 1996. [Online] Available: http://journals.sagepub.com/doi/abs/10.3102/00346543066002099 [Accessed: 08- May- 2017].

[9] Y.Eiad, N.Rabie, T.Anas, *ICT's impact on youth and local communities in Syria*, Vol. 498, pp. 223-336, 2015, [Online] Available: https://www.researchgate.net/publication/283057201_ICT%27s_Impact_on_Youth_and_Local_Communities_in_Syria [Accessed: 05- Feb- 2017].

[10] *Causes for child pregnancy*. HEB, 2009; pp1-4

[11]*Teenage pregnancy* [Online], Available: http://www.who.int/mediacentre/factsheets/fs364/en , [Accessed 12-Mar-2017]

[12] *Preventing early pregnancy and poor reproductive outcomes among adolescents in developing countries, what the evidence says:* [Online], WHO, FWC, MCA, 2015 [Accessed 01-Mar-2017]

[13] Daniel, T.L., Rachel, C.F.(2012). *Promoting psychosocial competencies in university students: evaluation based on a one-group pre-test/post-test design,* 11(3), pp. 229-234.

[14]Yang, C., Richard, G., Durkin, M., (2016), *The association between Myers-Briggs Type Indicator and Psychiatry as the specialty choice*, Vol.7, pp. 48-51, [Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/26851600 [Accessed: 04- Apr- 2017].

[15]Kolb, D. (1996), *Kolb's Learning Styles*, pp 1698-1703

[16]Honey, P., Mumford, A., (2006), *The learning styles questionnaire*, pp 4-8

[17] Botturi, L. (2003). *Instructional design & learning technology standard. Icef -Quaderni dell'istituto,* pp. 1-9

[18] Driscoll M.P. (2005), *Gagne's theory of instruction: Psychology of learning for instruction*. pp. 341-373.

[19] Copper, M.H. ,Bentley, J.P.H. &Scroder.K., (2009). *How well do high quality online courses employee Merrill's first principles of instruction*. pp. 121-140

[20] Gagne, R. M., Briggs, L. J., & Wager, W. W. (1992). *Principles of instructional design* , 4th ed.,Forth Worth, TX: Harcourt Brace Jovanovich College Publishers.

[21] David, M. (2002) *Merrill Educational Technology, Research and Development* , Vol.3, ProQuest Education Journals, pg. 43 , [Online] Available: http://mdavidmerrill.com/Papers/papers.htm [Accessed: 03- Mar- 2017].

[22] Klabbers, H. G.(2009), *the magic circle: principles of gaming & simulation*, pp. 4-77

[23] Malone, T. & Lepper (1987). *Making Learning Fun: A Taxonomy of Intrinsic Motivations for Learning. In Snow*, R. & Farr, M. J. (Ed), Aptitude, Learning, and Instruction Vol 3: Conative and Affective Process Analyses. Hillsdale, NJ

[24] Beatty, D.I., (2014), *Gaming the system: video games as a theoretical framework for instructional design*, pp 1-8

[25] K.L Engle, H.L. Vahdat, E.Ndakidemi, C.Lasway, T.Zan, *Evaluating feasibility, reach and potential impact of a text message family planning information service in Tanzania*, vol. 87, pp 251-256, 2012; [Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/22935322 [Accessed: 07- Feb- 2017].

[26] D.Levine, J.McCright, L.Dobkin, A.J Woodruff, J.D Klausner, *SEXINFO: a sexual health text messaging service for San Francisco youth*, 2008 [Online] Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2253571/ [Accessed: 03- Apr- 2017].

[27] C.W. Raymond, K.C. Kayekjian, R.A.Braun, M.cantu, B.Sheron, P.J. Chung, *Adolescents' Perspectives on the Use of a Text Messaging Service for Preventive Sexual Health Promotion*, vol. 51, pp. 220-225, 2012, [Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/22921131 [Accessed: 05- May- 2017].

[28] A.E. Pedrana, R.S.Davis, M.E. Hellard, S.Chang, S.Howard, L.Keogh, J.S.Hocking, M.A.Stoove, *A systematic examination of the use of Online social networking sites for sexual health promotion*, 2011,[Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/21777470 [Accessed: 04- May- 2017].

[29] D. Levine, *Using New Media to Promote Adolescent Sexual Health : Examples from the Field*, pp. 1–6, 2009

[30] *Social Media: Going Viral Against HIV and STIs*, The AIDS Institute, New York State Department of Health, 2010; [Online] Available: http://www.incarecampaign.org/files/using-social-media-and-retention/social-media-going-viral-against-hiv-and-stis2/ [Accessed: 01- Mar- 2017].

[31] *TeenSource.Org: The only teen sexual health information site of its kind*, California Family Health Council, 2003, [Online] Available: https://www.teensource.org [Accessed: 08- Feb- 2017].

[32]*Podcasts at CDCn* [Online], Available https://www2c.cdc.gov/podcasts/browse.asp?showAll=1 [Accessed 10-May-2017]

[33] A.K. Blanc, *The Effect of Power in Sexual Relationships on Sexual and Reproductive Health: An Examination of the Evidence*, 2001. [Online] Available: http://onlinelibrary.wiley.com/doi/10.1111/j.1728-4465.2001.00189.x/full [Accessed: 10-Apr-2017].

[34]*Midwest Teen Sex Show:wiki* [Online], Available https://en.wikipedia.org/wiki/Midwest_Teen_Sex_Show [Accessed 04-Mar-2017]

[35] N.Dahya, *Serious Learning in Playful Roles: Socio-political games for education and social change*, 2009. [Online] Available: http://journals.sfu.ca/loading/index.php/loading/article/viewArticle/63 [Accessed: 04- May- 2017].

[36] DeSmet, A., Shegog, R., Van Ryckeghem, D., Crombez, G. and De Bourdeaudhuij, I., 2015. *A systematic review and meta-analysis of interventions for sexual health promotion involving serious digital games*. *Games for health journal*, *4*(2), pp.78-90. [Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/26181801 [Accessed: 04- Jun- 2017].

[37] P.Boynthon, *What if Your Undies had the Last Word?*, 2008 [Online] Available: https://myspace.com/isis_inc_org/video/in-brief-what-if-your-undies-had-the-last-word/32055981 [Accessed: 20- Apr- 2017].

[38] L. Calear, Alison, Christensen, Helen, Mackinnon, Andrew, Griffiths, M. Kathleen, O'Kearney, Richard, 2009, *The Youth Mood Project: A cluster randomized controlled trial of an online cognitive behavioral program with adolescents*, Vol. 77(6), pp. 1021-1032, [Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/19968379 [Accessed 30-Mar-2017]

[39] L. Maguire, M. Clarke, M. Linden, M. Lohan, and L. Mcdaid, 2014, *Feasibility trial of a film-based educational intervention for increasing boys ' and girls ' intentions to avoid teenage pregnancy : Study protocol §*, vol. 68, pp. 35–45, [Online] Available; https://www.ncbi.nlm.nih.gov/pubmed/25284956 [Accessed 27-May-2017]

[40] *Estimating the size of populations at risk for HIV: issues and methods*. Arlington, VA: Family Health International, UNAIDS, WHO, 2002

[41] E. W. T.Ngai, S. S. Lam, and J. K. L. Poon. *Computer-supported collaborative learning system in teaching e-commerce.* In Proceedings of the Thirteenth Australasian Computing Education Conference-Vol. 114, pp. 63-72. Australian Computer Society, Inc., 2011.

[42] T. A. Weerasinghe, R. Ramberg, and K. P. Hewagamage. *Inquiry-based learning with and without facilitator interactions*. International Journal of E-Learning & Distance Education 26, Vol. 2, 2012. [Online] Available: http://www.ijede.ca/index.php/jde/article/view/779/1406 [Accessed 25-Apr-2017]

[43] *TeenSource.Org: The only teen sexual health information site of its kind*, 2003, California Family Health Council, Vol.228, pp. 112-119. [Online] Available: https://apha.confex.com/apha/131am/techprogram/paper_57538.htm [Accessed 21-Mar-2017]

[44] E. Péter, K. Gábor, N. Zsolt, and M. Lenke. 2016, *The comparison of impact offline and online presentation on student achievements: A case study*. In Information and Communication Technology, Electronics and Microelectronics (MIPRO), 2016 39th International Convention on, pp. 802-806. [Online] Available : http://ieeexplore.ieee.org/document/7522249/?reload=true [Accessed 12-Mar-2017]

[45] B. Williams, B. Williams and V. profile, *Cohen's d and Effect Size*, 2002. [Online]. Available: http://mandeblog.blogspot.com/2011/05/cohens-d-and-effect-size.html. [Accessed: 16- Mar- 2017].

[46]*CodeIgniter MVC Framework*, 2005. [Online]. Available: https://www.tutorialspoint.com/codeigniter/codeigniter_mvc_framework.htm [Accessed:12-Apr-2017].

Appendix

Following table represents the complete results set, of the pretest questionnaire that was given to the students at Henegama Central College, Gampaha (See Table 1).

Student	Pretest results
St1	36.36%
St2	72.73%
St3	27.27%
St4	45.45%
St5	54.55%
St6	27.27%
St7	63.64%
St8	27.27%
St9	72.73%
St10	54.55%
St11	36.36%
St12	90.91%
St13	81.82%
St14	45.45%
St15	63.64%
St16	54.55%
St17	72.73%
St18	54.55%
St19	9.09%
St20	72.73%
St21	9.09%
St22	54.55%
St23	72.73%
St24	45.45%
St25	27.27%
St26	63.64%
St27	27.27%
St28	72.73%

St29	45.45%
St30	54.55%
St31	72.73%
St32	63.64%
St33	45.45%
St34	45.45%
St35	54.55%
St36	54.55%
St37	54.55%
St38	45.45%
St39	63.64%
St40	45.45%
St41	54.55%
St42	63.64%
St43	63.64%
St44	63.64%
St45	72.73%
St46	45.45%
St47	72.73%
St48	54.55%
St49	63.64%
St50	27.27%
St51	45.45%
St52	45.45%
St53	54.55%
St54	63.64%
St55	45.45%
St56	54.55%
St57	45.45%
St58	27.27%
St59	54.55%
St60	63.64%

Table 1: Pretest results

Following table represents the complete results set, of the posttest of the treatment group (See Table 2).

Student	Treatment group posttest results
St1	54.55%
St4	90.91%
St5	100%
St7	100%
St9	90.91%
St10	100%
St11	54.55%
St15	100%
St16	72.73%
St18	72.73%
St20	90.91%
St23	100%
St26	100%
St30	72.73%
St34	72.73%
St39	90.91%
St41	100%
St43	90.91%
St45	100%
St48	90.91%
St53	100%
St54	100%
St56	90.91%
St60	90.91%

Table 2: posttest results of the treatment group

Following table represents the complete results set, of the posttest of the control group (See Table 3).

Student	Control group posttest results
St2	72.73%
St12	100%
St17	72.73%
St22	72.73%
St24	72.73%
St28	100%
St29	90.91%
St31	100%
St32	90.91%
St33	90.91%
St35	72.73%
St36	90.91%
St38	90.91%
St40	72.73%
St42	90.91%
St44	72.73%
St46	90.91%
St47	72.73%
St49	72.73%
St51	90.91%
St52	72.73%
St55	54.55%
St57	54.55%
St59	54.55%

Table 3: posttest results of the control group

Part 2

Paper 1: ICT for psychosocial competence development among adolescents

Paper 2: Sri Lankan female adolescents' willingness to share psychosocial issue and receive advice online

Paper1

ICT for psychosocial competence development among adolescents

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Abstract- Along with the technology development, teenagers get more freedom and opportunities to experience new things and people. As a result teenagers are more vulnerable for abuse and health problems in particularly for teenage pregnancy. In order to minimize this issue Health Organizations have started conducting workshops with the intention of empowering teenagers with knowledge, attitude and safety skills required to prevent pregnancy. However, teenagers seem reluctant to show their interest for studying about sexuality and talk about their issues openly. Therefore, health organizations emphasize the importance of identifying an innovative and personalized strategy to develop psychosocial competencies in teenagers. Since information and communication technology has proven to bring benefits for education, the present study investigated how ICT can be used to reduce the major health problem, teenage pregnancy through psychosocial competence development among teenagers. The study consisted of a literature review and two focus group interviews. The findings imply that video, game and discussion are considered as suitable instructional methods to deliver eLearning content in an effective way. Based on the findings this paper discusses how ICT based interventions should be designed to support adolescents to develop their psychosocial competencies.

Keywords— Psychosocial competency, Teenage pregnancy

1. Introduction

Teenagers are the most valuable asset in a country. About one fifth (1/5) of world population are teenagers [2]. However, according to World Health Organization (WHO) hundreds of teenagers get infected with HIV every week [3] and according to the United Nations Populations Fund [1] adolescents have experience in limited and incomplete knowledge on sexual and reproductive health, a small percentage of adolescents have experienced pre marital sex, unprotected sex with sex workers and about 6% of adolescent girls in ages between 15-19 had a baby or were pregnant. Therefore health organizations [1] have taken initiatives to improve quality and access to youth friendly health programs and services. These initiatives aim to build health workforce capacity to effectively and efficiently respond youth health issues and to [4] expand and strengthen physical and mental health including sexual and reproductive health education of adolescents at school level. According to The United Nations Children's Fund (UNICEF) [8] psychosocial competencies are essential for adolescents to face challenges effectively that meet in their day to day life [1]. World Health Organization [1] has also state that psychosocial competencies and attitudes are more important than knowledge for adolescents to face day to day problems.

A study conducted by Botvin et al. [5], LaFromboise et al. [40] and Stein et al. [6] signifies that psychosocial competencies are a major component in reducing adolescents' health problems. Further the United Nations Populations Fund (UNFPA) [1] has identified that empowering psychosocial competencies as a behaviour change communication strategy in order to adopt and maintain the desirable behaviours among adolescents in the area of sexual and reproductive health. Based on their findings UNFPA [3] that use of ICT based intervention to develop psychosocial competencies among adolescents' will be more beneficial than a traditional intervention. ICT has rapidly been brought to use in various areas [8] including teaching and learning. Moreover, it has been globally accepted as a component of education. Online interventions can be accessed by all learners at the anytime irrespective of their locations. Also it will be a solution for the problem of addressing individual learning differences and time limitation to conduct the psychosocial competencies development programs at school level.

However, it is not clear how ICT should be used to develop psychosocial competencies in teenagers. Therefore present study aimed to answer "How can ICT be used to support development of psychosocial competencies in teenagers?".

2. Methodology

The study consisted of two major phases: a literature review and two focus group interviews. The literature review was conducted by analyzing more than fourty (40) research papers which included Twenty five (25) conference papers and Twelve (12) journal papers. Also we referred to several magazines and reports published by World Health Organization [3][2][4]. The papers and magazines were retrieved from Google Scholar, Science Direct, Web of Science, and ACM Digital library by using search text such as “teenage pregnancy” + ICT, "psychosocial competency development"+ ICT, "life skills" + ICT , "psychosocial competencies intervention" +ICT, "adolescents' reproductive health"+ ICT.

The content of the relevant research papers about interventions of proven effectiveness were further analyzed to find ICT based pedagogical approaches or technologies used to develop psychosocial competencies in teenagers.

The findings of this literature review were triangulated with two focus group interviews conducted with a group of female adolescents having regular contacts with the Ministry of Health Sri Lanka. The sample group consisted of 10 adolescents' ages between 15and 19 and they were selected upon their consent for participating in the study.

The interviews were guided by a set of questions prepared based on the data gathered from professional student counsellors and some medical reports at the Ministry of Health, Sri Lanka. Prior to use, the questionnaire was reviewed by a professional counsellor and it was used to gather data at the interviews under his guidance. The data collected through the focus group interviews were analysed quantitatively and qualitatively.

3. Analysis and Results

The sample of papers collected for the literature review were analyzed and categorized based on different instructional methods and technologies used to develop ICT-based learning interventions (see Table 3.1).

Table 3.1: Instructional methods, technologies and examples

Instructional method	Technology	Example
Video	Video sharing sites	Teensource.org [9]
	Vodcasts	The Midwest Teen Sex Show [10]
Game	Online game	RePlay: Finding Zoe [11]
		Serious digital games like Prepare, The Romance Game, SISTAS, and It's Your Game [12]
Images and text	Web sites	Youthline at http://www.youthline.ca
		QYouth Resource at http://qyouthresources.org/
		WebMD at http://www.webmd.com
		Sex,etc at https://sexetc.org/
Audio	Podcasts	Sex Really: The Show [13]
		Podcasts at CDC [9]
		Planned Parenthood Online's Speaking of Sex [14]
Discussion (Q&A)	Short Message Service (SMS) technology	Mobile for Reproductive Health (m4RH) [15]
		SexINFO [16]
		Hookup [17]
	Web-based social networking sites (SnSs)	Health promoting activities using MySpace, Facebook, Twitter

The above described primary analysis of literature implied that there are five main technologies mostly used for developing psychosocial competencies in adolescents. They are SMS technology, SnSs, video-sharing web sites, podcasts and online games. These technologies have been mostly used to deliver instructions based on discussion, video, audio and games.

The literature reporting about these technologies were further analyzed to identify the most suitable technology that can be used to develop an intervention aiming to support development of psychosocial competencies in adolescents. The findings of this further analysis are showing in Table 3.2.

Table 3.2: Comparison of instructional methods and technologies

Instructional method		**Discussion**	**Video**	**Audio**	**Game**
	Technologies	SnSs	Video sharing sites	Podcasts	Online game
Discussion	SMS	Studies showed that SnSs is more efficient than SMS in reproductive health education among adolescents[21]	Studies showed that 57% of online adolescents watched the videos posted on the video sharing sites and stated that this is effective than text messaging to deliver reproductive health education [23] [22]	Studies showed that text messaging is more efficient than podcasts for reproductive health education [24]	Interventions showed that 99% of adolescent boys and 94% of adolescent girls like to play online games than using text messages [35][26].

	SnSs	-	As videos can be shared using SnSs, the SnSs are more effective than video only sharing sites for reproductive health education [27]	Interventions reported that only 19% of online adolescents tends to download podcasts and SnSs are more effective for reproductive health education [28]	Studies showed that playing games over and over again can change adolescents' behaviour [29] over other technologies and found 65% of boys and 35% girls play games daily [30]. As well as studies showed that Most adolescents like to play video/online games for reproductive health education than using other methods as it is comfortable, personal and interactive [31]
Video	Video sharing sites	-	-	Studies showed that 14% of online adolescents uploaded a video file to a sharing site and 39% of online adolescents	Studies showed that 99% of adolescent boys and 94% of adolescent girls like to play online games and only

				shared their own artistic creations on video sharing sites like YouTube than using podcasts. Therefore video sharing sites are more efficient than podcasts[32] [33]	57% of online adolescents watched the videos posted on the video sharing sites. Therefore online games are more effective than video sharing sites [34][35]
Audio	Podcasts	-	-	-	Studies showed that online games are more effective than podcasts regarding to Reproductive health education as only 19% of online adolescents tends to use podcasts.[36]

The findings of the literature review implied that video, game and discussion were the most effective instructional methods to deliver an online content (See Table 3.2).

4. Findings from the focus group discussion

Further a focus group discussion was conducted with a group of female adolescents to know their perception regarding the instructional methods. 80% of them expressed their willingness to study through online games and all informed that they would like to learn through videos (see Table 4.1).

Table 4.1: Preference for instructional methods

instructional method	Preference
Video	100%
Game	80%
Image and text	40%
Audio	30%
Discussion	100%

Based on the findings of the focus group interviews, an online learning intervention was designed to support adolescents to develop their psychosocial competencies.

4.1. Implications for design of online platform

The following flow charts (See Figure 4.1, 4.2 and 4.3) were designed to satisfy the requirements of the adolescents who wish to receive support or learn about psychosocial competencies online. The requirements were identified and the expected levels of interaction were determined and based on the finding of the focus group interviews.

Further an online questionnaire was given to the adolescents to verify the design decisions taken. Based on the marks, the sample of adolescents was grouped into three categories: beginner, intermediate, and expert. Beginners are the adolescents who scored marks less than 30% and experts are the adolescents who score more than 80%. Intermediates scored in between 30% and 80% for the online questionnaire. These grouping levels were decided based on the information provided by the counselors at the Ministry of Health.

According to the information provided by the ministry, only the adolescents in the intermediate group should better be provided with an online learning content and adolescents who scored less than 30% should be immediately directed to a professional counselor for personal advice [1].

Figure 4.1.1: Major design of the online intervention

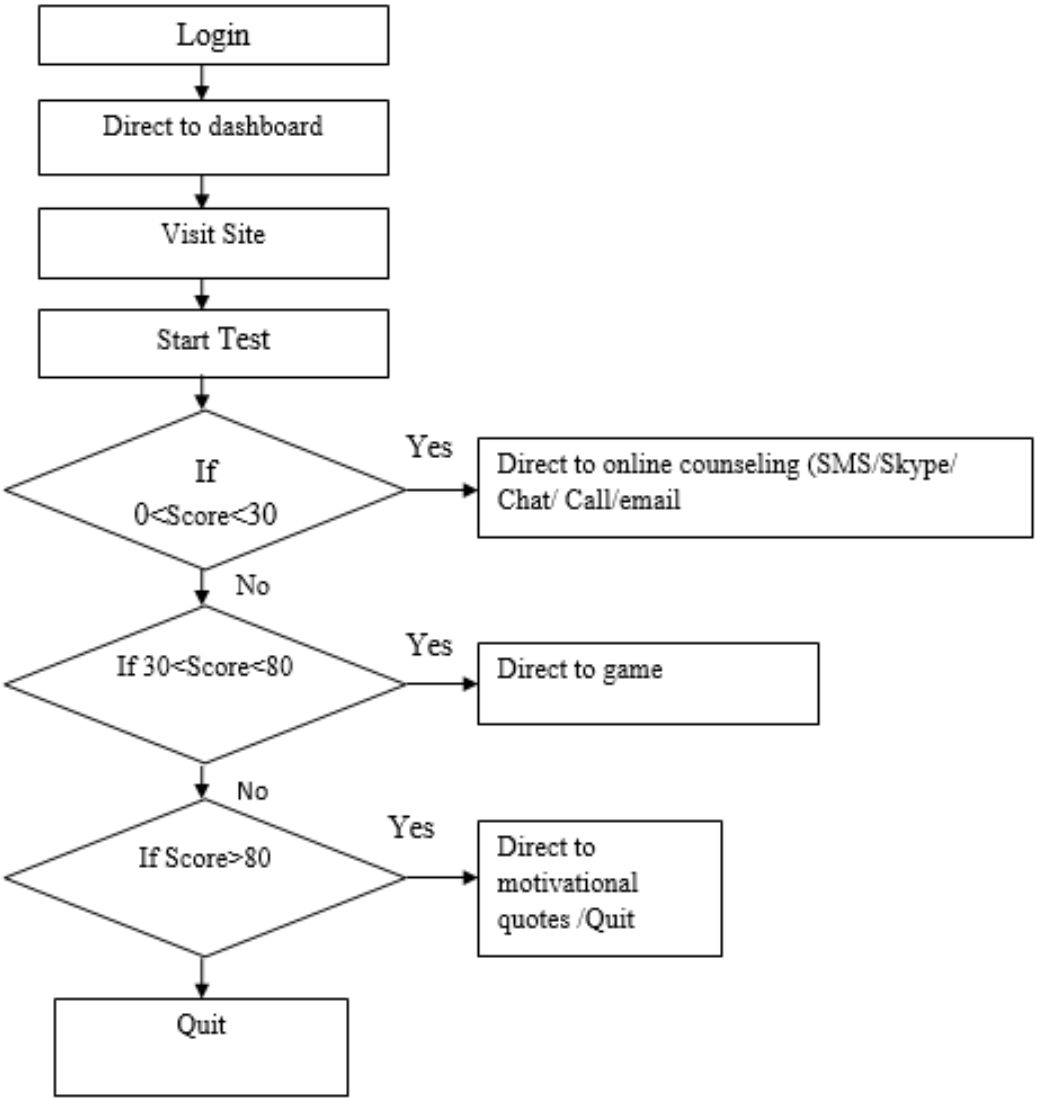


Figure 4.1.2: Design of the game

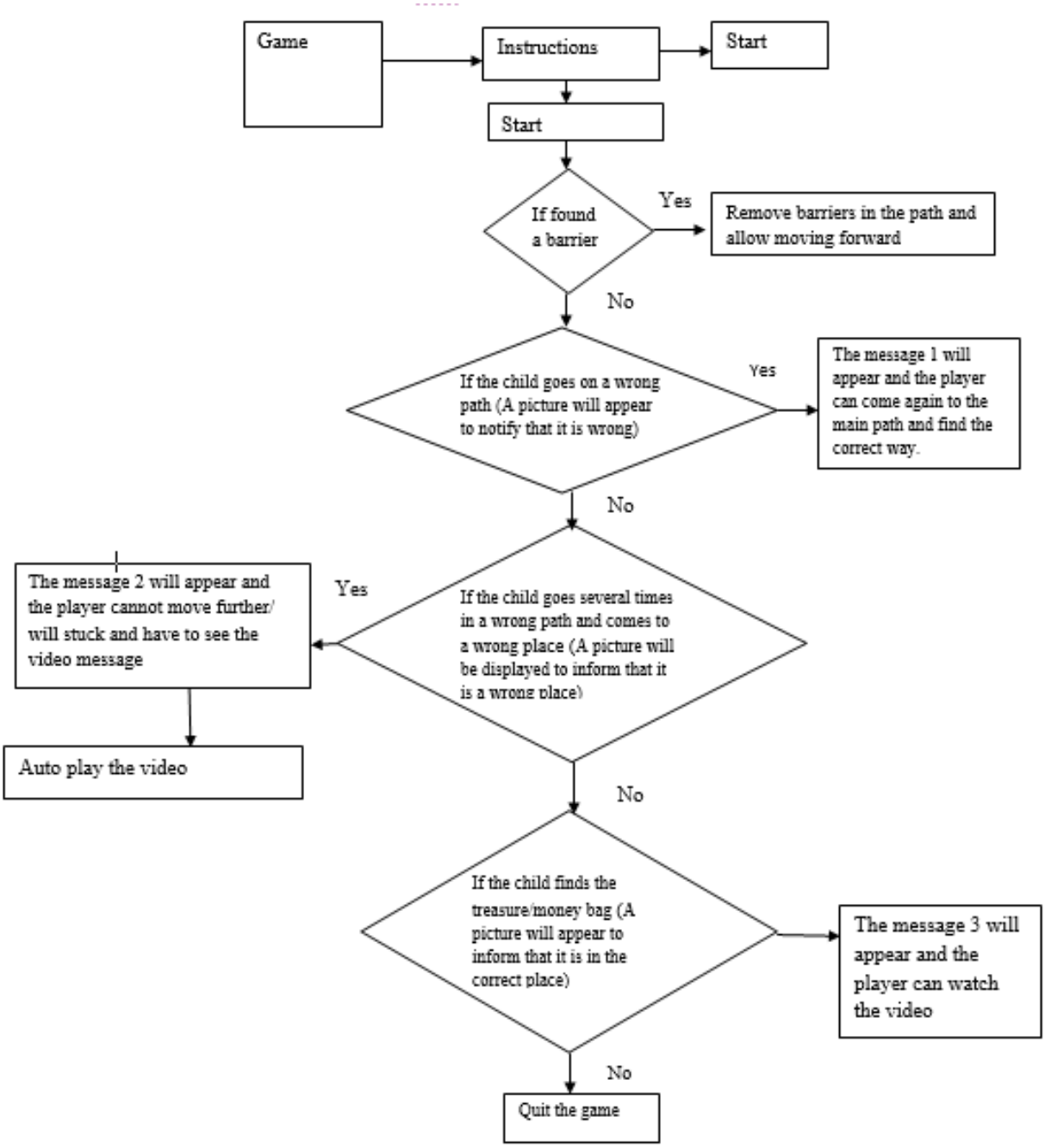
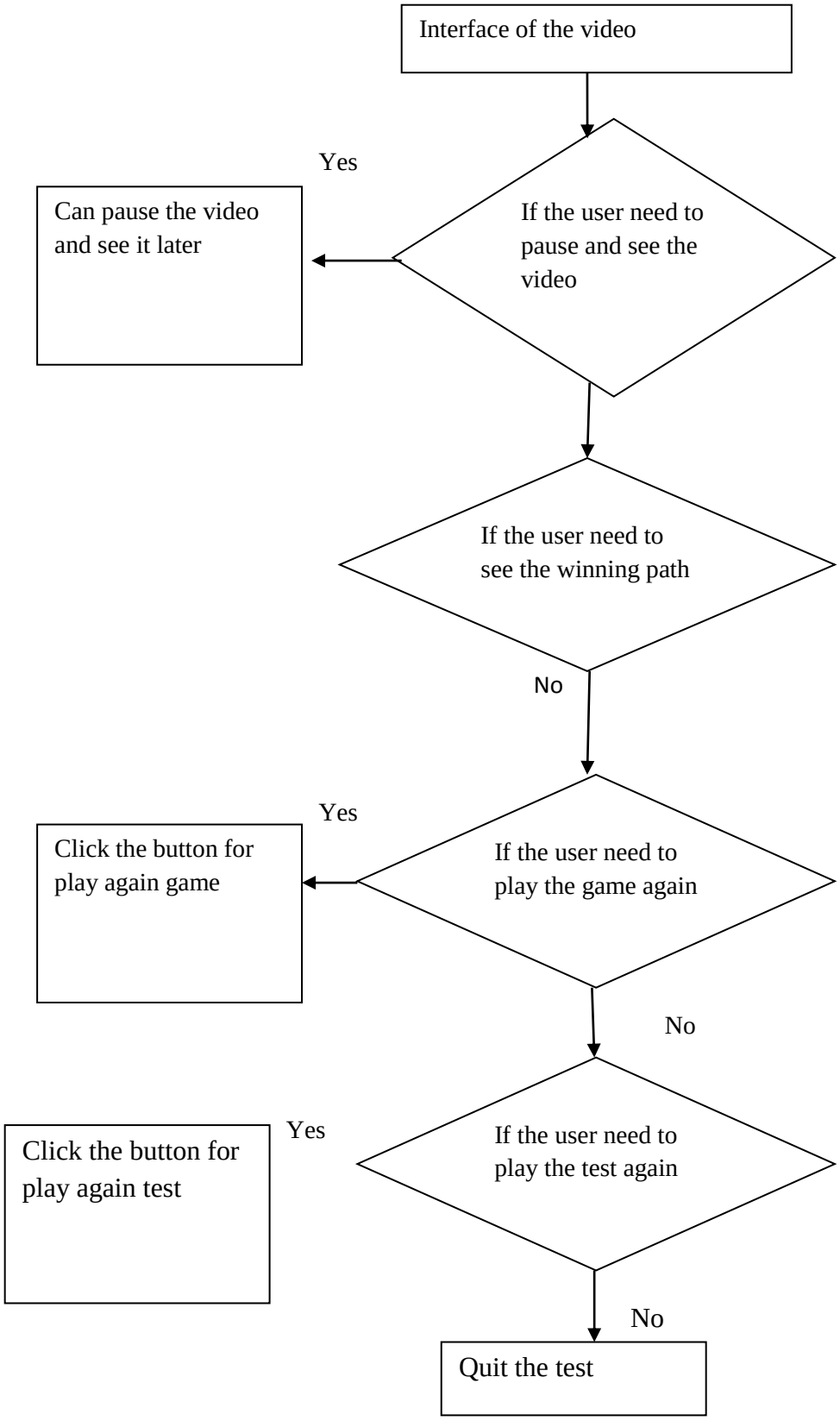


Figure 4.1.3: Design of the interface of the video



5. Discussion and Conclusion

The present research aimed at answering, how ICT can be used to reduce one of the major health problems, teenage pregnancy through psychosocial competence development among teenagers. According to the literature reviews psychosocial competency is a major component in reducing adolescents' reproductive health problems and emphasizes that technology used should be flexible, interactive, and fresh. Most of the above mentioned interventions used video, game and discussion methods. Further, the results on adolescents' preferences for instructional methods revealed that video, game and discussions based learning can be considered as suitable methods for designing an online learning platform to support learning psychosocial competencies. This finding complies with the result of Péter et al.[18] who reported that video based learning is more effective than traditional methods of teaching and learning. Also, game based learning has been considered effective for creating and maintaining learners' motivation throughout the lesson [19] and discussion based learning has been found as an effective method to engage learners in deep and meaningful learning [20]. Incorporating these findings of the contemporary research, the results of the present study informs that online learning environments that are designed to support adolescents developing knowledge and skills related to psychosocial competencies may better be designed with videos, games and discussions.

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References

[1] B *Behavior change communication strategy on reproductive health in Sri Lanka*, Ministry of Health, HEO, FHB, UNFPA, 2015

[2]S.Shariati, N. Fakuri, M. Omidi (2014)" *The Relationship between Identity Styles to happiness and mental Health of Students, Journal of Behavioral sciences in Asia*" 2(12): 86-97, [Online] Available:https://www.researchgate.net/publication/269697200_The_Relationship_between_Identity_Styles_to_Happiness_And_Mental_Health_of_Students. [Accessed: 16- Mar- 2017].

[3]Estimating the size of populations at risk for HIV: issues and methods. Arlington, VA, Family Health International, UNAIDS, WHO, 2002\

[4] *Yowun sawukkya*, 1st ed. Ministry of health, WHO, UNFPA, 2002, pp. 1-38.

[5] Botvin, G.J. Kantor, L. (2000). *Preventing Alcohol and Tobacco Use Through Life Skills Training*, pp. 33-52

[6] Stein, M., 2006, *young people leaving care,Child and Family Social Work*, pp. 273–279.

[7] Y.Eiad, N.Rabie, T.Anas, *ICT's impact on youth and local communities in Syria*, Vol. 498, pp. 223-336, 2015, [Online] Available: https://www.researchgate.net/publication/283057201_ICT%27s_Impact_on_Youth_and_Local_Communities_in_Syria [Accessed: 05- Feb- 2017].

[8] *TeenSource.Org: The only teen sexual health information site of its kind*, California Family Health Council, 2003, [Online] Available: https://www.teensource.org [Accessed: 08- Feb- 2017].

[9]*Midwest Teen Sex Show:wiki* [Online], Available https://en.wikipedia.org/wiki/Midwest_Teen_Sex_Show [Accessed 04-Mar-2017]

[10] N.Dahya, *Serious Learning in Playful Roles: Socio-political games for education and social change*, 2009. [Online] Available: http://journals.sfu.ca/loading/index.php/loading/article/viewArticle/63 [Accessed: 04- May- 2017].

[11] DeSmet, A., Shegog, R., Van Ryckeghem, D., Crombez, G. and De Bourdeaudhuij, I., 2015. *A systematic review and meta-analysis of interventions for sexual health promotion involving serious digital games*. *Games for health journal*, *4*(2), pp.78-90. [Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/26181801 [Accessed: 04- Jun- 2017].

[12]A.E. Pedrana, R.S.Davis, M.E. Hellard, S.Chang, S.Howard, L.Keogh, J.S.Hocking, M.A.Stoove, *A systematic examination of the use of Online social networking sites for sexual health promotion*, 2011, [Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/21777470 [Accessed: 04- May- 2017].

[13]*Podcasts at CDCn* [Online], Available https://www2c.cdc.gov/podcasts/browse.asp?showAll=1 [Accessed 10-May-2017]

[14] Beatty, D.I., (2014), *Gaming the system: video games as a theoretical framework for instructional design*, pp 1-8

[15] K.L Engle, H.L. Vahdat, E.Ndakidemi, C.Lasway, T.Zan, *Evaluating feasibility, reach and potential impact of a text message family planning information service in Tanzania*, vol. 87, pp

251-256, 2012; [Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/22935322 [Accessed: 07- Feb- 2017].

[16] D.Levine, J.McCright, L.Dobkin, A.J Woodruff, J.D Klausner, *SEXINFO: a sexual health text messaging service for San Francisco youth*, 2008 [Online] Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2253571/ [Accessed: 03- Apr- 2017].

[17] E. W. T.Ngai, S. S. Lam, and J. K. L. Poon. *Computer-supported collaborative learning system in teaching e-commerce.* In Proceedings of the Thirteenth Australasian Computing Education Conference-Vol. 114, pp. 63-72. Australian Computer Society, Inc., 2011.

[18] T. A. Weerasinghe, R. Ramberg, and K. P. Hewagamage. *Inquiry-based learning with and without facilitator interactions*. International Journal of E-Learning & Distance Education 26, Vol. 2, 2012. [Online] Available: http://www.ijede.ca/index.php/jde/article/view/779/1406 [Accessed 25-Apr-2017]

[19] *TeenSource.Org: The only teen sexual health information site of its kind*, California Family Health Council, 2003, [Online] Available: https://www.teensource.org [Accessed: 08- Feb- 2017].

[20] E.M .Selkie, M. Benson, M. Moreno, 2011, *Adolescents' Views Regarding Uses of Social Networking Websites and Text Messaging for Adolescent Sexual Health Education*, pp. 205-212,

[21] *Children, Adolescents, and the Media*, council on communications and media, 2013.

[22] D. Levine, *Using New Media to Promote Adolescent Sexual Health : Examples from the Field*, pp. 1–6, 2009

[23] C. Free, G. Phillips, L. Galli, L.Watson, L .Felix, P. Edwads, V. Patel, A. Haines , 2013, *The Effectiveness of Mobile-Health Technology-Based Health Behaviour Change or Disease Management Interventions for Health Care Consumers: A Systematic Review*, pp.23-45.

[24] A.Lenhart , J. Kahne, E. Middaugh, A.Macgill, C. Evans, J. Vitak, 2008,*Teens, Video Games and Civics* ,pp 223-334

[25] A.Lenhart,2015, *Video Games Are Key Elements in Friendships for Many* Boys, pp334-446

[26] C.W. Evers, K.Albury, P.Byron, K.Craford, 2013, *Young People, Social Media, Social Network Sites and Sexual Health Communication in Australia: "This is Funny, You Should Watch It*, pp. 263-280

[27] A.Lenhart, 2009, *Teens and Social Media*, pp1-8

[28] R.L Collins, S.C.Martino, R. ShwRand, 2011, *Influence of New Media on Adolescent Sexual Health: Evidence and Opportunities*" ,pp 1-6

[29] Z.Yang, 2010,*Encyclopedia of Cyber Behavior*, pp. 250-332

[30] *Sex education* [Online], Available: http://pixelkin.org/2014/08/11/sex-in-gaming-sex-ed/ [Accessed 15-Apr-2017]

[31] A. Lenhart , M.Madden , A. Smith ,2004, *Teens and Social Media*, pp.67-98

[32] A.Lenhart, K.Purcell, A.Smith, K. Zickhur,2010, *Social media and mobile internet use among teens and young adults* ,pp556-887

[33] Strasburger, V.C., Wilson, B.J., Jordon, A.M. ,2014, "Children, Adolescents, and the Media", pp1-9

[34] D.L Grange, J.Lock, 2011, *Eating Disorders in Children and Adolescents: A Clinical Handbook*, pp. 67-90

[35] A.Lenhart,2009, *Teens and Social Media*, pp1-9

[36] K.L Engle, H.L. Vahdat, E.Ndakidemi, C.Lasway, T.Zan, *Evaluating feasibility, reach and potential impact of a text message family planning information service in Tanzania*, vol. 87, pp 251-256, 2012; [Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/22935322 [Accessed: 07- Feb- 2017].

Paper 2:

SRI LANKAN FEMALE ADOLESCENTS' WILLINGNESS TO SHARE PSYCHOSOCIAL ISSUE AND RECEIVE ADVICEONLINE

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Abstract

Today teenagers have more freedom and opportunities to experience new things and people. Parents are busy with their career and they do not have time to pay concern on dramatic behavioral changes of their teenage children. As a result teenagers are more vulnerable for abuse and health problems in particularly for teenage pregnancy. In order to minimize this issue Health Organizations have started conducting workshops with the intention of empowering teenagers with knowledge, attitude and safety skills required to prevent pregnancy. However, teenagers seem reluctant to show their interest for studying about sexuality and talk about their issues openly. Therefore, health organizations emphasize the importance of identifying an innovative and personalized strategy to develop psychosocial competencies in teenagers. Since information and communication technology has proven to bring benefits for education, the present study investigated Sri Lankan female adolescents' willingness to share psychosocial issues and receive advice online. Data were gathered through a questionnaire and focused group interviews from a group of female adolescents who received support from professional counselors. The findings of the study implied that most of the Sri Lankan female adolescents may probably willing to share their psychosocial issues and receive advice online. Based on the findings of the study the paper discusses how a web-based learning environment should be designed to support and educate female adolescents.

Keywords— Psychosocial competency, Teenage pregnancy

1. Introduction

As we know adolescents are the most valuable asset in a country. About one fifth (1/5) of world population are teenagers [1]. But today teenagers have more freedom and opportunities to experience new thing and people. Parents are busy with their career and they do not have time to pay concern on dramatic behavioral changes of their teenage children.

As a result teenagers are more vulnerable for abuse and health problems in particularly for adolescents' reproductive health problems. According to World Health Organization (WHO) hundreds of teenagers get infected with HIV every week [2] and according to the United Nations Populations Fund [3] adolescents have experience in limited and incomplete knowledge on sexual and reproductive health, a small percentage of adolescents have experienced premarital sex, unprotected sex with sex workers and about 6% of adolescent girls in ages between 15-19 had a baby or were pregnant. In order to minimize this issue the World Health Organization has started conducting workshops to empowered teenagers with knowledge, attitude and safety skills related for prevention of teenage pregnancy. Therefore health organizations [3] have taken initiatives to improve quality and access to youth friendly health programs and services. These initiatives aim to build health workforce capacity to effectively and efficiently respond youth health issues and to expand and strengthen physical and mental health including sexual and reproductive health education of adolescents at school level [4]. However, According to The United Nations Children's Fund (UNICEF) [6] psychosocial competencies are essential for adolescents to face challenges effectively that meet in their day to day life [3].

World Health Organization [5] has also state that psychosocial competencies and attitudes are more important than knowledge for adolescents to face day to day problems. A study conducted by Alubo et al. [7], Magnani et al. [8] and Hattie et al. [9] signifies that psychosocial competencies are a major component in reducing adolescents' health problems. Further the United Nations Populations Fund (UNFPA) [3] has identified that empowering psychosocial competencies as a behaviour change communication strategy is important to adopt and maintain the desirable behaviours among adolescents in the area of sexual and reproductive health. Based on their findings UNFPA reports [3] that use of ICT based intervention to develop psychosocial competencies among adolescents' will be more beneficial than a traditional intervention. ICT has rapidly been brought to use in various areas [10] including teaching and learning. Moreover, it has been globally accepted as a component of education. Online interventions can be accessed by all learners at anytime irrespective of their locations. Also it will be a solution for the problem of addressing individual learning differences and time limitation to conduct the psychosocial competencies development programs at school level. Therefore, the health organizations emphasize the importance of identifying an interactive and innovative strategy to develop

psychosocial competencies in teenagers to reduce reproductive health problems. Since information and communication technology has proven to bring benefits for education and many other fields, we were motivated to develop an information system which can assess teenagers' level of psychosocial competencies and support them solving their psychosocial issues. For this purpose, the present study aimed to investigate teenagers' willingness to share their psychosocial issues online and receive advice. Based on the results of the study this paper discusses the possibility of designing a suitable web based system to support the female adolescents.

2. Methodology

The study was conducted with a group of female adolescents having regular contacts with the Ministry of Health Sri Lanka for counselling support. A group of 10 adolescents' ages between 15and 19 were selected upon their consent for participating in the study. Data were mainly gathered through focus group interviews and an online questionnaire.

The set of questions to conduct the interview was prepared based on the data gathered from the doctors (professional student counsellors) and some medical reports at the Ministry of Health, Sri Lanka. There were questions such as "*Have you heard about psychosocial competencies before?","What are psychosocial competencies?", and "Do you like to know (more) about psychosocial competencies online?*".The questionnaire was properly evaluated by a professional counsellor and it was used to gather data at the interviews under his recommendation. Notes were taken during the focus group interviews and data were analysed quantitatively and qualitatively.

An online questionnaire was prepared (see Figure 2.1) based on the questionnaires provided by the Ministry of Health, Sri Lanka and it was given to the participants who were willing to get their psychosocial competencies measured online.

Figure 2.1: A screenshot of online questionnaire

Further, a literature review was conducted to identify the preferred instructional methods to acquire knowledge and develop skills related to psychosocial competencies. The findings of this literature review were triangulate with the findings of a debriefing session which was conducted with the group of adolescents in order to identify their learning preferences.

3. Results and discussion

According to the results of the analysis of data collected at focus group interviews informed that 90% liked to share their information and discuss their psychosocial issues online (Table 3.1). The remaining 10% did not respond and remained silent.

Table 3.1: Willingness to learn, share issues and receive advice

Item	Rate
Already know about psychosocial competencies	100%
Like to learn about psychosocial competencies online	90%
Like to get the level of psychosocialcompetencies assessed online	100%
Feel OK to discuss your issues related to psychosocial competencies online?	80%
Do you like to receive counseling support online?	50%

However, when online questionnaire was given all the subjects were willing to attempt the online questionnaire. They were satisfied about the online questionnaire. After attempting it, they reported that they like to learn about psychosocial competencies online. This finding is supported by Pedrana et al. [11] who conducted research usingMySpace and reported that over half (58%) of Internet using teens went and were willing to go online to search for information about health and 40% used the internet to look for sexual health information [12].

4. Adolescents' preferences for instructional methods

Further in order to design the online information system to support the adolescents to overcome their psychosocial issues, a set of questions regarding appropriate instructional method were raised at the interview. 80% of them expressed their willingness to study through online games and all informed that they would like to learn through videos (See Table 3.1.1).

Table 3.1.1: Preference for instructional methods

instructional method	Preference
Video	100%
Game	80%
Image and text	40%
Audio	30%
Discussion	100%

4.1. Implications for design of online platform

Based on the level of marks that oursample of adolescents achieved, they could be grouped into three categories: beginner, intermediate, and expert. Beginners are the adolescents who scored marks less than 30% and experts are the adolescents who score more than 80%. Intermediates scored in between 30% and 80% for the online questionnaire. These grouping levels were decided based on the information provided by the counselors at the Ministry of Health.

According to the information provided by the ministry, only the adolescents in the intermediate group should better be provided with an online learning content and adolescents who scored less than 30% should be immediately directed to a professional counselor for personal advice [13].

The results on adolescents' preferences for instructional methods revealed that video, game and discussions based learning can be considered as suitable methods for designing an online learning platform to support learning psychosocial competencies. This finding complies with the result of Péter et al.[14] who reported that video based learning is more effective than traditional methods of teaching and learning. Also, game based learning has been considered effective for creating and maintaining learners' motivation throughout the lesson [15] and discussion based learning has been found as an effective method to engage learners in deep and meaningful learning [16]. Incorporating these findings of the contemporary research, the results of the present study informs that online learning environments that are designed to support adolescents developing knowledge and skills related to psychosocial competencies may better be designed with videos, games and discussions.

5. Conclusion

The results of the present study informed that adolescents' level of psychosocial competencies can be assessed and they can be supported through an online system. However, when collecting data from the adolescents we need to concern a lot about protecting their privacy. Also, it is important to check whether the users of this system (adolescents) can receive adequate support that they expected. Further, the results of the present study suggested that an online learning environment delivering lessons using videos, games and discussions might probably be well accepted by the adolescents and they will be willing to share their issues related to psychosocial competencies and received advice online.

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References

[1] S.Shariati, N. Fakuri, M. Omidi (2014)" *The Relationship between Identity Styles to happiness and mental Health of Students, Journal of Behavioral sciences in Asia*" 2(12): 86-97, [Online]

Available:https://www.researchgate.net/publication/269697200_The_Relationship_between_dentity_Styles_to_Happiness_And_Mental_Health_of_Students. [Accessed: 16- Mar- 2017].

[2] *Estimating the size of populations at risk for HIV: issues and methods*. Arlington, VA: Family Health International, UNAIDS, WHO, 2002.

[3] *Behavior change communication strategy on reproductive health in Sri Lanka*, Ministry of Health, HEO, FHB, UNFPA, 2015

[4] *Yowun sawukkya*, 1st ed. Ministry of health, WHO, UNFPA, 2002, pp. 1-38.

[5] *Adolescents health* , 2005 [Online], Available http://www.who.int/maternal_child_adolescent/topics/adolescence/dev/en/ [Accessed 04-May-2017] Vol. 119, 10- 28

[6] *Adolescence age of opportunity*, 2011, UNICEF, Vol 148, pp 20- 46,

[7] O. Alobo, *The challenges of adolescent sexulity and reproductive health in Nigeria*. 1999/2000, pp. 12-19.

[8] R. Magnani, K. MacIntyre, A.M. Karim, L. Brown, P. Hutchinson, *The impact of life skills education on adolescent sexual risk behaviors in KwaZulu-Natal, South Africa*, Vol. 803, pp 738-729, 2005, [Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/15780784 [Accessed: 10- Apr- 2017].

[9] J. Hattie, J. Biggs, N. Purdie, *Effects of Learning Skills Interventions on Student Learning: A Meta-Analysis*, Vol. 308, pp. 113-236, 1996. [Online] Available: http://journals.sagepub.com/doi/abs/10.3102/00346543066002099 [Accessed: 08- May-2017].

[10] Y.Eiad, N.Rabie, T.Anas, *ICT's impact on youth and local communities in Syria*, Vol. 498, pp. 223-336, 2015, [Online] Available: https://www.researchgate.net/publication/283057201_ICT%27s_Impact_on_Youth_and_Local_Communities_in_Syria [Accessed: 05- Feb- 2017].

[11] A.E. Pedrana, R.S.Davis, M.E. Hellard, S.Chang, S.Howard, L.Keogh, J.S.Hocking, M.A.Stoove, *A systematic examination of the use of Online social networking sites for sexual health promotion*, 2011, [Online] Available: https://www.ncbi.nlm.nih.gov/pubmed/21777470 [Accessed: 04- May- 2017].

[12] E. Péter, K. Gábor, N. Zsolt, and M. Lenke. 2016, *The comparison of impact offline and online presentation on student achievements: A case study*. In Information and

Communication Technology, Electronics and Microelectronics (MIPRO), 2016 39th International Convention on, pp. 802-806. [Online] Available: http://ieeexplore.ieee.org/document/7522249/?reload=true [Accessed 12-Mar-2017]

[13]. *JeewanaNipunatha*, FHB, UNICEF, 2005

[14] E. W. T.Ngai, S. S. Lam, and J. K. L. Poon. 2011, *Computer-supported collaborative learning system in teaching e-commerce*. In Proceedings of the Thirteenth Australasian Computing Education Conference-Vol. 114, pp. 63-72.

[15] T. A. Weerasinghe, R. Ramberg, and K. P. Hewagamage. 2012, *Inquiry-based learning with and without facilitator interactions.* International Journal of E-Learning & Distance Education 26, Vol. 2.

[16] *TeenSource.Org: The only teen sexual health information site of its kind*, 2003, California Family Health Council, Vol.228, pp. 112-119.

[17] N.Dahya, 2009, *Serious Learning in Playful Roles: Socio-political games for education and social change*, Vol. 445, pp. 11-27.