Learning Through Technology: Development of a Sexual Health Education Application for Adolescents and Youth in Benin

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Abstract: **In Benin, to support the promotion of sexual health education, the government has made the improvement of sexual and gender health conditions in schools one of its priorities. The introduction of technological tools, Internet access (ADSL/Wifi) and the growing importance of the use of digital social networks by many school children in Benin constitute a challenge for the entire educational community. In order to respond to the lack of digital educational materials to improve knowledge and change attitudes towards sexual health among adolescents and young people, we designed a digital tool, in the form of a sexual health education application, and then used it as educational materials in several high schools and colleges in Benin. After the experimental use of the application in the chosen school environment, a survey was conducted to study the attitudes of adolescent students towards this mode of learning. The results obtained show a general increase in learners' interest in sexual health education through the device. Learning seems to have a more playful aspect that keeps learners engaged and maximizes accessibility to key concepts in sexual health education. However, further data collection from learners is needed before appropriate ways to integrate sex education can be deduced. The long-term impact of the application needs to be studied further in order to reach more formal and decisive conclusions.**

Keywords: **Learning Through Technology, attitudes, sexual health, mobile learning, adolescents and youth**

I. INTRODUCTION

Almost all young people in sub-Saharan Africa - including Benin - grow up without access to formal, personalized information about their sexuality, sexual and reproductive health and rights (SRHR) and human rights, mainly because of taboos and stigmas created by cultures, traditions and religions. As a result, millions of these young people are more vulnerable than they need to be - vulnerable to Sexually Transmitted Infections (STIs), unplanned pregnancies, exposure to unsafe (unsafe) abortion, and/or forced or early marriage, HIV/AIDS, stigma and discrimination. There is a critical need to know about these important issues that could affect their health and life outcomes.

Increasingly, the phenomenon of pregnancy among secondary school girls is growing in Benin to the point where some school officials have called it an "epidemic". As the subject of sexuality is already taboo in Beninese culture, it is hardly discussed in society (neither in the family nor at school, etc.)

and young people do not have the right information on good sexual practices (INSAE, 2015).

This situation will, in the long run, seriously undermine the country's development ambitions. In 2015, the Beninese government commissioned a study on early and/or unwanted pregnancies and risky sexual behaviours among adolescents and young people in public and private schools, vocational training and universities in Benin. This study revealed that, in general, adolescent sexuality in Benin is characterized by risk-taking, sexual mimicry, unplanned sexual relations, strong socio-economic influence and sometimes multiple sexual partners (INSAE, 2015).

There is unanimity on the need to activate a number of levers to positively influence sexual behaviour and gender in schools. The development of a Sexual Health Education application could provide solutions to this prerequisite.

Indeed, the revolution in information and communication technologies has favored the increasing use of mobile applications in recent years. This growing use of modern technologies and their development can compromise the attendance and effectiveness of learners. According to Prensky (2001, 2005), these skills are present in the generation born since 1980. This generation has developed a different way of learning and structuring information than previous generations. Young people are said to learn more easily by experimenting, to be competent in performing more than one task at a time, and to be dependent on technology to access information or to socialize. This finding was also reiterated by Oblinger and Oblinger (2005) and CEFRIO (2009).

In light of these observations, the students' concerns raised during our research led us to ask the following questions: What elements should be included in a mobile teaching aid to reinforce the learning of students in Beninese public colleges in order to meet students' expectations related to sexual health education? Specifically, what is sexual health education? What knowledge and skills do students need to reinforce and appropriate? And what activities, approaches, strategies... should be followed for the development of this mobile offline as well as connected (online) digital educational tool in the teaching/learning process in schools. The main objective of this research is to develop a mobile pedagogical tool for improving

knowledge and changing attitudes on sexual and reproductive health among secondary school learners in Benin.

II. THEORETICAL FRAMEWORK

UNFPA (United Nations Population Fund) is one of several partners working with the government of Benin to develop, test and scale up a comprehensive sexuality education curriculum. It was in the process of drafting this curriculum that UNFPA (2015) requested OneWorld's ICT expertise to design a platform to facilitate access to reproductive and sexual health information for young people and vulnerable groups through the development of an integrated sexuality education curriculum in schools (as well as out-of-school settings) in Benin.

In order to answer the research question and to achieve the objectives for the development of our digital pedagogical object, we examined the components of the playful aspect of the educational application, as well as the theories that deal with changing health attitudes before relying on the theoretical framework relating to development research conducted by Van Der Maren (Van Der Maren, 1999, 2003).

2.1. Use of ICT in learning

ICT has already invaded the daily lives of our learners. It is difficult to estimate the number of teenagers who use mobile phones; it is also difficult to estimate the certainly high rate of internet use by teenagers. Multimedia mobiles are numerous nowadays, and many of our learners easily connect to the internet from their mobile phones. The most visited sites are often social networks and download sites. In other words, no one will deny the particular interest of adolescents in ICT and multimedia. There is therefore no need to familiarize them with a new, totally unknown tool. Rather, it is a matter of accompanying them in the use of these tools, orienting and guiding them, and bringing out other aspects of these tools that are unknown to them: the educational aspects. The pedagogical integration of ICT is therefore the use of ICT by the teacher or pupils with the aim of developing skills or promoting learning.

According to Demounem (1990), "The field of education must take full advantage of the contribution of these technologies and must be aware of the following elements

1. the integration of new information and communication technologies (NICT) transforms not only the way of learning but also the time, the nature and the place of learning;
2. the use of ICT can encourage active, collaborative, interdisciplinary and individualized learning and thus enhance the professionalism of teachers
3. the inclusion of NICTs should not be limited to a simple end product designed to satisfy the school's image of these technologies, but should be a continuous process that will provide pupils and teachers with a "base of computer skills" relating to different situations experienced across several disciplines.

2.2 Definition of online educational games

Our review of the scientific literature on the effectiveness of educational games on health was based on a definition of an educational game: an artificial (fictional, fantasy) situation which, while having the potential to promote learning, places one or more players in a position of conflict (struggle, confrontation) either against each other or all together (cooperation) against other forces. These players must respect the rules (procedure, control and closure) that structure their actions with a view to a given goal: either to win (winner against loser), to be victorious (against chance, the computer, one or more players), or to take revenge against an opponent (Sauvé *et al.*, 2005).

In this study, we are particularly interested in educational games that have been created using web programming languages. These games do not require any downloading and can only be accessed via the Internet with or without a connection.

2.3 How can a fun online application or game addresses attitudes?

The importance is to develop health-related games based on social cognitive theories and following health promotion principles, where the individual is put in a position to make the most informed choices for themselves (Lieberman,1997). Attitudinal change is an important goal in health promotion because attitudes promote affective learning. This is especially important for issues related to sexuality, which are intimate, so that openly admitting sexual activity or sexual orientation may be difficult because of stigma or secrecy. Thus, attitudes are worth considering because they play a role in shaping the context in which sexual behaviour occurs.

We need to distinguish here between attitude and behaviour. An attitude is a general orientation of an individual's way of being towards certain elements in the world (Mucchielli, 2002). For example, one can have a distrustful attitude towards a person older than oneself, but adopt a trusting attitude towards a young person of one's own age. It is a mental disposition that explains the behaviour, but it is not the behaviour (Mucchielli, 2002; Renaud and Sauvé, 1990). Attitudes have three major components: a cognitive component, which concerns an individual's beliefs or prejudices about an object or subject; an affective component, which refers to the disposition to react positively, negatively or neutrally to an object, person or idea; and a behavioural component, which is defined as an individual's predisposition to act when the object or subject of the attitude is presented to him or her (Caron-Bouchard and Renaud, 2001). For example, believing that one will be frowned upon if one offers a condom. As for behaviour, it is defined as a set of reactions of an individual that are objectively observable according to Le Petit Larousse illustré (2004); for example, the individual purchases a condom.

Other research articles focus on the effects of the game's knowledge on young people. For our part, we wanted to examine in depth the effect of a game application on attitudes

based on mobile learning, as very few articles in the research literature address this very relevant issue.

Different theories allow us to highlight the components that need to be integrated into an educational application so that it can influence attitudes. According to the reinforcement theory, the dissonance theory and the inoculation theory (Petty *et al.,* 1981; Renaud and Sauvé, 1990), learning activities must allow the learner to play a real or fictitious role that allows him or her to confront positions similar or different from his or her own in interaction with his or her peers, while receiving feedback that allows him or her to readjust as he or she learns. These four components are largely found in role-playing, which is considered to be an activity that has an influence on attitude change (Chauvin, 2001; Renaud and Sauvé, 1990). According to Chauvin (2001), role-playing is a pedagogical technique stemming from the active method and allowing the person to make discoveries by putting himself on stage, by playing a fictional or real role.

Given that the educational application which is the subject of our experimentation aims to change attitudes, it should therefore offer activities based on the parameters of a role-playing game

2.4 Van Der Maren Van Der Maren's theoretical approach

Van Der Maren's methodological approach offers practical solutions to a problem experienced by a given population and Organisation. In fact, this approach is applicable to the analysis and treatment of four problems, namely nomothetic (discipline aiming to derive general laws from observed facts), pragmatic, political and ontogenic. In order to address our concerns, we aimed at solving problems formulated from daily practice by using various theories developed by research, based on the observation that the development of a pedagogical tool calls for a methodological approach specific to developmental research in education (Van Der Maren, 2003). From this point of view, our stated questioning really fits into the 2nd category relating to the pragmatic question of Van Der Maren (1996, 2003). Indeed, our objective is to develop a playful pedagogical tool based on mobile technology for improving knowledge and changing attitudes on sexual and reproductive health among secondary school learners in Benin.

III. MATERIALS AND METHODS

The choice of our methodological approach is based on the use of scientific knowledge and research data to produce new objects or processes (Legendre, 2005). We used existing knowledge to develop a new intervention, improve an existing one, etc. This approach enabled us to identify the most appropriate methods for the development of a new intervention. Indeed, this approach enabled us to identify characteristics to be considered during the scripting and design of the mobile educational application and to contribute to the improvement of knowledge and change of attitudes in sexual and reproductive health of young people and adolescents with the conviction of the interest of taking existing knowledge into account in the research and development process.

However, the analysis of the request, the specifications, the design of the object, the technical preparation, the construction of the prototype and the development (Van Der Maren, 2003) were the main stages. Based on the model of Van Der Maren (2003), we have outlined our research approach to address the purpose of our study. The six main steps above led us to the development of our mobile learning application for both offline and online mobile learning in school-based sexual health education: It is about the analysis of the request, the specifications, the design of the object, the preparation, the development and the implementation.

3.1 Demand analysis (needs analysis) and development of specifications

First, we carried out an analysis of the demand, while following a collaborative participatory approach by actors in the field, young people, resource persons from the Direction de la Santé, de la Mère et de l'Enfant of the Ministry of Health, OSV Jordan, APESSA, OXFAM, and actors such as parents of pupils. This multi-stakeholder involvement has the advantage of ensuring that national and ethical standards are respected in the content of the messages in order to "take into account their constraints and priorities" (Van Der Maren, 2003), but also to facilitate the appropriation of this tool by the various stakeholders. The in-depth interviews were conducted in April 2019 with 36 students, aged between 14 and 15, who had taken SSE courses for the first time in the Beninese secondary school cycle and who had not benefited from any digital teaching material in this subject, and six Beninese secondary school teachers from six (6) schools belonging to the six major departments of Benin (Atacora, Atlantique, Borgou, Mono, Ouémé and Zou) whose teachers have benefited from double capacity building in the NICHE Ben project. 239 teaching sexual health education (SHE) and training in the use of the digital tool "My Life My Choice" for the same purpose. This led us to determine their real needs which could be likely to meet their expectations in terms of changing attitudes to sexual health.

Discussions and questions in the interviews focused on the nature of the game application to be developed, the SSE lessons infused into the classroom, the materials used, the problems experienced in sexual health education, the availability of teaching materials for students to strengthen their sexual health education skills, etc.

The results of the demand analysis reveal that all the students and teachers we spoke to mentioned the lack of digital teaching materials available to them that conformed to any classroom curriculum. Indeed, all the students and teachers we spoke to mentioned the absence of digital teaching aids available to them that conform to any curriculum taught in class. All the students mentioned the problem of insufficient time allocated to learning, the demotivation caused by the number of students, taboos and stigmas created by cultures, traditions and religions, etc. These realities compromise the achievement of the objectives of the project. These realities compromise the achievement of the declared objectives for effective and

efficient learning of SSE courses taught in class in Beninese public schools.

In view of this situation, students would like to have an offline as well as an online mobile digital teaching aid containing their SSE curriculum taught in a classroom infused manner and free for educational use in the form of rich, interactive, diversified, light activities (exercises, video lessons, syntax summaries, games, tests...) carried on a smartphone technology, targeting and covering the eight (8) axes: Episode; Thematic; Discussion; Creation; Quiz; Takeaway; Engagement; FAQ (Frequently Asked Questions) of the seven (7) lessons taught in a classroom infused way and offering them the possibility of learning autonomy, using and reusing the resources freely when and where they want.

In this sense, Van Der Maren (2003) considers that this first phase is particularly important. It refers to the analysis of the needs of a problematic situation and allows the determination of the specifications (characteristics, target audience, objectives, technical functionalities of the application...). Indeed, these specifications were a key element in our approach to developing the mobile educational application.

In order to complete the analysis of the demand and the specifications, we resorted to a variant of collaborative development research. This variant "recommends that the demand analysis and preparation phases be carried out in collaboration with teachers" (Van Der Maren, 2003) in order to create an object that truly reflects a concern of practitioners in the field and to "consider their constraints and priorities".

In this perspective, we have resorted to the collaboration of teachers involved in the experimental phase of the introduction of SSE in schools, experts from OneWorld and Butterfly Works based on their experience in the development of pedagogical tools, experts from INIFRCF (Institut National d'Ingénierie de Formation et de Renforcement de Capacités des Formateurs) in order to carry out the design phase of the prototype of the mobile educational application.

The involvement of the learners in the interactive pedagogical design and development activities designed for mobile learning was also an issue to ensure our successful development and design of an educational application (pedagogical design model) adapted to their expectations.

In a first step, we opted for the scripting, design, development and testing of a prototype, while respecting the specifications established in collaboration with the project stakeholders. Furthermore, we took into consideration that "the specifications would have to be reworked after the design phase, as it is probably not yet clear what technical characteristics the object would need to have in order to fulfil the functions assigned to it".

3.2 Design of the mobile application

According to Van Der Maren, (1996; 2014) this phase constitutes the theoretical aspect of research and development and leads to its modelling. It is about completing and analyzing the available knowledge that will be used in the design of the material, both in terms of its content and its structure and presentation. In this respect, following the consultation of scientific and professional literature on the subject, three data collection techniques will be used, namely:

1. Documentary review: this enabled the research team to familiarize itself with all the documentation related to this project, to exploit secondary sources of information and, after triangulation and content analysis, it enabled us to fill in the evaluation matrix;

2. In-depth interviews: these were conducted with resource persons and some association managers who had benefited from these interventions. The mapping of actors carried out beforehand was used to identify and assess the resource persons to be consulted or interviewed in order to gather key and useful information. Face-to-face interviews were preferred, especially with officials from the various ministries, UNFPA, the donor and some officials from associations that had directly benefited from this support;

3. Focus Group Discussion (FGD). All these techniques are based on ethical aspects where all 'major' stakeholders must give their informed consent before being interviewed. For minors, prior consent is required from their legal guardians (teachers for those in class at the time of the assessment) before the FGDs are organized.

And following the theoretical model that had been developed, we determine the essential elements and possible structures of the content of the mobile educational application and the form of presentation it could take.

3.3. Ethical permission

All these techniques will be based on the ethical aspects where all 'major' stakeholders will have to give their informed consent before being interviewed. For minors, prior assent will be required from their legal guardians (teachers for those who are in class at the time of the assessment) before the FGDs are organized. And following the theoretical model that had been developed, we tried to determine the essential elements and possible structures of the content of the mobile educational application and the form of presentation it could take.

For this purpose, we prepared pedagogical scenarios and story boards of the prototype application module. In this sense, we recall that our project targeted the seven lessons of the module of the different SSE subjects (French, SVT, EFS, etc.), taught in an infused way: - Gender - Reproductive Health and Sexual Rights - STI/HIV - Contraceptive Methods - Self Esteem - Healthy Relationships - Addictions.

Each module consists of one lesson and each lesson encompasses eight areas: Episode (an animated video introducing the theme); Theme (a slide-show with a bit of 'theory', explaining the difficult concepts of the story); Discussion (exercised in the form of a role-play or discussion); Creation (an exercise that reveals the creativity of the young people as they reflect on the themes given to them); Quiz (short

quizzes that test the user's knowledge. This can be in the form of a multiple-choice question, opinion/value-based games and more); Takeaway (the summary of the lesson, with the most important messages to take away); Engagement (the short description of actions that young people can take in their own lives regarding the topic); FAQ (Frequently Asked Questions) (frequently asked questions and answers on the different topics in the lesson content), each of which contains a set of interactive and constructive activities.

However, the potential users at this stage have been teachers, inspectors, school students, experts in multimedia educational engineering and IT development.

3.4. Technical preparation and construction of the prototype

After modelling the tool, Van der Maren (2003) proposes to tackle the phases of technical preparation and construction of the prototype. It is then important to develop "different possible variants of the object" in order to stimulate its creation and evaluation, and then to choose the most appropriate variant "according to an optimal realization of the specifications". Van Der Maren (2003) proposes to first carry out a "feasibility study" of the different variants of the prototype. The aim is to eliminate those simulations of the model which would be too difficult to build while satisfying the specifications. We can think, among others, of "all potentially very interesting realizations that nevertheless require material facilities ... or resources that are not available or accessible (...) in the context envisaged". (Dominé, 2015; Van Der Maren, 2004).

In this research, at this stage, the activities were adapted to make them accessible to students and teachers and to meet their expectations. A guide was produced to help them use the content of the mobile application. Subsequently, we began the technical and pedagogical development of our educational support for mobile learning, both offline and online, in sexual health education in schools. It is important to note that this phase involved a strong collaboration between different partners and collaborators during which several corrections and updates were made to improve the application and make it satisfactory and adaptable to Beninese secondary school students.

Finally, in collaboration with the above-mentioned partners, the development of the application was finalized.

3.5. Development of the application

In the framework of this study, the pre-test was carried out as follows: the tools were presented to teachers involved in Sexual Health Education in schools. It was also presented in a classroom situation to teams (Belgian Embassy, Dutch Embassy, UNFPA).

Subsequently, the contents (video scripts, visuals of the characters, content of the lessons) were validated by the national authorities, in this case the INIFRCF experts, during a five-day workshop. This workshop brought together the Pedagogical Inspectors of the different SSE subjects (French, SVT, EFS, etc.), teachers, psychologists, doctors and pedagogues to review the content and proceed with the validation.

After the various remarks and suggestions were considered, the application was tested by the pupils of a general secondary school class (Terminale) during the relaxation holidays of the 2019-2020 academic year.

Indeed, a survey is necessary to perceive the change in attitudes recognizable through the report of the students' perceptions towards the learning activities related to the concepts of Sexual Health Education carried on a software. To do this, we explained the concepts composed of four (4) items, namely the general perception, the perception of the ease of use, the representation that the subject has of the tool and the attitude towards this mobile learning tool, both offline and online.

Following the explanations in a few upper secondary classrooms (second and first) during a class period, the volunteer pupils are invited to play the following weekend for their own pleasure.

IV. RESULTS AND DISCUSSION

The results are presented in the table below:

Table 1: Perception towards educational mobile application offline as well as online

Items	Scales					
	1	2	3	4	5	Total
Perceived usefulness (PG)	69%	21,6%	2,1%	6,8%	0,5%	100%
Simplicity of use (PSU)	49,8%	42%	2,7%	4,8%	0,7%	100%
Representation (PR)	2,2%	58,8%	31,4%	7,6%	-	100%
Attitudes	58,7%	29,4%	5,5%	2,3%	4,1%	100%

Legend: 1-5 represent the scale. 1 represent the highest scale and 5 the lowest scale.

Students' overall perception of learning sexual health education concepts improved with the tool. 90.6% versus 9.4%. 69% are very favourable and 21.6% favourable. The students say that they feel freer to talk about their sexuality with others after the experimentation.

As for the perception of the ease of use, 49.8% of the students who used the application gave a very favourable opinion, 42% a favourable opinion against 5.5%. The majority of them have a laptop and some of them told us that the tool is more accessible than others proposed for the reinforcement of their capacity in other subjects.

With regard to the subject's representation of the use of the tool, the difference is not at all significant between the pupils' attitudes on this subject, before and after the experimentation. The only good point concerns the answers to certain personal questions that the subject can have without exchanging with a third person. At this level 2.2% and 58% are respectively favourable against 49%.

Finally, as far as attitude is concerned, we note that the use of the software makes it possible to limit the damage and counteract the obstacles. In this study, 88.1% of the subjects said that talking about sexual relations and contraception was less embarrassing. The way of behaving changes. 58.7% are very favourable and 29.4% favourable after the experimentation, against 6.4% who remain sceptical.

V. CONCLUSION

The objective of this research was to develop an offline as well as an online mobile learning application for changing the attitudes of Beninese students towards sexual health education.

The results observed for this type of mobile application oriented towards improving knowledge for changing the learning attitudes of Beninese students were generally positive. In terms of the evaluation of the positive action of the tool on attitudes, the results of our study show that a certain modification of attitudes is possible when learning through an offline as well as an online application.

However, some limitations of this study do not allow us to extend the results. As for the examination of attitudes, we chose to examine mental dispositions, rather than to observe the behaviour itself.

Finally, the time allotted for experimenting with the tool, holidays, a weekend and a class period, does not seem to be sufficient to allow the students to carry out, at least twice, the activities of the tool, which could have influenced the results of this study differently. This work could be a blueprint for the development of new offline as well as connected (online) mobile learning methods to reduce sexually transmitted diseases and school dropout in order to guide students towards responsible sexuality.

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CONFLICTS OF INTEREST

The author declares that there are no conflicts of interest.

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