Design of an Awareness System on Sexual and Reproductive Health Based on the Recognition of Emotional Facial Expressions

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Abstract— Nowadays, the information systems have become essential for organizations which constitute a necessity in order to take the decisions of better quality. This is the reason that forces the orientation towards the computerization process. However, all organizations are seeking an information system which allows an evolution, a development and an improvement of their business processes. This is the reason for which we consider putting in place an awareness information system so that it can sensitize citizens about contagious and infectious diseases such as AIDS (HIV) and hepatitis (A - B - C), and adapt to the needs of citizens according to their emotional states expressed during the online training, as well as other indicators of adaptation (generation, gender, city, language, knowledge level).
The objective of this work is to study the management, which is responsible for the information system that helps to sensitize on sexual and reproductive health. This study is characterized by the use of information technologies and communication, aimed at improving the process, communication between users and information systems and the effectiveness of the administration, either in terms of deadlines, quality, or productivity of public officials to protect the generation.

Keywords- *Information system; Awareness; Adaptation; Emotional state; Sexual and Reproductive Health; OPALS.*

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I. INTRODUCTION

Currently, the information systems play an increasingly crucial role among the modern resources aimed at raising awareness, however, many people find these information systems incompatible with their requirements. To be convinced, it is enough to see the number of unsatisfied people to this technology.

In running our outreach expenses as active members of the Pan-African Organization against AIDS (OPALS-Morocco), we find ourselves more often in need to deal with varied cultures and completely different mentalities, where the use of differentiated pedagogy during the design of an information system becomes a necessity.

This problematic pushes us to work strongly to extend the functionality of the information system, in order to invent a new adaptive system able of reaching all the components without exception.

Based on these objectives, we work on the design of an adaptive information system with several high-quality options in numerous converging sciences such as medicine, psychology and science education.

To succeed in this operation, we will firstly reveal the limits of current information system and, secondly, we will attempt to identify the importance of emotional states as essential factor of mutual understanding. The purpose is to strengthen the awareness role in order to deepen the bonds of trust with the generation and consequently protect it.

II. AWARENESS SYSTEM IN SEXUAL AND REPRODUCTIVE HEALTH PROTECTED GENERATION

Sexual and reproductive health is considered one of the main pillars, which ensure the stability and the establishment of a balance within the societies, by promoting the disappearance of sexually transmitted diseases and the birth control.
Among the main goals of the concept of "*Sexual and Reproductive Health*" [3]:
- Avoid diseases, affections and weaknesses related to sexuality and reproduction, and benefit from appropriate care in case of needs;
- Be protected of violence and other harmful practices related to sexuality and reproduction.

All citizens have the right to have awareness; it must not be booked or limited to a part no more. Therefore, all the governmental and non-governmental organizations (NGO) of the company have to engage and contribute in this project, which aims to ensure that future generations live in good environment.
According to a study that we were conducted with the Pan-African Organization against AIDS (OPALS) [4] in Morocco, concerning:
Sexual and Reproductive health of adolescents and young people:
- 53% of girls said, they were shocked of the appearance of the first menarche.
- 12% of girls aged 15 to 24 years who have had sexual intercourse have had an unwanted pregnancy.

- In adolescent girls of 15 to 19 years, the first cause of death are complications of pregnancy
- 15% of young people do not know any contraceptive.
- Maternal mortality among adolescents 15 to 19 years is double that of women aged 20 to 29 years
- Maternal mortality 112/100 000 live births (2011)
- The child mortality 30/1000 NV (2011)

The Epidemiology of HIV- AIDS:
- From 1986 to June 30, 2013: 7682 Cases
- The transmission is heterosexual, that is to say that the woman is generally contaminated with her husband in their homes: 84.1%
- AIDS affects women more and more: 49%
- 500 to 1000 children with AIDS have less than 15 years
- In Morocco, we have 10 new infections/day and 4 deaths due to AIDS/day
- Between 120 and 150 children are infected with HIV each year, either 1 Child all 3 days.

As researchers in the area of science and technology and according to those statistics, we decided to continue in the same way. We have tried to design and develop an interactive system, capable to increase the citizen's awareness and to be their companion and mentor, in the aim to help the society to preserve the next generations connected and attached to the technologies.

In order that our system becomes a humanized system, we aim to adapt the content of the awareness training to the social situation, which suits each citizen based on his region, gender and age as well as his emotional behaviors expressed during the online training.

We cannot doubt the scarcity of trainers in the field of sexual and reproductive health; therefore, our solution will be a fundamental element to create a collective conscience.

III. LIMITS OF THE CURRENT AWARENESS INFORMATION SYSTEM

Awareness information system is the heart of all organizations responsible for outreach and education; in order to introduce the best information, it becomes crucial for development, a better ability and good management.

Awareness information system has several qualities, but it is still limited.
- Lack of emotional states expressed during the training.
- Not taking into consideration the culture and the traditions of the different regions.
- No distribution by generation, gender, level of knowledge and language mastered by individuals.
- No animation, followed and the update of the training content.
- Not taking into account the awareness of the blind.

IV. THE IMPORTANCE OF EMOTIONAL STATES AT THE LEVEL OF AWARENESS SRH

In recent years, the digital world has undergone an evolution which has allowed to mention and to improve the information and communication technologies (ICTS), in particular in the learning and training so as to make communication more interactive and effective.

Emotions play a crucial role in receiving information and the expression of individual's behavior. Several researches in various fields are interested to manage and understand the emotional states of individuals, such as the learning, the interactive games, driving, and the security field [5], [6].

It is recognized that human beings are different in terms of cultures, knowledge, feelings and expectations. Generally, the emotions provide information on the individual's behavior and their mental states:
- Interest
- Concentration
- The feeling of satisfaction about the training content.
- The lack of understanding.

All these emotions can be expressed by the individual's facial expressions, as well as other indicators that are seen and changed from one person to another [7], for example a redness that indicates the timidity, the rhythms to respiratory and cardiac which express the fear and tiredness.
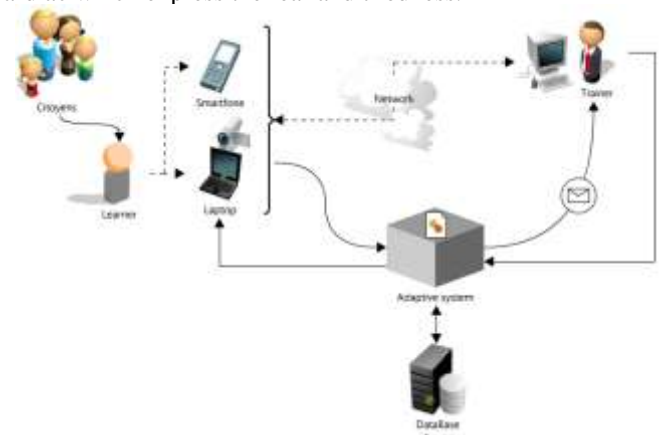

Figure 1: Online communication between trainer, system and user

The trainer tries to perceive and understand the learner's emotions in order to transmit information in a relevant manner so that the learner will be comfortable. Our goal is to adapt the content of awareness training in SRH in a way adequate to the needs of each individual, subsequently improve the quality of the distance training, promote, enrich and provide a more effective and open communication between the trainer and the citizen.

Once the learner connects to the training Platform through his or her computer or Smartphone, the emphasis is on two levels of adaptation; firstly, the learner will enter his personal details:
- Culture,
- Gender,
- Level of knowledge
- Mastered language

These data form the basis which will allow the system to determine and to adapt the training content according to the cultural profile, and secondly, during the training, the system will automatically receive the emotional states of learners and after that these will be sent to the trainer in the case of an intervention on his part.

V.   CASE STUDY

Current awareness information systems are not adaptive to the user's needs. For this reason, we seek to put in place an information system of awareness adaptive to certain criteria.

This kind of information system remains the most effective for the awareness and good training, to transmit easily and concisely convey information according to the nature of the information to the concerned users, while respecting the indicators of training access.
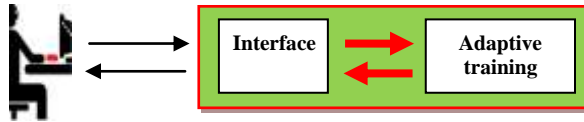

Figure 2: Decomposition of the interactive system whose content is proposed by the Pan-African Organization against AIDS (OPALS)

A.   Design of an expert system

The development of an expert system made the call to a fundamental strategy to the humanities and social sciences.

In effect, it does not remain a method to limit a certain expert's strategy, but generally, the designer is trying to achieve three levels within the mass of knowledge:

1.   Structuring level
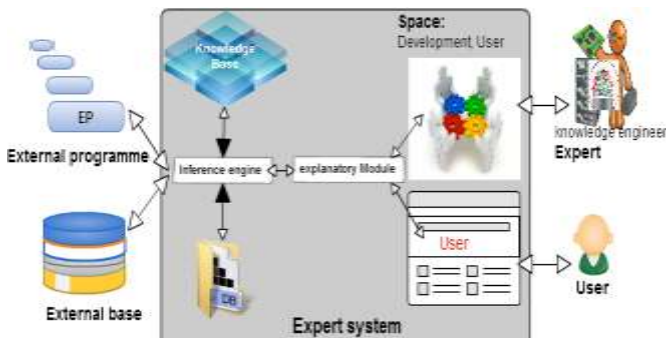2.   Conceptual level
3.   Cognitive level

Figure 3: Design of an expert system

B.   Materials and methods

Actions concerning the information systems should be taken by the executive management. It is the only one which is able to give the impetus, knowing that the company's strategies and its relevance as well as the accuracy pass by the reactivity capacity of the information system.

Taking into consideration several factors, such as the evolution of the world and the change at the administration's level, this requires the establishment of an elegant information system unlike the former information systems.

1) Knowledge engineering

At the acquisition of data, it is estimated by the use of interviews that we can generate a very limited number of rules by day for the establishment of a system of rules [1].

The knowledge engineering would evoke the techniques to manipulate knowledge on computer.

The effort is focused on:

- Identification and Acquisition
- Modeling and Formalization
- Utilization
- Maintenance and Management

2) Technical analysis of facial expressions

The goal behind the detection, extraction, and classification of facial features is adapting the awareness training content according the emotional states and behaviors expressed by online learners.

The methods:

- *IntraFace*: Face tracking and detection, it provides a functionality which aims to track and notify if the face has been seen or not.
- *Local Binary Pattern (LBP):* Extraction and recognition of the characteristic traits of face.
- *Support Vector Machine (SVM):* Classification and synthesis of the emotion's characteristics.

VI.   DISCUSSION

The establishment of an adaptive and expert information system allows the respect of different rear-thoughts in Morocco according to a certain number of criteria such as the emotional state, generation, gender, region, culture and language.

This information system helps to raise awareness and transfer the information to people more easily, depending on the type and the culture of each user, as well as it treats the users according to specific categories and according to their affiliation.
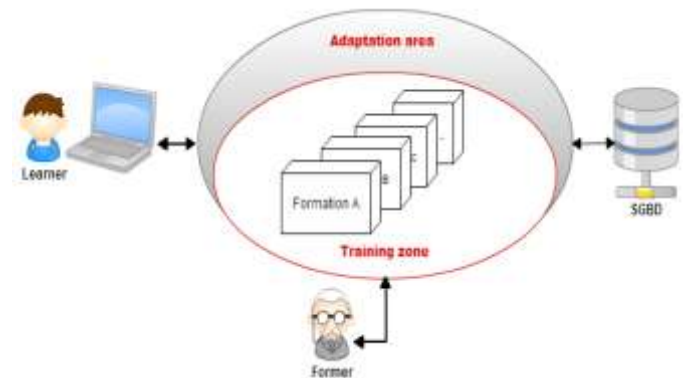

Figure 4: The architecture of the adaptive system information

Indeed, the establishment of this new information system allows improving the quality and validity of the results.

Our solution presents many advantages:

- The respect of the culture and traditions of each region.
- Perception of emotional states expressed during the training.
- The composition of several languages, which help to the understanding of all users.
- Adapt the training to several parameters.
- The monitoring and updating of the content.

To note, that we aim to improve our information system to raise the awareness of the blind.

VII.   CONCLUSION

Today, the information systems are considered as an effective tool to accomplish humanitarian services such as

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awareness; However, in practice most of the information systems that intended to raise the awareness of the people are not adaptive, which creates the real obstacles in order to achieve the desired objective.

In fact, this is a challenge because awareness through the information systems involves necessarily the adaptation of the content with the desired objective. This later is the reason for which the modern organizations are moving toward the adaptation of information systems intended for the awareness, furthermore most of the objectives set at the level of this project will be carried out and applied in the new system except that it leaves the door open for the research.

On the other hand, we are interested in the awareness of a particular segment in society, which concerns people with visual disabilities; therefore, the question that seems to us very important is how to put in place an awareness information system dedicated for the blind people?

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