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Cohort study to evaluate the assimilation and retention of knowledge after theoretical test in undergraduate health science

Jorge Josaphat Ferreira*, Lukewell Maguta, António Bernardo Chissaca, Inocêncio Fancisco Jussa, Sara Sarajabo Abudo

Faculty of Health Sciences, Lurio University, Nampula, Mozambique

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ABSTRACT

Background: Each year new undergraduate courses are emerging in Mozambique, and with them the number of students has been increasing exponentially. In higher education institutions, particularly in the health sciences, knowledge retention becomes essential for learning and for efficient and effective training of capable health professionals.
Methodology: This is a prospective cohort study, conducted at the Lurio University, Mozambique. To evaluate the assimilation and retention of knowledge, a theoretical lesson was taught. The class time was 90 minutes divided into a theoretical stageand the other was a discussion stage (30 minutes) for clarification of doubts. Questionnaire was administered in the pretest, post-test and after six months.
Results: Of all students ($n = 241$), enrolled in the second semester of the first year of the course, 190 students did the pretest, 187 did the post-test and 183 students did the test after six months. Before the lecture none of the course managed to achieve the satisfactory percentage of 75% of correct answers ($p<0,001$). Assimilation of knowledge in the post-test performance there has been a significant increase in knowledge, in all questions the students reached the recommended percentage as "satisfactory knowledge" ($p < 0.001$). The post-test suggests that participants in this study had a significant capacity of memorization which is essential in the retention of knowledge.
Conclusion: It can be concluded that the assimilative and retention capacity improve the student knowledge immediately after a theoretical lesson with addition audiovisual resources, and the acquired knowledge remains even though there is a deterioration with passage of the time.

Background

Higher education has been the subject of numerous discussions in Mozambique and worldwide. The development of undergraduates and commitment to general education, which enables the student a basis on which he/she can develop and learn continuously is in "Undergraduate Legislation Reports in Mozambique". The are two relevant recommendations: the mediating role the teacher should play in teaching and learning process, and the active of students stance in the construction process of knowledge.[1]

The assimilation and retention of knowledge are profound and ongoing activities that are restricted to the context of formal instruction and are essential to maintain good academic performance of students. In higher education institutions, particularly in the health sciences, knowledge retention becomes essential for learning and for efficient and effective training of capable health professionals.[2] This type of learning is created through personal development which should be enhanced to promote the transmission of new knowledge, concepts and attitudes in addition to specific technical training of the subject.[3]

Each year new undergraduate courses are emerging in Mozambique, and with them the number of students has been increasing exponentially. One reason for this increase is justified by demographic and statistical data.[4] Among 20 million Mozambicans, only 100,000 are students in higher education, which means a gross rate of participation in higher education of only 0.5%, compared to an African mean of 5.4%. This expansion of higher education must be accompanied by continuous improvement of in the quality of the courses that institutions offer. In this sense they should pay particular attention to the fulfillment of quality standards regarding robust and competitive training.[5]

* Corresponding author.
E-mail address: jorgejosap@gmail.com (J.J. Ferreira).

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Traditionally the theoretical lesson is the most used ways to promote the assimilation and retention of knowledge in higher education. This method consists of "verbal lecture used by teachers with purpose of transmitting knowledge" about a subject in a logical way. It is the most method used to be more easily suited to numerous classes. Furthermore, a flexible method is, or may be adapted in real time to various audiences, in addition to allowing the use of various audiovisual resources (from traditional slate even the audiovisual resources), for example, use of multimedia projector and programs like PowerPoint and Prezi.[6] Summarizing its advantages as producing better visual effects, high efficiency in information transfer, precise and systemic knowledge structure. Disadvantages of addition audiovisual may be induced by irrelevant information, neglect of interaction with students, uncontrolled speed in presenting or too strict order of information.[7]

There are various learning styles, methods, techniques, means and teaching procedures as strategies to evaluate the assimilation and retention of knowledge, and cannot be reduced only to theoretical lesson. Although the theoretical lesson was choice of this article because it has been the most used teaching strategies in UniLurio, therefore it is important to mention the use of other strategies, such as supervised study, discussion, seminars, case study, simulation lab, drama, movies, integrative panel, creative games, teamwork, portfolio, online programs and educational workshop.[8–10]

In this context scientific research is seen as one of the tools that can help in the teaching and learning process because it helps both validation of already established practices and qualifying their use in everyday life, as in the critical transformation of the present, by the opportunity to point out the necessary changes.[11] Based on these, the goal is to discuss the assimilation and retention of knowledge among university students of health sciences in UniLurio.

Methodology

This is a prospective cohort study, conducted at the Faculty of Health Sciences, Lurio University (UniLurio) in Nampula, Mozambique, from September 2014 to March 2015. The study included students from undergraduate courses (medical, dentistry, pharmacy, optometry, nutrition and nursing) who were enrolled in the second semester of the first year of 2014 and were willing to participate.

To evaluate the assimilation and retention of knowledge, a theoretical lesson (with multimedia projector and PowerPoint program) was taught in the discipline of Community Health, in September 2014, by an Assistant Professor with a Master of Science degree in Epidemiology. The theme chosen for the lecture was the Ebola Outbreak because in 2014 the World Health Organization (WHO) confirmed the largest epidemic Ebola virus of all time[12] that was responsible for the deaths of many health professionals.[13] The class time was 90 min divided into a theoretical stage (60 min), based on knowledge of WHO guidelines, and the other was a discussion stage (30 min) for clarification of doubts. The location of the lecture was the Magna Room at the UniLurio. The lecture and data collection was given to all the courses at the first year at the same time.

The research instrument used for data collection was a simple questionnaire (with the contents of the theoretical lesson), encoded by student number, and with 9 closed questions *(1. The name of the course; 2. First country to emerge Ebola Virus; 3. How to diagnose the disease; 4. Do you know the signs and symptoms; 5. Do you know how to confirm a sick person with Ebola Virus; 6. Do you know how to treat a patient with Ebola Virus; 7. Do you know how to prevent the disease; 8. Do you know how to do the biosecurity against Ebola Virus; 9. Do you know the main difficulties to control the disease)*, and 5 open questions on which the students should reference to three symptoms, three interventions, three ways of prevention, three ways of biosecurity and three ways to difficulties in controlling the disease caused by the Ebola virus according to WHO guidelines. For quantitative analysis of the open questions was considered correct answers those who have at least two right reference.

This questionnaire was administered in three evaluation periods, the first before the lecture (pretest), the second after the lecture/discussion (post-test) and the third six months later (after six months). Some students who did not respond to the questionnaire in all evaluation periods were excluded. Although the research instrument has not established objective parameters of percentage of correct answers, literature data indicates that 75% of success is considered a satisfactory result.[14] Thus, this study considered 75% accuracy as a satisfactory result.

Statistical analysis

An analysis was performed using the Statistical Package for Social Sciences (SPSS) 21.0. Categorical variables were expressed as percentages or absolute values, and continuous values as mean ± standard deviation. For the inferential analysis of comparison between continuous variables among the three evaluation periods and between courses, an analysis of variance (ANOVA) for parametric data was included and for the comparisons of categorical variables we used the chi-square test, which considered a significant value of $p < 0.05$.

Ethical approval

This study was approved by the Institutional Ethics Committees of UniLurio, reserving all rights of the participants and the institution, ensuring participants the freedom to refuse to participate or withdraw consent during the investigation.

Results

Sample characterization

Of all students ($n = 241$), enrolled in the second semester of the first year of the course, 190 students did the pretest, 187 did the post-test and 183 students did the test after six months. Among medical students ($n = 60$), 46 answered the pretest, 50 post-test and 37 after six months. Of all dentistry students ($n = 30$), 28 participated in the pretest, 20 post-test and 26 after six months. In relation to pharmacy students ($n = 30$), 17 responded to the pretest, 17 post-test and 20 after six month. Among the optometry students ($n = 30$), 14 answered the pretest, 18 post-test and 21 after six months. For nutrition students ($n = 61$), 49 participated in the pretest, 53 post-test and 51 after six months. As for the total nursing students ($n = 36$), 36 responded to the pretest, 29 post-test and 28 after six months. 43 students were excluded from the study because they did not answer to the questionnaire in all evaluation periods, (13 medical, 8 dentistry, 3 pharmacy, 4 nutrition, 7 optometry and 8 nursing). Thus, a total of 165 students answered the questionnaire in the three evaluation periods and so were eligible for the study (37 medical, 20 dentistry, 17 pharmacy, 49 nutrition, 14 optometry and 28 nursing).

Frequency of correct answers

All questions showed differences in the frequency of correct answers in the pretest, post-test and after six months of lecture. In all questions, the frequency of correct answers of the pretest demonstrates that students had little knowledge about the Ebola virus, for example in the question "*Write two biosafety interventions against Ebola Virus*" among 165 students were only 38% able