

Developing of a test on sound phenomena oriented to students of Health Sciences

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Abstract. This work presents the process of developing a test which seeks to investigate the understanding of the phenomena of reflection and refraction of sound, directed towards students of Health Sciences. For this purpose, first, a survey was elaborated and applied to know the conceptions of the students about these two phenomena. With this background, it was proceeded to build a test of 30 multiple choice questions of a single answer that were implemented online; such version was evaluated by experts. From the analysis of the observations given by the experts, the pertinent corrections were made, and a validated version of the test was obtained.

1 Introduction

Careers in Health Sciences require the understanding of physical concepts that facilitate the understanding of processes that are specific to their areas of study. Some of them have included physics courses in their curricula and others integrate physical concepts in their specialty courses. Whatever the situation, certain physical concepts are integrated into their formation. We can mention, by way of examples, the curricula of the careers of Medicine in Pontificia Universidad Católica, Universidad de Sevilla, Universidad de Buenos Aires, etc.

In Physics it is possible to find a series of tests that seek to know the level of understanding of certain concepts, so, for example, they can be mentioned, among others: a) In Mechanics, Force Concept Inventory, (FCI) [1], which aims to evaluate the comprehension of the concepts of speed, acceleration and force from the Newtonian point of view; b) In Electromagnetism, Brief Electricity and Magnetism Assessment (BEMA) [2], which evaluates basic concepts of electricity and magnetism, c) In Astronomy, Astronomy Diagnostic Test (ADT), [3, 4], which evaluates the understanding of astronomy concepts included in introductory astronomy courses for careers not related to science, d) Quantum Mechanics, Quantum Mechanics Conceptual Survey (QMCS) [5], which measures the understanding of fundamental concepts of Quantum Mechanics, e) In hydrodynamics, Bernoulli's Law Test [6], which seeks to measure the learning of Bernoulli's hydrodynamic pressure law in engineering students, f) In waves, Wave Concept Inventory (WCI) [7], that explores the visualization of waves, their definition and their mathematical representation. Many of these questionnaires were developed to be applied in engineering or physical science careers.

In Austral University of Chile, in Puerto Montt, there are some careers in the field of Health Sciences, among which are the Phono audiology and Medical Technology careers. These careers have in their study plans the subject of Acoustics that includes, among other various contents, sound phenomena (reflection, refraction, diffraction, interference, reverberation and resonance), sound characteristics (tone, timbre, intensity) and acoustic impedance. Product of that arises the interest to evaluate the comprehension of the phenomena of reflection and refraction of the sound but giving him a direction towards the sciences of the health.

2 Methodology

With the information about the conceptions presented by the students, the process of designing a questionnaire with multiple choice questions was started, which allowed to find out the comprehension of reflection and refraction phenomena, as well as the knowledge of the characteristics of the sound that remain unchanged. or are modified when these phenomena occur. To develop reagents questions misconceptions identified in the survey were used. Considering the modified Bloom Taxonomy [8] the items involve the cognitive dimensions remember, understand, apply and analyze. The next step to the design of the test was to develop a method that would allow collecting suggestions from a group of experts, with the purpose of making the necessary modifications that would allow the instrument to be validated [9]. Once the questionnaire was designed, it was implemented online with the purpose that both the experts and the students could evaluate and respond, respectively

3 Conclusion

Bibliographically it can be observed that there are instruments of conceptual inquiry about different physics concepts, but not oriented to careers in health sciences. However, there are several contents, such as optics, hydrodynamics, electromagnetism and others that involve a range of concepts that students in these areas of knowledge must study and understand in their training. This makes it important to build more instruments of these characteristics to measure the understanding of the different physical concepts that are part of the health careers curriculum.

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