

# CONTENT VALIDATION OF VIRTUAL LEARNING OBJECTS: Proposal for a methodological approach

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## 2.1.1 Scientific Investigation: Research

## 2.1.2 Higher Education

## 2.1.3 Research Methods for Distance Education and Transfer of Knowledge

## 2.1.4 Description of Ongoing Project

### **ABSTRACT**

*The expanding use of information and communication technologies in education opens the way for improvements in the teaching-learning process, such as through the use of virtual learning objects (VLOs). For this purpose, these objects need to be suitable for their intended purposes, including the content about the theme of interest and the way they represent the unit of knowledge to be learned by the student. Therefore, it is necessary to validate these VLOs, not only as to appearance and technological aspects, but also regarding their content, so that they can serve as effective educational resources. For this purpose, it is necessary to develop adequate instruments for the content validation process, contemplating the domains involved in this step of methodological studies. Because of the absence in the literature of standardized and validated instruments for this phase, we report here a study on the development and validation of an instrument that can be adapted to different VLO modalities, to help researchers to construct and validate the content of these resources.*

**Keywords:** Distance education; educational technology; method; evaluation.

## 1- INTRODUCTION

In recent years the use of technology in the field of education and training has been expanding strongly. The advantages of this technology run the gamut from facilitating interaction with classmates and production of collective knowledge in traditional in-person degree programs to online learning through distance education.

This situation puts pressure on teachers themselves to learn how best to use innovative technologies, to make the learning process more pleasant and effective for students.

Galvez Júnior (2014) highlights the benefit of this new dimension of the use of technologies in educational contexts, observing the significant impact of technology on students, who are increasingly familiar with and participative in this process through their use of computers, so that information and communication technologies (ICTs) have become integral parts of their learning and professional development, both in formal and informal situations.

Barreto (2004) focuses on the reconfiguration of teaching through the use of ICTs from the perspective of teachers. The increasing presence of various technologies in pedagogical practices involves both a set of language practices developed in teaching situations and practices that aim to reach a level of explanation for these same situations.

In this context, virtual learning objects (VLOs) have emerged as important tools. They are defined as digital resources that can be reutilized to support learning. According to Santos and Amaral (2012), the main idea behind their use is to “break down” the educational curriculum content into small parts that can be tailored and reused in various settings.

Several studies have investigated the benefits of using these resources in the teaching-learning-evaluation process. Among the main benefits that can be attributed to them are enhanced learning in online courses by simulating clinical scenarios and the nurturing of a feeling of belonging among students through participative learning (Fonseca et al., 2008; Dal Sasso and Sousa, 2006; Lima and Lacerda, 2010).

Although many studies have been published on the use of VLOs, to the best of our knowledge no studies have been carried out seeking to construct instruments to validate their characteristics. Among other aspects, these should contemplate the specific domains of the targeted subject matter and satisfy an important requirement of measurement instruments: validity of content.

In using VLOs in the teaching-learning process, it is necessary to assure they are able to represent the majority (or ideally all) the components of the learning domain related to the content that was fragmented to construct the VLO in question, so as to validate the inclusion of the characteristics of quality, utility, presentation and suitability to the particular content (Alvarez and Dal Sasso, 2011).

Because of the importance of this evaluation, the aim of this study is to construct an instrument for validation of the content of VLOs, based on theoretical and methodological references for their construction and adjustment to different contexts for use.

The aim is to support educators who are interested in building these resources so that they will be guided by the items of the instrument, facilitating the theoretical and methodological construction of VLOs and enabling a parallel process of evaluation to optimize the process.

## **2- OBJECTIVES**

### **2.1- GENERAL OBJECTIVE**

- To construct a content validation instrument for virtual learning objects.

### **2.2- SPECIFIC OBJECTIVES**

- To identify domains to be evaluated through instruments that assess the content of virtual learning objects.
- To construct validated items for evaluation of the domains present in virtual learning objects.

### 3- THEORETICAL FRAMEWORK

Our basic theoretical framework for this methodological study is psychometrics, as presented by Luiz Pasquali (2013), covering the development and evaluation of tests in the fields of psychology and education, justifying this choice for this study.

Next we briefly present some historical and theoretical references that underpin psychometrics as a science and its use in the construction and validation of educational technologies, to support our choice in this study.

#### 3.1- Psychometrics: the science of measurement

According to Pasquali (2009), psychometrics rests etymologically on the theory and technique of measuring mental processes, and is particularly applied in the areas of psychology and education. It is grounded on the general theory of measurement in the sciences, or put otherwise, on the quantitative method, whose main characteristic is the fact it represents knowledge of nature more precisely that can be achieved by common language to describe the observation of natural phenomena.

It traces its formal origins to the epistemological vying among currents of psychology in the late nineteenth and early twentieth centuries, and has the statistics of learning as a precursor. Indeed, it is still often considered to be a branch of statistics, although it should really be considered a branch of psychology that interfaces with statistics, as argued by Pasquali (2013).

Various scholars contributed to its definition as a science, with Leon Louis Thurstone, the creator of multiple factor analysis, being its leading exponent, by differentiating it from the psychophysics of the German psychologists Ernst Heinrich Weber and Gustav Fechner. Psychophysics was defined as the measurement of directly observed processes, i.e., the organism's stimulus and response by means of mental processes (law of comparative judgment) (Pasquali, 2009; 2013).

Pasquali (2009) explains that psychometrics seeks to explain the meaning of the responses given by subjects to a series of tasks, typically called

items, presented in two currents: classical test theory (CTT) and item response theory (IRT).

In general, CTT tries to explain the total final result or the sum of the responses to a series of items, expressed as a score. In contrast, IRT is not interested in the total score of a test. Instead it is focused on each of the items and wants to know the probability of correctly or incorrectly answering, or of accepting or rejecting, the items and the factors that influence this probability (Pasquali, 2009).

### **3.2- The validity of tests as a parameter of psychometrics**

According to Pasquali (2009), in both CTT and IRT the two most important parameters for the legitimacy of a metric or test are validity and reliability. The first is a parameter that is typically discussed in the context of the psychosocial sciences, with validity being considered present when the test or metric really measures what it is supposed to.

In the area of nursing, Polit and Beck (2011) state that content validity, a type of validity that can be tested through specific techniques in psychometrics, verifies whether the concepts are adequately represented, as well as whether the items or texts of the instrument are representative of the universe of the product.

Sampieri, Collado and Lucio (2013) add that the question that must be answered to establish the validity of a determined content is: *Does the instrument adequately measure the main dimensions of the variable under study?*

Because of the importance of answering that question, suitable instruments for the validation process must be constructed and evaluated.

## **4- METHODOLOGICAL PROCEDURES**

This is a methodological study, which according to Polit, Beck and Hungler (2004) serves to investigate the methods to obtain, organize and analyze data with the formulation, validation and assessment of instruments, through steps implemented and debated after the conclusion of each step.

For content validation, Anastasi (1986) established the following steps, which start with the formulation of detailed trait of construct definitions, derived from the theory of psychology, previous research or systematic observation and analysis of the relevant behavior domain. Then the test items are prepared to fit the construct's definitions, followed by analysis of empirical items selected. Finally, the most effective (i.e., valid) items are selected from the initial sample of items, thus composing the final instrument.

For this construction, we will use the VLOs available in the International Database of Educational Resources, selecting those categorized in the *Higher Education* section, focused on *Health Sciences*, in the specific area of *Nursing*. As the final criterion for inclusion, we will limit the evaluation to VLOs to those in the format of *simulation/animation*, since the VLOs of interest are for the teaching of childbirth procedures during clinical practice.

The next process after selection of the VLOs will be the theoretical-methodological process of constructing the instrument, according to the recommendations of Pasquali (2013), involving seven steps:

1. Definition of the cognitive domain: definition of the objectives or psychological processes to be evaluated, using the taxonomy of Bloom (1956);
2. Definition of the universe of the content: delineation of the content to be taught, divided into units and subunits;
3. Definition of the representation of the content: definition of the proportion of each topic and subtopic that should be represented in the instrument, by deciding on the importance of each one in the total content of the universe;
4. Preparation of a specification table: establishment of the relationship of the contents with the cognitive processes that will be evaluated, as well as the relative importance of each unit
5. Construction of the instrument: preparation of the items that will the instrument;
6. Theoretical analysis: evaluation of the pertinence of the unit or cognitive process, carried out by judges; and
7. Empirical analysis of the items: determination of the levels of difficulty for discrimination of the instrument's items, by applying item response theory.

The entire process will follow the ethical and legal precepts on research with human subjects, as defined in Resolution 466/2012 from the National Health Council, since judges will be invited to evaluate the pertinence of the items.

The judges will be chosen in line with the multidisciplinary character of the study, composed of practitioners in the areas of nursing, education and informatics. Each potential judge will receive a letter of invitation, explaining the purposes of the study, its pertinence and the importance the person's participation, with assurance of anonymity.

## 5- PRELIMINARY RESULTS

The study is in the phase of identification and categorization of the VLOs that will be subjected to the initial analysis for constructing the instrument, followed by the steps presented in Figure 1.

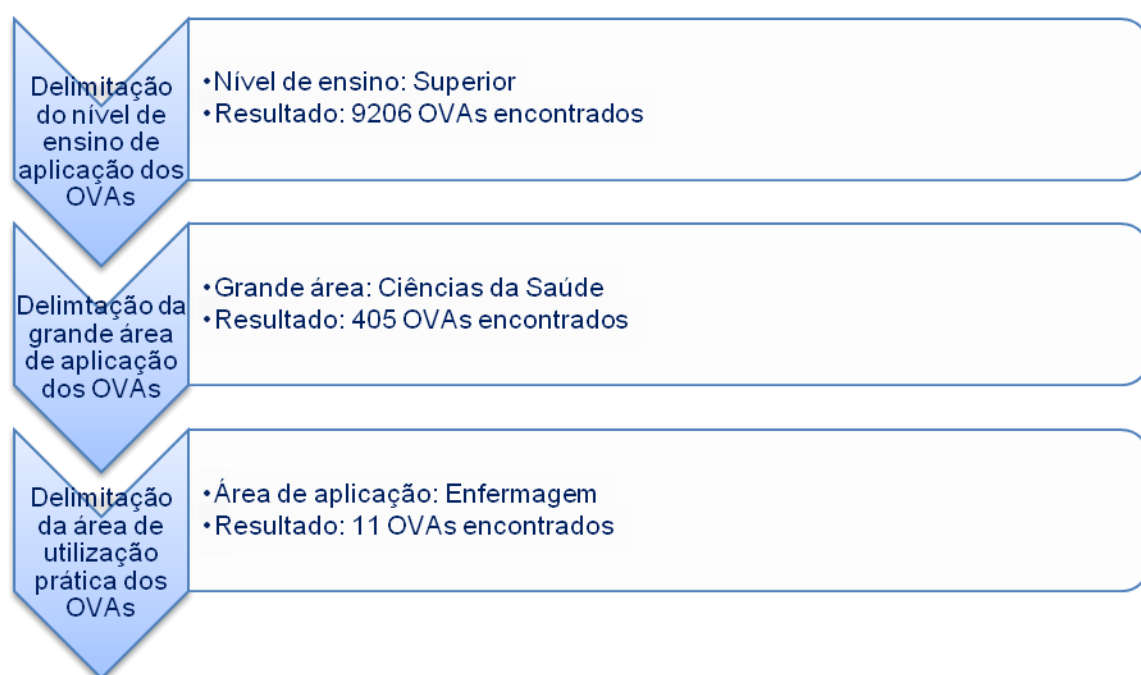


Figure 1: Flowchart for identification and categorization of the VLOs selected for preparation of the analytic instrument

Delineation of the level of teaching for application of the VLOs	Teaching level: University Result: 9206 VLOs found
Delineation of the overall area for application of the LVOs	Overall area: Health sciences Result: 405 VLOs found

Delineation of the specific area for application of the VLOs	Specific area: Nursing Result: 11 VLOs found
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After this previous selection, we will categorize the VLOs identified regarding the following variables: year of publication, type of VLOs (only considering those found in the classifications simulation/animation and videos) and format of the VLOs according to the resources available to execute them.

They will be analyzed regarding possibility of use (specific areas of nursing with potential for use of VLOs) and executability, considering factors like time of execution and resources available for utilization (types of media).

The validation instrument being prepared is in its first version. For this preparation we relied on the studies of Aguiar and Cassiani (2014), Corradi, Silva and Scalabrin (2011) and Santos and Amaral (2012) to establish the domains that will compose the instrument and will be evaluated by the judges.

Various studies have indicated the importance of construction and validation of educational materials for the health area, in particular for nursing because of the role of nurses as educators and communicators. Hence there is a need for adequate resources so these processes can occur, established by using instructional materials that are suitable for the context (Bastable, 2010).

Since we did not find any references specifically covering this construction, focused on methodological aspects involving this process, except for a few studies on the process of assessing VLOs, but without addressing the methodological aspects for their construction, we believe this research will be important for construction and validation of an instrument tailored to evaluate this aspect of the components of the VLOs, systematizing or classifying their use as teaching resource (Aguiar and Cassiani, 2007; Corradi, Silva and Scalabrin, 2011).

We believe this study will contribute to the body of knowledge regarding the use of VLOs as valid and effective tools to be used by teachers and students, in particular in distance education, in light of its peculiarities, involving development of autonomy by the student in his or her learning process.

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