

**CHALLENGES IN DEVELOPING AND VALIDATING RESEARCH
INSTRUMENTS IN THE AREA OF EDUCATION IN MOZAMBIQUE**

DESAFIOS NA ELABORAÇÃO E VALIDAÇÃO DE INSTRUMENTOS DE PESQUISA
NA ÁREA DE EDUCAÇÃO EM MOÇAMBIQUE

DESAFÍOS EN LA PREPARACIÓN Y VALIDACIÓN DE INSTRUMENTOS DE
INVESTIGACIÓN EN EL ÁMBITO DE LA EDUCACIÓN EN MOZAMBIQUE

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ABSTRACT:

The quality of a research is determined by the rigor of its methods. Successful data collection depends on the robustness of the instruments used to obtain them, according to their validity, objectivity and reliability. Thus, this qualitative literature review aims to analyze the models of elaboration and validation of data collection instruments in educational research of Mozambican Higher Education institutions. To this end, 30 undergraduate and 30 master's degree final projects were reviewed, with analysis focusing on the methodological part, namely regarding the procedures for developing the instruments and their validation. The results revealed that the instruments are created by the students and reviewed by their supervisors and co-supervisors. Methodologically, the works analyzed make limited mention (three dissertations) of the adoption of some process that can be recognized as an effort to validate research instruments; however, they do not strictly adopt the technical criteria for this purpose. Therefore, for the research findings to be even more qualified, it is suggested that the final projects in Mozambique, both undergraduate and postgraduate, begin to adopt greater methodological rigor regarding the procedures for developing and validating the instruments for obtaining data.

Keywords: methodological studies; data accuracy; validation studies as topic; evaluation studies as topic; literature review.

RESUMO:

A qualidade de uma pesquisa é determinada pelo rigor nos seus métodos. Uma colecta de dados exitosa depende da robustez dos instrumentos para a sua obtenção, conforme a sua validade, objectividade e fiabilidade. Assim, este trabalho de natureza qualitativa, do tipo revisão de literatura, objectiva analisar os modelos de elaboração e validação dos instrumentos de recolha de dados em pesquisas educacionais das instituições de ensino superior moçambicanas. Para o efeito, foram revistos 30 trabalhos de culminação de licenciatura e 30 de mestrado, com análise focada na parte metodológica, nomeadamente quanto aos procedimentos de elaboração dos instrumentos e sua validação. Os resultados revelaram que os instrumentos são elaborados pelos estudantes e revistos pelos seus supervisores e co-supervisores. Metodologicamente os trabalhos analisados fazem restrita menção (três dissertações) da adopção de algum processo

que possa ser reconhecido como um esforço para a validação dos instrumentos de pesquisa, no entanto, não adoptam rigorosamente os critérios técnicos para esse propósito. Então, para que os achados das pesquisas sejam ainda mais qualificados, sugere-se que os trabalhos de culminação de curso em Moçambique, tanto da graduação como da pós-graduação, comecem a adoptar maior rigor metodológico sobre os procedimentos de elaboração e validação dos instrumentos para a obtenção dos dados.

Palavras-chave: estudo metodológico; confiabilidade dos dados; estudos de validação como assunto; estudos de avaliação como assunto; revisão de literatura.

RESUMEN:

La calidad de una investigación está determinada por el rigor de sus métodos. El éxito de la recolección de datos depende de la robustez de los instrumentos utilizados para obtenerlos, de acuerdo con su validez, objetividad y confiabilidad. Así, este trabajo cualitativo, del tipo revisión de la literatura, tiene como objetivo analizar los modelos de elaboración y validación de instrumentos de recolección de datos en la investigación educativa de las instituciones de Educación Superior de Mozambique. Para ello, se revisaron 30 trabajos de pregrado y 30 de maestría, con análisis enfocados en la parte metodológica, particularmente en lo que respecta a los procedimientos de elaboración de los instrumentos y su validación. Los resultados revelaron que los instrumentos son creados por los estudiantes y revisados por sus supervisores y co-supervisores. Metodológicamente, los trabajos analizados hacen mención limitada (tres disertaciones) de la adopción de algún proceso que pueda reconocerse como un esfuerzo de validación de instrumentos de investigación; sin embargo, no adoptan estrictamente los criterios técnicos para tal fin. Por lo tanto, para que los hallazgos de la investigación sean aún más cualificados, se sugiere que los proyectos finales en Mozambique, tanto de pregrado como de posgrado, comiencen a adoptar un mayor rigor metodológico en cuanto a los procedimientos de desarrollo y validación de los instrumentos de obtención de datos.

Palabras clave: estudio metodológico; confiabilidad de los datos; estudios de validación como materia; estudios de evaluación como materia; revisión de literatura.

Introduction

Mozambique is a country located on the east coast of southern Africa, bordered to the north by Tanzania, to the northwest by Malawi and Zambia, to the west by Zimbabwe, South Africa and Swaziland, to the south by South Africa and to the east by a section of the Indian Ocean. It has an area of 799,380 km² and an approximate population of 32,742 million (Instituto Nacional de Estatística, 2023). The country became independent from Portuguese colonization in 1975.

After independence, a new country was built. From now on, a new ideal in the production of academic knowledge arise as well. Thus, the reconstruction of research centers, theoretical models and research methods was strongly marked by the Center for African Studies (CEA) works at the Eduardo Mondlane University (Feijó, 2020), the only institution of higher education until 1985 (Noa, 2011).

Over time, there has been a relatively rapid and significant growth in the number of higher education institutions in the country. The number of institutions increased from one in 1975 to 53 in 2024, including public and private institutions (Ministério da Ciência, Tecnologia e Ensino Superior, 2024). These institutions promote participation and equitable access to higher education. It also responds to the country's needs in a dynamic way. The institutions develop teaching, research and extension to strengthen intellectual, scientific, technological and cultural capacity in the context of a growing society (Ministério da Educação e Desenvolvimento Humano, 2020). Herein, these higher education institutions works to promote systematic activities for excellence in research, teaching, extension, the provision of services to the community and transversal actions.

"In a broad sense, science refers to systematic knowledge, formed from a body of knowledge acquired from theoretical study or practical analysis" (Tamaso; Horvath Júnior, 2023, p.3). Despite the possible criticism of replacing common sense with scientific knowledge, the last one has taken on a prominent role in human communities (Mussi *et al.*, 2019). Its importance in different everyday activities is recognized, which makes it difficult to imagine what society would be like without the scientific contributions accumulated over time.

In response to the mission of promoting research at these universities, there has been a marked increase in the preparation and execution of academic work. This emphasis the growing number of undergraduate monographs and master's dissertations produced. Therefore, it is understood that the Mozambican reality is aligned with the growing possibility of developing a society based on scientific knowledge, which is based on the growing production, dissemination and, above all, critical understanding of academic information.

This scientific development takes place through the planning and execution of academic studies, activities that enable the identification, production and discovery of new knowledge, the resolution of problems and/or the fulfillment of research objectives (Mussi *et al.*, 2019). All research must initially be surrounded by a good review and choice of theoretical bases, "avoiding the occurrence of repetitions and works with little originality and little novelty" (Medeiros Neta; Silva, 2024, p. 1). In practice, its procedures must be selected according to the research design to show reliable results. Conversely, its optimal execution is based on the intentional choice of methods and techniques, so that the most accurate object under investigation understanding is achieved (Mussi *et al.*, 2019).

Nonetheless, despite the growth in university production, it has been recognized for quite some time that the research system in Mozambique faces important challenges, such as: (a) the limited number of researchers working full-time in research institutions, (b) the high

concentration of research development in public universities, (c) the strong dependence on external funding and the lack of solutions and (d) resources aimed at publishing findings (Monteiro, 2010).

Otherwise, there is a weakness in the methodological rigor of the research carried out. It puts produced data credibility at risk, either by providing inconsistent information - by errors in the data collection process, by disorganization and technical insufficiency -, or even by some kind of results manipulation (Feijó, 2020). All these issues confront the understanding of research as responsible for producing reliable knowledge that generates coherent solutions to problems in different fields and social dimensions. The lack of scientific rigor makes it difficult, or even impossible, for valuable information about subjects and/or situations to be more widely disseminated, accessed and used to improve individual or collective living conditions.

These vulnerabilities and misunderstandings in research may be the result of an academic process that is still under development and can be corrected as it continues to mature and consolidate, but manipulating data is a serious ethical problem. Despite the understanding that ethical-scientific misconduct is a complex issue, influenced by multiple factors, its adoption is usually due to the search for recognition and academic prestige (Lourenço; Meneghini; Rech, 2024), personal and/or institutional, hindering the development and credibility of research, more specifically, and science, more broadly.

Another important explanation for the fragility of surveys, and their consequent reduced data credibility, may also be due to the quality of their collection instruments, in terms of how they are prepared and/or selected, validated or adapted to the public that will take part in the survey. This is where the three criteria of scientific come into play: coherence, consistency and objectivity (Tamaso; Horvath Júnior, 2023), elements which, when guaranteed, qualify and make reliable the research instruments, the information obtained, and the knowledge produced.

In this context, the type of approach and methodology is directly related to the data collection instruments structuring and/or construction, as well as their appropriate application, which will have a direct impact on the research success or failure (Rafagnin; Madruga; Furtado, 2020). In a complementary way, the importance of validating instruments is highlighted, as a mechanism that seeks to guarantee their effectiveness (Fachel; Camey, 2003), an action that can be replaced by the adoption of previously validated instruments.

The instrument validity refers to its specificity in identifying precise data relating to the phenomenon studied. In other words, a valid instrument is one that can reliably and sensitively guarantee its purpose (Alexandre; Coluci, 2011). Reliability refers to the consistent results reproducibility. Sensitivity deals with the ability to identify differences, even subtle ones,

between people or groups of participants.

Given the concerns raised, it is argued that inconsistent methods and poorly designed research instruments generate basic biases, which compromise the results and the quality of scientific evidence (Salbego *et al.*, 2023). In this way, we understand the importance of using instruments that have undergone a careful design process and validation filters, giving them even greater reliability and the desired legitimacy to the research results.

Considering the above, this research is based on the following question: how are the criteria for drawing up and validating data collection instruments for educational research carried out in Mozambican universities arranged methodologically? Its main objective is to analyze the models for preparing and validating data collection instruments in educational research at Mozambican higher education institutions.

Methods

This study is characterized as a qualitative approach (Mussi *et al.*, 2019), as it adopts an analytical perspective of the methodological issues investigated, therefore, information of an editorial nature, which does not focus its attention on quantification; and, the narrative literature review type (according to the definition presented Medeiros Neta; Silva, 2024), since it addresses scientific productions already finalized and made available in academic places/channels, with the sources having been selected without the adoption of a formal protocol.

To obtain the data, we used course final papers in the field of Educational Sciences, defended between 2020 and 2024 by higher education institutions in Mozambique, both public and private, and which had applied some data collection instrument in the word development. This option was based on the understanding that basic one element that make up professional academic training is academic-scientific production (Stockmanns *et al.*, 2018), with universities representing one of the main spaces and times for its promotion, execution and availability.

To achieve this, the sample included six higher education institutions, selected for convenience, two in each of the three regions of Mozambique (north, center and south). The universities in the regions indicated were defined according to the criterion of the first with the largest number of students regularly enrolled at the time of collection (July 2024), among which were identified, in the north: Rovuma University and Catholic University of Moçambique; in the central zone: Pungue University and Licungo University; and, in the south: Universidade Eduardo Mondlane and Pedagogical University of Maputo.

The sample consisted of 60 works (30 monographs and 30 dissertations - five of each

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category in each of the institutions), if they had developed research in the field of education, regardless of the areas and sub-areas of knowledge. The choice for undergraduate and postgraduate levels was due, on the one hand, to the fact that they are the levels that develop scientific productions with the greatest flow, and, on the other hand, to their representativeness in all country regions.

The works were obtained by consulting the virtual repositories available on the higher education institutions platforms, and the physical works available in the libraries (in the case of the institutions that did not have a repository). Five undergraduate and five postgraduate papers were accepted from each of the universities selected above, as described in Table 1.

Table 1. Description of the distribution of the papers selected for the research.

Regions of the country	Selected Universities	Courses covered	Type of work	Total	
North	Rovuma University	Teaching Biology	Monographs	5	10
		Educational Evaluation	Dissertations	5	
	Catholic University of Mozambique	Psychopedagogy	Monographs	5	10
		Educational Management	Dissertations	5	
Center	Pungue University	Statistics and Information Management	Monographs	2	10
		Teaching Mathematics	Monographs	3	
		Educational Administration and Management	Dissertations	5	
	Licungo University	Teaching Mathematics	Monographs	3	10
		Teaching Physics	Monographs	1	
		Educational Psychology	Monographs	1	
South	Eduardo Mondlane University	Organization and Management of Education	Monographs	5	10
		Education	Dissertations	5	
	Maputo Pedagogical University	Teaching Physics	Monographs	5	10
		Education/Portuguese Teaching	Dissertations	5	

Source: prepared by the authors

For the actual data collection, the chapters on methods were read in the selected papers, with special attention to the part on the presence and description of the research instruments, checking the procedures for their preparation and validation. About design, we were interested in checking whether the instruments were written by the students or adapted/selected from previous studies. As for validation, the concern was to see if any of the procedures applied for this purpose had occurred. Since, according to Alexandre and Coluci (2011), it is through technical-academic validation that it is verified how accurate the instrument is in verifying the phenomenon to be studied.

Presentation and discussion

An evaluation system, even with proper planning, is vulnerable to failure when the data needed for analysis cannot be obtained, or if it is inaccurate or unreliable (Barbosa, 2008). The same is true of scientific research, which is why this reflection focuses on the procedures for drawing up data collection and/or production instruments and their validation procedures, at undergraduate and postgraduate level in Mozambique.

Research instruments

It was selected 60 (sixty) papers that formed part of this study's sample. In all of them, it was observed that in the topics relating to the presentation of research methods, the authors did not mention the origin of the instruments used for data collection. This assumption leads to the understanding that they were authored by the students themselves in agreement with their supervisors and/or co-supervisors.

In a complementary way, it is understood that, in accordance with the reasoning of scientific humility, all passages or materials used throughout the research that are not authored by the researcher should be duly cited in the text and in the list of bibliographical references. In this way, the implication of ethical misconduct will be avoided, especially the suggestion of plagiarism, which can be identified using *software* that compares files, analyzes them and issues a report indicating similarities (Lourenço; Meneghini; Rech, 2024), which should be carefully reviewed by the authors and those responsible for the place of publication, so that the bad practice can be confirmed or rejected. In addition, all the authors of the works analyzed maintain, in their statements of honor, that their content is original and that all the sources consulted are duly mentioned in the text, in the notes and in the final list of references.

At the same time, it should be noted that in the scientific field, when a ready-made instrument is not selected, there are at least three possibilities for the origin of data collection instruments, namely: 1. Authored by the researcher - those that are developed by the researcher themselves according to the object of their research (Moreira; Mussi; Cardoso, 2022); 2. Adapted or cross-culturally adapted - those in which the researcher uses instruments previously developed by other researchers, adapting them to their research context according to the similarity of the object of study. Adapted or cross-culturally adapted - those in which the researcher makes use of instruments previously developed by other researchers, adapting them to their research context according to the similarity of the object of study, which can be done

by translating them from the language of origin to that of the target population (Sales Filho *et al.*, 2024). 3) Partially elaborated/adapted - these are those in which the researcher conceives part of the questions and uses some others adapted from instruments proposed by other references, understanding that the use of these complete instruments would not fully meet their research object (Palmeira; Lima; Adriano, 2020).

Adapting a collection instrument is necessary in situations where those instruments found do not fully meet the technical and research needs required. It cannot be considered a mistake, nor can its development, especially when it is not considered feasible to adapt an existing one (Palmeira; Lima; Adriano, 2020).

However, it is necessary that any options are minimally described among the methodological procedures from the project writing, including at least the process/type of literature review/consultation that was adopted for the theoretical-technical-methodological deepening regarding the theme, as already mentioned, recognized as primarily responsible for the intentional and adequate selection, adaptation or proposition of the technique for data production.

In addition, in the case of drafting (or even adaptation), it is strongly recommended that it undergo at least a pre-test (pilot study type), so that minor flaws can be corrected (linguistic inaccuracies in some questioning, the removal of questions that may generate some kind of embarrassment and/or the removal of unnecessary parts) (Mussi *et al.*, 2024). Ideally, however, the instrument should go through a set of technical procedures that promote its technical-scientific validation.

The techniques used to develop research instruments have aroused academic and scientific interest in a wide range of scientific fields. According to Alexandre and Coluci (2011), the construction of a data collection instrument must initially involve defining its general structural elements and its dimensions. In both cases, the choices/determinations emerge from the theoretical and technical indications arising from a careful literature review, also considering the consultation of qualified specialists in the field/scientific area of specific interest and representatives of the community that characterizes the profile of participants in the study to be carried out. In a nutshell, the process of drawing up instruments must consider the following phases: identification of the domains/dimensions, the formation of the items/questions and the construction of the instrument itself.

As it said, regardless of the instrument's origin, it is essential that the authors carefully explain the methodological procedures used in their final work, both at undergraduate and postgraduate level, with a detailed and well-founded description of all the processes

adopted. Now, the monographs and dissertations judged in this analysis had no less than these three possibilities of choice for presentation in their methods, considering that each of them has its advantages, however, none of the essays reviewed did so in an adequate manner.

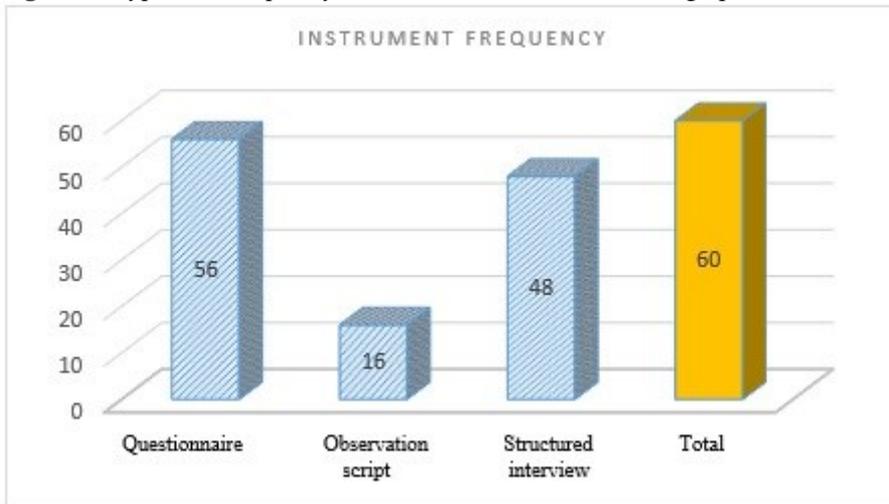
When they are developed, as the productions under review suggest, it is not enough for the instruments to be mentioned in the methodological writing. It is crucial, as already mentioned, that in addition to describing the actions taken throughout their conception, that it is guaranteed and made explicit, by means of technical-academic checks and tests, that they directly meet the objective (main and, where appropriate, specific), its research question and that the combination of its elements will obtain data/information that meets/responds to the purpose and problem on which the study was based, providing the full success of the academic work.

The correct choice of method, the type selection of instruments and their careful preparation would already make an important contribution to the quality of the academic results. However, it was found that some of the instruments used in the Mozambican studies included in this analysis showed little consistency, given the low correlation with the research question and the defined objectives, revealing a fragile rigor in their elaboration. In this case, there seems to be a consensus that these misalignments between the instrument and the basic elements of the research hinder (or even prevent) obtaining data/information that meets/responds to the problem being investigated (Batista; Pereira, 2024).

Types of research instruments

In the methodology of the monographs and dissertations from higher education institutions in Mozambique reviewed, the type of instrument used (in some cases more than one) to collect or produce data was specified, and the following were identified: questionnaire, structured interview script and observation script. To this end, the instruments of the same nature were grouped according to the absolute frequency distribution of the 60 papers analyzed, as shown in figure 1 below.

Figure 1- Types and frequency of instruments used in the monographs and dissertations analyzed



Source: prepared by the authors.

A special part of increasing the reliability of academic research analysis involves the selection or development of instruments for obtaining data/information, which, when well developed, enhances access to the knowledge that is essential for achieving the objective (Mussi *et al.*, 2024).

The academic questionnaire (used in 56 of the studies analyzed) is characterized by a sequence of questions aimed at obtaining information to meet the research objective. One of the main advantages for its use in research is that it can be answered by the participants (Bortolozzi, 2020), even in the absence of the responsible for administering it, reaching a greater number of people. This may have been the first of the factors that made the questionnaire the most widely used technique in Mozambican research.

Regarding the construction process, like other types of instruments, the questionnaire must go through the planning stage, followed by its structuring into dimensions and, only then, the formulation of the questions, which must be written in language that is easily accessible to the target audience, targeted and ordered, specifically to ensure that the strictly necessary information is obtained.

For its application, it is considered basic that the instructions for filling it in are as simple and objective as possible. Complying with these instructions will avoid doubts on the part of the person answering, especially when it comes to the possibility or necessity of carrying out the task in the absence of the person 'applying' it (Bortolozzi, 2020).

To ensure its theoretical and linguistic qualification and to minimize problems in its use, this type of instrument can and should undergo different validation techniques, such as: content, language and reliability, as developed by Moreira, Mussi e Cardoso (2022).

The recurrent use of the interview in the Mozambican studies analyzed can be explained by its adherence to both qualitative and quantitative methodological designs. However, "a successful technical-scientific interview requires the ideal, detailed, careful and explicit selection and prior description of all the processes relating to the choice/elaboration of the methodological procedures to be adopted" (Mussi *et al.*, 2024) and does not depend exclusively on a well-designed and/or validated script.

Methodologically, understanding the interview is an activity that requires social interaction, it is recommended that it be carried out by one person (Bortolozzi, 2020). However, there is no impediment to its application by several people, if they all undergo careful training to reduce distortions and biases during its application throughout the collections.

There are several recognized motivations for using interviews in academic research, probably the main one being the lack/insufficiency or difficult accessibility of information related to the subject in documents or other types of available records (Mussi *et al.*, 2024). In addition, interviews allow for the exploration of various facets of phenomena that are intended to improve understanding (Batista; Pereira, 2024).

As a result, this instrument allows for a more in-depth understanding of the problem under investigation, considering greater detail of the facts, processes and flows in situations of more complex analysis of the object, with the script being subject to validation, of content and language, for its qualification (Mussi *et al.*, 2024). These characteristics certainly influenced the choice to use them repeatedly in Mozambican research.

From another perspective, the observation script (adopted in 16 of the cases studied) requires a previously defined routine, containing a list of all the aspects to be observed. Technically, for the observation to be considered reliable, the script must cover all the main aspects of what will be observed and the person responsible for collecting it must have a good understanding of the situations that will be observed, avoiding personal bias during data generation (Del-Masso; Cotta; Santos, 2018).

Descriptively, a script can record information about the location, the relationships between people, the date it will take place, who or what situation will be checked, the amount of time it will last, how all these elements will be recorded, among other items that will guarantee the relevant data analysis (Del-Masso; Cotta; Santos, 2018). When submitted to some validation technique, such as content and language, the instrument will gain in quality.

In this type of instrument, the presence of the person responsible for the collection is necessary, with or without the use of equipment to support the recording (audio, video or photographic recorder), but there is not necessarily direct interaction with the participant(s)

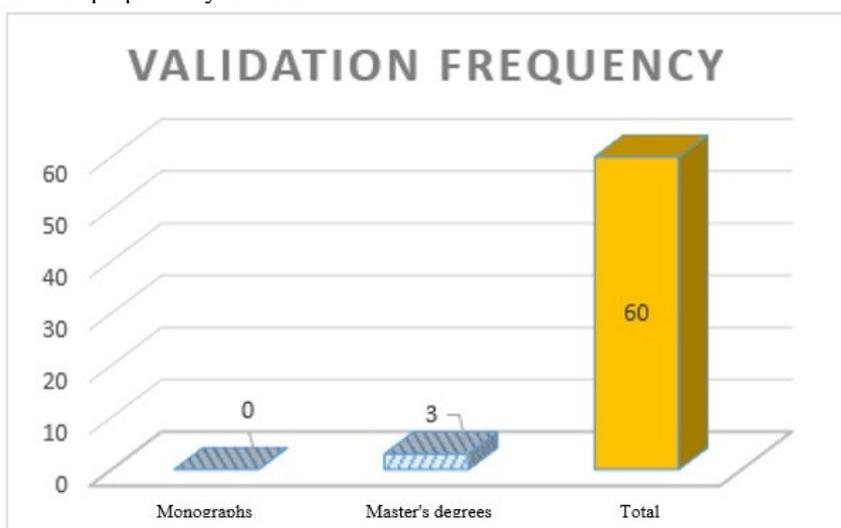
observed, which should be considered as a motivation for the instrument having been the least used in the investigations analyzed.

Validation of research instruments

As indicated above, the three types of instruments (questionnaire, interview script and observation script) used in the Mozambican university surveys analyzed are subject to some kind of validation process for their technical-scientific qualification.

However, as illustrated in figure 2, of the 60 course final papers analyzed, 3 dissertations cited in their methodological writing the use of some procedure relating to the effort to validate data collection or production instruments in their research. Raymundo (2009) states that instrument validation is the act of analyzing the accuracy of a certain prediction or conclusion based on the results of a test through a research process.

Figure 2 - Frequency of validation of research instruments in Mozambican monographs and dissertations. Source: prepared by the authors.



Fonte: elaborado pelos autores.

In fact, when analyzing the 30 monographs, none of them indicated that they had used any technical criteria to validate the instruments used for data collection, which may reveal a poor grasp of validation procedures or even a lack of instructions for this procedure to be observed prior to fieldwork. This reinforces the point that "whenever the use of instruments to make decisions about people is contemplated, their potential use should be considered and analyzed" (Urbina, 2007, p. 257).

About the 30 master's degrees, 3 of them indicated in their methodological writing that they had adopted a validation procedure called "validity and reliability". In this procedure, two cases mention that the instruments were submitted to their supervisors and co-supervisors for

validation and then tested in the field. One of the three studies reported that the process of validating their data collection instruments was carried out by a methodology specialist, with the support of their supervisor.

In this context, Raymundo (2009) indicates that content validity refers to the judgment about the suitability of the instrument for the research topic, i.e., whether it really covers the different conceptual and theoretical aspects of its subject and does not contain elements that can be attributed to other subjects. This type of methodological procedure is considered essential evidence to ensure that there is sufficient quality in an instrument for it to be used (Gonçalves; Pedro, 2023).

For content validation, according to Alexandre and Coluci (2011) it is recommended, despite the controversies, that the instrument be reviewed by at least five experts, defined on the basis of their training and qualifications related to the subject, also taking into account the availability of the necessary professionals. They also mention that if the study that generated the instrument involves multiple areas of knowledge, the experts for its validation should be at least three individuals from each of the areas.

It should be added that the selection of potential evaluators for the content should consider the representation of the groups of participants to whom the research is aimed, as they would have theoretical closeness and methodological experience with the subject to be investigated. Also, as this is an academic-scientific study, it is a prerequisite that those selected have a minimum master's degree and understand the scenario that will be investigated.

In this sense, the authors of the three Mozambican dissertations who indicated that they had prepared and submitted their instruments for supervisory appraisal (a situation that may have occurred in other works, but which was not reported in their methods) and, in one case, to a specialist in methodology, guaranteed a careful process of correction/adjustment of their proposals.

However, given the technical indicators for content validation mentioned above, despite the care taken in the production of their instruments and the supervisor's review, it cannot be said that these master's studies have undergone the content validation process. This is because the process of correction, by supervision and co-supervision, or by just one specialist, is fraught with intentions and personalities, which can lead to biases in recognizing the sufficiency of the content of the proposed instrument.

Given the above, we cannot deny the importance of content validation as a usual and necessary means of qualifying the construction and improvement of data collection instruments in academic studies, but its subjective nature often requires the use of complementary

techniques (Alexandre; Coluci, 2011).

In our analysis of the 60 papers in our sample, we found that none of them describe language validation procedures in their methods. Thus, the aim of this stage is to assess the degree of specificity of the verbiage used in the questions (Moreira; Mussi; Cardoso, 2022), which must be intentionally linked to the cultural and linguistic characteristics of the target audience to which it will be applied.

In a complementary way, Marziale *et al.* (2021) indicate that language validity refers to the analysis of the meaning of words, concepts and expressions, signaling the idiomatic, semantic, cultural and conceptual equivalence of the instrument's items, and gauging whether these are effectively capable of producing the desired data. In addition, language validation allows for the composition of the best version of the instrument and the minimization of comprehension biases (Torlig *et al.*, 2022).

Based on the assumptions presented in the review of coursework in Mozambique, it is notable that the supervisors are exclusively responsible for checking the language used in the instruments, and in some cases, this is done in coordination with the co-supervisor. In addition, pre-tests are rarely carried out with the target group to assess whether the questions in the instruments are sufficiently simple and understandable for this population, as one of the semantic validation procedures.

For this process, the literature technically recommends that the instrument be submitted to a committee of experts made up of individuals with similar population characteristics to those who will make up the group taking part in the research and who have experience in the subject to be explored (Marziale *et al.*, 2021). As for the number of individuals who will take part in this validation stage, the literature does not suggest a minimum number (Vazzoler-Mendonça; Rondini; Costa-Lobo, 2023), but it is advised that the greater the number of participants for language verification, the fewer inadequacies and vocabulary biases will occur.

About the work under analysis, it seems that the language check, when it was carried out, took place when the student was preparing to collect the data. At this stage, the supervisor and/or co-supervisor analyzed the writing of the questions in the instruments according to the profile of the study participants, made their observations and suggested the necessary improvements. Once the corrections had been made and confirmed, the instrument was semantically validated. So, as with the question of verifying the content, this illustrates that the work of the research supervisor contributes to correcting/adjusting the language of the instrument but cannot technically be accepted as a methodological process of language validation, for the same reasons mentioned in the previous case.

Despite the three postgraduate studies that presented some kind of validation procedure for their research instruments, there was also an isolated case of a dissertation that referred to a criterion for validating the answers. This is also an applicable procedure, but one that is generally recommended after validating the instruments that will be applied in the field, to validate the answers that will be obtained. In this context, although the researcher applied a procedure to check the validity of the answers, it did not meet the requirements for validating research instruments. For this reason, even considering the student's effort, methodologically he would not be included in the statistics of the studies that validated the data collection instruments.

Although the studies in question have gone through some important efforts to qualify their instruments, the specialized technical literature establishes requirements for them to be considered validated, such as the criteria already established and accepted for content validation, language validation and reliability validation, which are among some of the most common filters in contributing to the constitution of consistent instruments for data collection with quality in the information obtained.

In the case of the studies analyzed in this review, these techniques were practically ignored, as only two of the 30 postgraduate studies claim to have carried out some kind of practical testing of their instruments, although they did not complete the technical-academic requirements for verifying their reliability, their reapplication. In this sense, we understand that in both cases there was only a pilot test, without a re-test (which would bring the proposal closer to an effort to verify its reliability).

Pilot testing is one of the stages in the technical verification of the practical data collection process. At this point it is checked, for example, how long it will take to apply or whether there is a need for any strategy to prepare the participants or the location for its development. However, its use is only recommended after the instrument has gone through the procedures for its academic-scientific validation.

Reliability assessment refers to the instrument's ability to reproduce a consistent response/result over time and space, or from different observers, based on aspects of coherence, precision, stability, equivalence and homogeneity (Souza; Alexandre; Guirardello, 2017).

Reliability testing is one of the last stages in the validation of research instruments. At this stage, the test and retest is carried out, which consists of applying the instrument twice to the same participants, who have a similar profile to the one the research is aimed at, at different times, with an interval of at least one week for the retest (Moreira; Mussi; Cardoso, 2022). However, Souza, Alexandre and Guirardello (2017) indicate that the interval between test and retest should be between 10 and 14 days, with a sample of at least 50 individuals.

Final considerations

Based on the analysis of the undergraduate and master's degree works in the field of education in Mozambique, it was found that they do not explain, or present insufficiently, the methodological guidelines relating to the development and validation of the instruments used in their investigations.

These findings may be influenced by the absence, in universities, of academic guidelines for the development/adaptation and validation of data collection/production instruments. This situation allows researchers to have them constructed by students and applied after review/correction by their respective supervisors, which allows for greater flexibility, but incurs a greater risk of using incomplete, excessive, inaccurate and vulnerable to bias instruments.

It is felt that there is a need for actions to reinforce the importance of more in-depth academic training on methodological issues, as it seems that this still does not sufficiently address important aspects to guarantee scientific rigor. In this case, special attention should be paid to the detailed and well-founded description of the techniques used to develop, validate and test the instruments used to collect data/information.

Since Mozambique should not be treated as if it were an island, it is believed that this study will open space for a broad reflection on the practices of preparing and validating research instruments, as has been happening in other nations and regions of the world. Therefore, it is expected that, based on specialized literature that addresses the importance and techniques for producing more consistent research instruments, the country will follow the academic-scientific movement that has generated greater quality and reliability in research and, above all, from the validation of its instruments, in its results.

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