
RESEARCH

UNDERSTANDING VALIDITY AND RELIABILITY FROM QUALITATIVE AND QUANTITATIVE RESEARCH TRADITIONS

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Abstract: Educational constructs change over time to reflect developments in research and educational approaches. To illustrate the process, this article aims to examine validity and reliability, which are important concepts to justify research quality. Originally, validity and reliability were applied to quantitative research. However, these criteria can not be equally applied to qualitative research studies which differ in terms of their theoretical foundations and research aims. The unclear use of these concepts might lead to inappropriate research design or evaluation. This paper, therefore, first examines two different theoretical foundations underlying these two research traditions. It then analyses the subtle variations to clarify the notions of reliability and validity. Some implications are made for researchers to flexibly employ these criteria to enhance their research rigor.

Key words: validity, reliability, qualitative research, quantitative research

1. Introduction

Validity and reliability are among important concepts to justify research quality. They are considered as “the two best-known relevant” quality criteria for both quantitative and qualitative research (Dörnyei, 2007, p. 49) and given, in addition to generalization, “the status of a scientific holy trinity” (Kvale, 2002, p. 300). Validity and reliability originated from quantitative research, which follows positivism and aims to generalise observed rules. Therefore, it is still not always easy to apply these two quality criteria in qualitative research, which

follows constructivism and aims to construct an understanding of reality. This often gives rise to questions such as: Are reliability and validity important for the qualitative approach? If they are, what types of validity and reliability exist and how can researchers ensure that their qualitative research is valid and reliable? As a part of a research project about concepts in educational technology¹, we decided to explore these two concepts as they are related to two common pedagogies, project-based learning and problem-based learning in which learners have to conduct independent research projects. This could be a reference material for educators and

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students to evaluate their own research.

In an attempt to understand a scientific concept, we look at its definitions in the literature to synthesize an operational definition for the researcher's situation. However, it seems that this procedure is unlikely to work well with validity and reliability. One possible reason is that these two concepts are developed under different research approaches and epistemologies, which could be either complementary or contrary. Another reason is that researchers are not always explicit in associating validity and reliability with a research instrument, research technique, research data, or the entire research (Aguinis & Solarino, 2019; Dörnyei, 2007). To complicate matters, a research study might involve several techniques and instruments used under different research epistemologies.

This article first examines different theoretical foundations underlying these two research traditions. It then analyses their subtle variations to clarify the notions of reliability and validity, followed by some implications for researchers.

2. Research Methodology and the Pursuit of Knowledge

There is an established consensus that research methodology has been influenced by our beliefs of reality and knowledge. A set of beliefs that guide our activities is called a paradigm (Guba & Lincoln, 1989). In the 1980s, researchers were involved in a paradigm war, which continuously questioned and contrasted two main paradigms: the conventional/positivist paradigm versus constructivist one. They believe that these two paradigms are mutually exclusive (Dörnyei, 2007). Guba and Lincoln (1989), who take this purist approach, hold that these paradigms can be contrasted at three levels of abstraction: ontology, epistemology, and methodology.

At the ontological level,

conventionalists take a **realist ontology** (Guba & Lincoln, 1989) which asserts that a single and unchanging reality exists independently of human minds. In contrast, constructivists follow a **relativist ontology** which asserts the existence of multiple socially constructed realities unguided by any causal laws. At the epistemological level, conventionalists believe in a **dualist objectivist epistemology** which asserts that the observers are detached and distant from the phenomenon studied while constructivists believe in a **monistic subjectivist epistemology**, asserting the interlock between “an inquirer and the inquired-into” (Guba & Lincoln, 1989). At the methodological level, the conventionalists adopt an **interventionist methodology** to remove contaminating influences from the context so that the inquiry can converge on truth and explain nature as it really is and really works for prediction and control purposes. Meanwhile, constructivists follow a **hermeneutic methodology** that involves an iterative process (iteration, analysis, critique, reiteration, reanalysis) leading to the emergence of a joint construction of a case.

The co-existence of these two belief systems provides solid foundations for the establishment of qualitative and quantitative research. Quantitative research, influenced by the conventional/positivist paradigm, therefore, is intended to induce universal laws by observing regularities or repeated outcomes. Knowledge is discovered via verification, falsification or hypothetico-deduction processes (Kuhn, 1970). Quantitative research, dominant for hundreds of years, can be criticised because we cannot be certain that “some form of the correspondence theory of truth would hold up forever” (Kamberelis & Dimitriadis, 2005, p. 17).

In response to the “internal inconsistency” (Kamberelis & Dimitriadis, 2005, p. 17) of the positivists, qualitative

research under the constructivist paradigm has come into practice. Instead of trying to explain a phenomenon through a verification or falsification process, qualitative research aims to “understand, interpret, explain complex and highly textualized social phenomena” (Kamberelis & Dimitriadis, 2005, p. 17).

While such purist authors contrast the two paradigms, situationalist and pragmatist researchers see the shared values of both paradigms (Donyei, 2007). For example, Merriam (2009) supports the view that qualitative research is best defined from its philosophical underpinnings, and at more micro levels, they may overlap. She states:

I think it is helpful to philosophically position qualitative research among other forms of research. Such a positioning entails what one believes about the nature of reality (also called ontology) and the nature of knowledge (epistemology). (p. 8)

The author explicitly outlines what she means by “philosophical foundation”, which comprises ontology and epistemology. She also briefly defines qualitative research, sometimes interchangeably used with naturalistic, interpretive inquiry, by looking at the purpose of qualitative researchers who are “interested in *understanding the meaning people have constructed*, that is, how people make sense of their world and the experiences they have in the world” (Merriam, 2009, p. 13) (emphasis in the original).

The latter group of authors, including Dörnyei (2007) and Marriam (2009), tend to value the co-existence and contribution of both qualitative and quantitative research paradigms as legitimate ways to pursue knowledge. However, complications occur when these concepts cross the paradigm lines and are uncritically applied in some research. Merriam (2009) explains this as a

habit when some researchers who have worked in quantitative research for a long time before they are introduced to qualitative research. Dörnyei (2007), for example, admits that he is “more naturally inclined” to quantitative research (p. 47), given his past training and experience in quantitative methodology. He needs collaboration with qualitative researchers to complement his quantitative orientation.

Another source of complications is the lack of clear-cut boundaries between sound and unsound research practices in mixed-method research. On the one hand, researchers intentionally adopt some unsound scientific practices to cope with publishing criteria (Świątkowski & Dompnier, 2017). For instance, HARKing, is a practice of quantitative researchers who change their hypothesis after the results are known. They start their research with a hypothesis which can not be positively confirmed due to some unexpected findings. Hence, they change their hypothesis to make it confirmable with the collected data. On the other hand, researchers are encouraged to adopt mixed method approaches to optimise their research benefits (Riazi & Candlin, 2014). For example, exploratory studies provide inputs to construct questionnaires for the hypothesis confirmatory research to follow. Post-positivism also acknowledges the existence of multiple realities that can be captured through objective scientific procedures. Yin (2014), for example, indicates that a case study can take either theoretical foundation: “a realist perspective, which assumes the existence of a single reality that is independent of any observer” or “a relativist perspective—acknowledging multiple realities having multiple meanings, with findings that are observer dependent” (p. 91). The use of validity and reliability in mixed-method studies requires subtle understanding from researchers.

In short, quantitative and qualitative traditions are established on two different

philosophical foundations, or paradigms. Each paradigm has its own merits for knowledge construction as well as required criteria to evaluate its rigor. The uncritical use of the criteria might cause misunderstanding and complications. The following discussion will elaborate on how we use reliability and validity criteria to evaluate quantitative and qualitative research to avoid uncritical application.

3. Reliability

There are different definitions of reliability in the literature. For example, Hammersley (1992, p. 67) identifies reliability as “the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions”. Silverman (2006, p. 282) examines reliability in quantitative research as “the extent to which an experiment, test, or measurement yields the same result or consistent measurement on repeated trials”. Similarly, reliability is equated with the “consistencies of data, scores, or observations obtained using elicitation instruments” (Chalhoub-Deville, 2006, p. 2). Gass (2010, p. 12) associates reliability with “score consistency across administrations of one’s instrument”.

As can be seen among these examples, consistency seems to be a common characteristic of reliability. Some authors might use replicability interchangeably with consistency (Merriam, 2009; Aguinis & Solarino, 2019), but they are still faithful to the original concept of consistency. However, there are two major debates around this approach: 1) what is consistent (reliable) in these definitions; and 2) consistency becomes problematic under subjectivist/constructivist epistemology which guides qualitative research.

Regarding the first debate, Dörnyei (2007, p. 50) comments:

It is important to remember that, contrary to much of the usage in the methodological literature, it is not the test or the measuring instrument that is reliable or unreliable. Reliability is a property of the scores on a test for a particular population of test-takers.

Dörnyei (2007) clearly associates reliability with the scores of a test or test-taking group. Similarly, Qureshi (2020) emphasizes score consistency as reliability. With Onwuegbuzie and Leech (2005), consistency refers to data. They observe that a large number of quantitative researchers have the unsound practice of “not providing reliability estimates for their own data” (p. 378).

In fact, providing reliability estimates for data is not a common practice in qualitative research. Many qualitative researchers focus on describing techniques to improve the reliability of their method instead. For example, Silverman (2006) uses the term “low-inference description” to achieve high reliability in qualitative research. Then he provides detailed description of various techniques that can be used for interviews, texts, and observation. However, this is not a misunderstanding of ‘reliability’. This is a deliberate response to the second criticism: consistency is problematic in a qualitative approach. The concept of consistency suggests that there is at least more than one set of data to be compared. The underlying assumption is that the data has the capacity to measure or represent a single objective reality. This is generally accepted in objectivist epistemology which guides quantitative research. Constructivist epistemology underlying qualitative research, on the other hand, perceives the world as “multidimensional” and “ever-changing” (Merriam, 2009, p. 213). Silverman (2006, p. 283) discards the concept of reliability in qualitative research by looking at its

epistemological stand:

Positivist notions of reliability assume an underlying universe where inquiry could, quite logically, be replicated. This assumption of unchanging social world is in direct contrast to the qualitative/interpretive assumption that the world is always changing and the concept of replication is itself problematic.

Wolcott (2005) elaborates on the characteristics of qualitative research to show that consistency is inappropriate for studying human behaviours in natural and unmanipulated conditions. With a softer tone, Merriam (2009) labels the consistency-as-reliability approach as “traditional reliability” (p. 209), which is based on the assumption or the logic that truth is established when observations are repeated with the same results. However, this logic could be problematic because observations can be repeatedly wrong: “A thermometer may repeatedly record boiling water at 85 degrees Fahrenheit” (Merriam, 2009, p. 221). In addition, qualitative research is more concerned with understanding people’s experience, so it does not rely much on the number of people experiencing the same phenomenon to make it “more reliable” (Merriam, 2009, p. 221). Indeed, this worldview difference has resulted in a so-called “replicability crisis” in social psychology (Świątkowski & Dompnier, 2017, p. 112). Accordingly, a study can be replicable when its results can confirm the hypothesis in a follow-up replication study. However, they point out that a low proportion of 25% of social psychology research results are replicated (p. 112). The authors believe that one cause of the crisis is the conflict between the exploratory nature of some research findings and the desire to confirm the hypothesis. Therefore, some researchers took the “unacceptable and condemnable practice” (p. 114) of changing

the hypothesis after the results were known to make the unexpected findings be a priori hypothesis. Świątkowski and Dompnier (2017) write:

Obviously, there is nothing wrong with conducting exploratory research per se... What is actually harmful, scientifically speaking, is disguising exploratory and other unexpected findings as confirmatory results. (p. 114)

These debates result in new ways of looking at reliability by qualitative researchers who believe that reliability should be congruent with its underlying theoretical perspectives. Some authors use different names for reliability. For instance, Lincoln and Guba (1985) use dependability instead of reliability. Their concern is not to make two data sets consistent. Rather, they make the results dependent on the data collected. Other authors use research strategies for enhanced reliability instead of numbers and statistical procedures. For example, Silverman (2006) adopts “low-inference description” strategies for observation, interview, and texts. Basically, a low-inference description tries to provide the most possible concrete data without the researcher’s “reconstruction” (p. 283). Merriam (2009) suggests the involvement of several techniques or analysts for enhanced reliability, such as triangulation, peer examination, investigator’s position, and audit trail. The following elaborations of research strategies to enhance the rigor of qualitative research are selective rather than inclusive.

1. *Triangulation* means using different sources of data for cross-checking. There are different types of triangulation such as method, data, investigator, theory, and environmental triangulation (Burns, 2010; Merriam, 2009). Method triangulation means using different methods for collecting data, e.g. a study employs a questionnaire, which is followed by interviews and class

observations. Environmental triangulation means collecting data at different places. Investigator triangulation involves different researchers collecting and analysing data. Theory triangulation requires the use of multiple theories to examine the issue under investigation.

2. *Audit trail* is a strategy for reliability assurance (Lincoln & Guba, 1985; Merriam, 2009). Its analogy comes from the process of auditing a business account. Independent readers can authenticate the findings by following the researcher's trail. Therefore, researchers are required to provide detailed accounts of how they arrived at their results. Aguinis and Solarino (2019) also recommend providing detailed descriptions of data coding, data analysis, and data disclosure.

3. *Low-interference description* requires researchers to provide detailed and concrete data presentation without researcher re-construction (Silverman, 2006) to allow readers' critical evaluation of the findings.

4. *Investigator's position, or reflexivity* is a strategy to ensure reliability which requires researchers to reflect on themselves critically as human instruments in research (Lincoln & Guba, 1985). They have to reveal their "biases, disposition, assumptions about the research being taken" (Merriam, 2009, p. 219) so that readers understand how they interpret the data and draw conclusions.

5. *Peer examination or peer review* is a process in which the research findings get commented and reviewed by other people (Merriam, 2009). The reviewer could be a "peer knowledgeable about the topic and methodology" (p. 220) or a colleague examining if the findings are plausible from the raw data.

6. *Adequate engagement* in the research until no new insights are found (Aguinis & Solarino, 2019; Merriam, 2009).

In short, quantitative research requires reliability of the research instruments, procedures, and results. Qualitative research aims to enhance dependability via multiple strategies to allow external evaluation of the research settings, researchers, data, research procedures, and findings. The following section will examine the concept of validity.

4. Validity

Validity is another debatable concept in methodology literature. With quantitative research, it is quite common to come across different types of validity including external validity, internal validity, face validity, content validity, and criterion validity. Dörnyei (2007) classifies validity concepts into two systems: the unitary system of construct validity and its components, and the internal/external validity dichotomy. The explanation is that validity is approached in quantitative research from two perspectives: measurement and research design. Originally, measurement validity looks at "the meaningfulness and appropriateness of the various test scores or other assessment procedure outcomes" (Dörnyei, 2007, p. 50). A test or an instrument is valid if it measures what it is intended to measure. Sub-types of measurement validity include construct validity, content validity, or criterion validity. The other system, external/internal dichotomy, is concerned with whether the whole research process is valid or not. Internal validity addresses the "soundedness" of the research and external validity aims at the "generalizability" (Dörnyei, 2007, p. 50) of the results beyond the observed sample. It is likely that these definitions are not useful for qualitative researchers aiming at understanding rather than generalization.

In a more general way, validity is defined as truth (Kvale, 2002; Nunan &

Bailey, 2009; Schwandt, 2001; Silverman, 2005). For example, Schwandt (2001) argues:

In social science.... validity is an epistemic criterion: to say that the findings are in fact (or must be) true and certain. Here “true” means that the findings accurately represent the phenomena to which they refer and “certain” means that the findings are backed by evidence -or warranted. (p. 267)

This definition, of course, causes outright rejection from qualitative researchers who hold different positions about truth (Schwandt, 2001). Kvale (2002) explains that the rejection occurs because the concept of validity-as-truth indicates that there is a “firm boundary between truth and non-truth” (p. 302), an obvious threat to constructivist beliefs of multiple truths.

In a response, qualitative researchers employ different concepts of validity such as trustworthiness (Lincoln & Guba, 1985), worthwhileness (Bradbury & Reason, 2001) or credibility (Maxwell, 2005; Silverman, 2006) which can be achieved by multiple specific strategies. Dörnyei (2007) believes that these offer useful frameworks to think about “the threats to validity and the possible ways that specific threats might be addressed” (p. 59). Other authors such as Kvale (2002) and Merriam (2009) still use the term validity, but they also suggest strategies for improving validity.

In the following section, I describe some strategies based on Dörnyei’s (2007) grouping: i) strategies to build up an image of researcher’s integrity; ii) validity/reliability check; and iii) research-design-based strategies.

i) strategies to build up an image of researcher’s integrity

Dörnyei (2007) asserts that the most important strategy to ensure the trustworthiness of a project is to create an

image of the researcher as a scholar with principled standards and integrity, which is called “craftsmanship” (Kvale, 2002, p. 321). Some specific strategies to ensure this include:

- *Contextualization and thick description* which requires researchers to present detailed accounts of the places and the phenomena under investigation, readers to benefit from deep understanding and allowing transferability of the research findings to other contexts (Aguinis & Solarino, 2019; Merriam, 2009);
- *Identifying potential researcher bias* which could be referred to as positioning the researcher or reflexivity mentioned by Merriam (2009) in the earlier section;
- *Examining outliers, extreme or negative cases and alternative explanations* which aims to identify and discuss aspects of the study not supportive of the conclusion to increase the result’s persuasiveness.

ii) validity/reliability check

This group includes specific steps deliberately taken during the research to improve validity:

- *Respondent feedback (or respondent validation/member checking)*: This involves inviting the participants to comment on the study conclusion via follow-up interviews;
- *Peer checking*: This technique has been described in the previous section of reliability.

iii) research-design based strategies

Under this heading, there are three strategies: method and data triangulation; prolonged engagement and persistent observation; and longitudinal research design. However, Dörnyei (2007, p. 61) indicates that these strategies could be most

effective when they are organic parts of the research rather than being “add-ons”. It could be inferred that these techniques should be well combined to contribute to the overall purposes of the research.

- *Method and data triangulation*: as discussed earlier, triangulation provides different angles of looking at the research problem (Merriam, 2009). It helps reduce “the chance of systematic bias in qualitative study” (Dörnyei, 2007, p. 61).
- *Prolonged engagement and persistent observation*: it is assumed that the longer the researchers are engaged in the project, the more convincing their results will be.
- *Longitudinal research design*: the advantage of longitudinal study is the increased opportunities for researchers to collect different data sets and thick description of the phenomenon/individual. It also allows tracing developmental change over time. Therefore, longitudinal design helps researchers to arrive at a “valid conclusion” (Duff, 2008, p. 41).

Clearly, validity can be the generalisability of quantitative results or the trustworthiness of qualitative findings from the collected data.

5. Conclusion and Implications

In summary, this paper has examined the concepts of reliability and validity to illustrate the developments of educational constructs. Although the debates on these concepts are not settled, there are certain consensus achieved in the literature. Firstly, reliability and validity, which have been analysed from two different theoretical foundations, are important quality assurance criteria for both qualitative and quantitative research. To ensure the robustness and rigor of research, researchers have to take actions to adhere to these criteria. Secondly,

reliability and validity are treated differently in qualitative and quantitative traditions. While quantitative research emphasizes the importance of the consistency of research results which can be replicated in other contexts, qualitative research aims at research transparency and transferability. Validity in quantitative research focuses on the meaningful fit of the tool with the observed object and the congruence of the results with reality. However, valid qualitative research requires evidence and trustworthiness. Because of this difference, alternative terms are used for reliability and validity in qualitative research such as credibility, dependability, trustworthiness, transparency, and transferability. Thirdly, each study can take one or many quality assurance measures to improve its robustness during the research process. Quantitative research seems to strictly require reliability and validity. Qualitative research, however, adopts a more flexible approach. Some exemplar strategies include triangulation, member check, audit trail, reflexivity, respondent validation, contextualization, and thick description. These strategies are “cumulative” (Aguinis & Solarino, 2019, p. 1296) rather than exclusive. Being aware of these subtle variations will definitely support researchers in selecting appropriate strategies that are aligned with their research purposes (Dörnyei, 2007) and beneficial to their pursuit of knowledge.

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HIỂU KHÁI NIỆM ĐỘ CHÍNH XÁC VÀ ĐỘ TIN CẬY TRONG CÁC NGHIÊN CỨU ĐỊNH LƯỢNG VÀ NGHIÊN CỨU ĐỊNH TÍNH

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Tóm tắt: Các khái niệm giáo dục thay đổi theo thời gian và thể hiện các mốc phát triển trong nghiên cứu hoặc đường hướng giáo dục. Để minh họa cho quá trình này, bài báo tìm hiểu ý nghĩa của hai khái niệm độ chính xác và độ tin cậy vốn là những khái niệm quan trọng dùng để đánh giá chất lượng nghiên cứu. Ban đầu, hai khái niệm này được dùng trong các nghiên cứu định lượng. Tuy nhiên, việc áp dụng hai tiêu chuẩn này cho việc đánh giá nghiên cứu định tính cần phải thay đổi vì hai loại nghiên cứu này khác nhau về nền tảng lí luận và mục tiêu nghiên cứu. Việc áp dụng không rõ ràng có thể dẫn đến việc áp dụng phương pháp nghiên cứu hoặc đánh giá nghiên cứu không phù hợp. Bài báo này sẽ làm rõ nền tảng lí luận của hai loại nghiên cứu định lượng và định tính sau đó phân tích những điểm khác biệt để hiểu rõ về khái niệm độ chính xác và độ tin cậy. Phần cuối của bài sẽ đưa ra một số đề xuất cho các nhà nghiên cứu có thể áp dụng linh hoạt hai tiêu chuẩn này để tăng giá trị và ảnh hưởng của nghiên cứu.

Từ khoá: độ chính xác, độ tin cậy, nghiên cứu định tính, nghiên cứu định lượng