

RESEARCH ARTICLE

Questionnaires in Educational Research: Instrument Selection, Design, Validation, and Responsible Use

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Abstract: Questionnaires are among the most widely used data collection instruments in educational research because of their efficiency, scalability, standardisation, and capacity to generate data from large and diverse populations. Despite their widespread use, methodological guidance often focuses primarily on questionnaire construction while giving comparatively limited attention to the more fundamental question of whether questionnaires are the most appropriate instrument for addressing a particular research problem. Consequently, researchers may adopt questionnaires without adequately considering the nature of the research question, the characteristics of the construct being investigated, or the type of evidence required. This paper provides a comprehensive examination of questionnaires as data-collection instruments in educational research, addressing both the methodological question of when to use questionnaires and the practical question of how to design, validate, and implement them. Drawing on contemporary literature in educational research, survey methodology, and measurement theory, this paper examines instrument selection, construct-method alignment, self-report measurement, and the assumptions underlying questionnaire data. Particular attention is given to the conditions under which questionnaires are appropriate and the circumstances in which alternative or complementary methods may provide more valid evidence. This paper further discusses the questionnaire structure, item development, validity and reliability, ethical considerations, methodological challenges, and applications in educational research. It argues that questionnaire development should be viewed as a secondary methodological decision, following the prior determination that questionnaires are appropriate for the research objectives and constructs under investigation. The paper further emphasises that methodological rigour depends not only on questionnaire design but also on informed instrument selection, systematic validation, ethical practice, and responsible interpretation of the findings. By integrating theoretical perspectives with practical guidance, this paper provides a framework for determining when questionnaires should be used, how they should be developed, and how their findings should be interpreted in educational research.

Keywords: educational research, questionnaires, instrument selection, self-report measurement, questionnaire validation, survey methodology

1 Introduction

Data collection is a fundamental component of the research process, providing an empirical foundation for addressing research questions, testing hypotheses and generating knowledge. In educational research, where complex human behaviours, learning processes, and institutional dynamics are examined, selecting appropriate data collection methods is critical. The choice of instrument not only determines the type and quality of data obtained but also influences the validity, reliability, and interpretability of research findings [1–3]. Consequently, researchers must make informed methodological decisions to ensure that their data-collection approaches align with the objectives and context of their studies.

An important but often overlooked aspect of methodological decision-making is determining whether a particular instrument is appropriate for investigating the phenomenon. Instrument selection involves more than choosing a convenient means of collecting data; it requires careful consideration of the nature of the research question, the characteristics of the construct being examined, and the type of evidence required. Although questionnaires are among the most widely used instruments in educational research, not all research questions are amenable to

questionnaire-based measurement. Some educational phenomena, such as classroom interactions, instructional practices, behavioural processes, or causal mechanisms, may be more appropriately investigated through observations, tests, experiments, interviews, case studies, or analyses of existing records. Therefore, methodological rigor requires researchers not only to understand how to design questionnaires but also to recognise when questionnaires constitute an appropriate research instrument and when alternative or complementary methods may be preferable.

Among the wide range of data collection methods available, including interviews, observations, and tests, questionnaires have emerged as one of the most widely used instruments in educational and social science research [4, 5]. A questionnaire is typically defined as a structured self-report tool comprising a series of questions designed to elicit information about respondents' attitudes, beliefs, perceptions, and behaviours. Contemporary survey methodology recognises that questionnaires can be administered in multiple modes (e.g. self-administered or researcher-administered; synchronous or asynchronous) and may include both structured and open-ended response formats. Its popularity is largely due to its efficiency, cost-effectiveness, and ability to collect standardised data from large, geographically dispersed populations. These characteristics make questionnaires particularly valuable for studies that seek to identify patterns, trends, and relationships across diverse educational contexts.

The growing use of questionnaires has been further accelerated by advances in digital technology, which have transformed traditional data collection methods. The shift from paper-based instruments to online survey platforms has enabled researchers to administer questionnaires more efficiently, reach wider audiences, and manage data in real time [6, 7]. Digital surveys offer enhanced flexibility through features such as automated data recording, branching or skip patterns (i.e. programmed pathways that direct respondents to different questions based on their previous answers), and adaptive questioning, making them especially suitable for large-scale educational research and program evaluations. As educational systems increasingly rely on data-driven decision-making, questionnaires have become central tools for gathering evidence at both the micro and macro levels.

Despite their widespread use, concerns persist regarding the methodological rigour with which questionnaires are designed and implemented. Research has shown that questionnaires are often developed without sufficient attention to construct clarity, item quality, and alignment with research objectives, leading to issues such as ambiguous wording, response bias, and measurement errors [6, 8, 9]. While such concerns are frequently noted in the broader research methods literature, there remains a limited synthesis that critically examines how these challenges manifest specifically within educational research contexts, particularly in diverse and resource-constrained settings. Equally important, existing methodological guidance tends to focus predominantly on the technical aspects of questionnaire construction while devoting comparatively little attention to the logically prior question of instrument appropriateness. Novice researchers are often taught how to write questionnaire items, develop scales, and assess validity and reliability; however, they receive far less guidance on determining whether a questionnaire is the most suitable instrument for addressing their research questions. Consequently, questionnaires may be used to investigate phenomena that are more appropriately examined through direct observation, performance assessment, experimentation, or qualitative enquiry, thereby creating risks of measurement error, construct underrepresentation, and misleading conclusions. This gap highlights the need for a more comprehensive treatment of questionnaire methodology that addresses both instrument selection and design. These limitations can compromise the validity and reliability of the findings, ultimately affecting the credibility of the research outcomes. Designing effective questionnaires can be challenging for novice researchers, as it requires both theoretical understanding and practical skills in instrument development.

In addition, although questionnaires are highly effective in collecting large volumes of structured data, they are not without restrictions. Their reliance on self-reported data introduces potential biases, including social desirability and misinterpretation of questions. Furthermore, questionnaires may lack the depth required to fully capture complex educational phenomena, particularly when used in isolation. These challenges highlight the need for careful design, thoughtful application, and, where appropriate, integration with complementary data-collection methods.

This paper is motivated not only by gaps in the literature but also by the author's professional experience in designing, validating, and reviewing questionnaire-based studies in educational contexts. Through this experience, recurring challenges have been observed, particularly among novice researchers, including difficulties in defining constructs, distinguishing questionnaires

from related instruments such as structured and semi-structured interviews, ensuring alignment between research objectives and questionnaire items, and determining whether questionnaires are the most appropriate instrument for investigating specific educational phenomena. These practical challenges underscore the need for clearer conceptual guidance and context-sensitive methodological support.

In response to these considerations, this paper presents a focused and analytically grounded examination of questionnaires as data-collection instruments in educational research. Rather than offering a purely descriptive overview, the paper seeks to address a specific methodological gap by clarifying the conceptual boundaries of questionnaires, integrating theoretical insights (particularly from self-report and survey response theory), and translating these into practical design principles. Importantly, this paper moves beyond the question of how questionnaires should be designed to address the prior methodological question of when questionnaires should be used. It examines the circumstances under which questionnaire-based measurements are appropriate, the assumptions underlying self-report data, the limitations of questionnaires relative to other research instruments, and the conditions under which alternative or complementary methods may be required. Building on this foundation, this paper then provides practical guidance on questionnaire development, validation, implementation, and ethical use.

More specifically, this paper is guided by the following central question: *How can researchers determine when questionnaires are an appropriate data collection instrument in educational research, and how can such instruments be designed, validated, and implemented to ensure methodological rigor and contextual relevance?* By addressing this question, the paper moves beyond general methodological description towards a more purposeful and structured contribution.

By bridging theory and practice, this paper aims to support emerging researchers, post-graduate students, and teacher-researchers in developing methodologically sound, contextually appropriate, and ethically grounded questionnaires. This study contributes to the literature by integrating instrument-selection considerations with questionnaire design principles, clarifying the conceptual boundaries between questionnaires and related methods, and providing a practical framework for determining when to use questionnaires and how to develop them. This promotes a more rigorous, reflective, and informed use of questionnaires in educational research, thereby enhancing the quality and credibility of the evidence generated across diverse research settings.

2 Conceptualising data collection and research instruments

2.1 Data collection

Data collection refers to the systematic process through which researchers gather information to address research questions, test hypotheses and generate empirical evidence [1, 2]. It is a foundational component of the research process, as the accuracy, relevance, and completeness of the collected data directly influence the credibility and usefulness of the research findings. Effective data collection requires careful planning, including decisions about what data are needed, how they will be collected, and from whom, to ensure alignment with the research design and study objectives [5].

From a practical perspective, data collection is not merely a procedural step but a strategic process that shapes the overall direction and quality of the study. Researchers must consider contextual factors such as the research setting, participant characteristics, and available resources when selecting appropriate data collection approaches [10]. In educational research, these considerations are particularly important because of the complexity of learning environments and the diversity of participants, including students, teachers, and administrators. Importantly, data collection involves two interconnected methodological decisions: the first concerns selecting an appropriate instrument capable of generating evidence relevant to the research question, while the second concerns the design and implementation of that instrument. Although methodological literature often focuses on instrument development and validation, prior decisions regarding instrument suitability are equally important. An instrument may be well-designed and statistically reliable, yet still produce inadequate or misleading evidence if it is not appropriate for the phenomenon being investigated. Consequently, researchers must carefully consider the nature of the research question, the characteristics of the construct under investigation, and the type of evidence required before selecting a data-collection method.

Data are commonly classified into two broad categories: primary data and secondary data.

Primary data are collected directly by the researcher for a specific purpose and tailored to address particular research questions. These data are typically obtained through instruments such as questionnaires, interviews, observations and tests [3]. The main advantage of primary data lies in their specificity and relevance, as they are generated within the context of a study.

In contrast, secondary data refer to information that has already been collected and processed by other researchers. These include government reports, institutional databases, and previously published studies [4]. Although secondary data can be cost-effective and time-efficient, researchers must critically evaluate their reliability, validity, and suitability for the intended research purpose [11]. Importantly, while secondary data can contribute to triangulation, they do not automatically fulfil this role. Triangulation requires the deliberate integration of multiple data sources, methods, and perspectives to corroborate findings [1, 12]. Secondary data can support triangulation only when they are conceptually aligned with the research questions and used alongside primary data or alternative methods to strengthen interpretive validity. Thus, the value of secondary data lies not merely in their availability but also in their strategic integration within a coherent research design.

In practice, many educational studies adopt a complementary approach by integrating primary and secondary data. This combination can enhance the robustness of the findings by allowing researchers to triangulate evidence and gain a more comprehensive understanding of the research problem. However, regardless of the data source, the effectiveness of data collection ultimately depends on the appropriateness and quality of the instruments employed.

2.2 Research instruments

Research instruments are tools or mechanisms used to collect data from participants or other sources. They serve as a critical link between abstract research concepts and measurable variables, enabling researchers to translate theoretical ideas into observable, analyzable data [13]. Therefore, selecting an appropriate instrument is a key methodological decision that directly affects the type, quality, and interpretability of the collected data.

In educational research, commonly used instruments include questionnaires, interviews, observations and tests. Each instrument is designed to capture different types of data and is suited for particular research purposes. For example, interviews are effective for exploring participants' experiences and perspectives in depth, whereas observations are useful for documenting behaviours and interactions in natural settings. Tests are typically used to measure knowledge, skills, and cognitive abilities in a structured and standardised manner [1].

A fundamental principle of instrument selection is that different research questions require different types of evidence. Consequently, instruments should be selected not based on convenience or familiarity but on their capacity to generate valid evidence relevant to the phenomenon under investigation. For example, when researchers seek to understand participants' attitudes, perceptions, beliefs, motivations, or self-reported experiences, questionnaires may provide an appropriate means of collecting data. Conversely, when the objective is to examine actual behaviour, classroom interactions, instructional practices, or learning processes as they occur, observational methods may provide more direct and valid evidence. Similarly, when the goal is to assess knowledge, achievement, or competence, tests are generally more appropriate than self-report measures.

Instrument selection should also be informed by the nature of the constructs being investigated. Some constructs are directly observable, whereas others are latent and must be inferred indirectly. Observable constructs include behaviours such as classroom participation, teacher questioning practices, and student interactions. The latent constructs include attitudes, beliefs, perceptions, self-efficacy, motivation, and satisfaction. Because latent constructs cannot be directly observed, researchers often rely on self-report measures, such as questionnaires, to capture them. However, when the construct is observable, self-report data should not be assumed to provide the most valid evidence.

Importantly, research instruments are not confined to a single methodological paradigm. Questionnaires can support quantitative, qualitative, and mixed-methods research designs. Structured closed-ended questionnaires are typically associated with quantitative research, whereas open-ended questionnaire items can generate qualitative data, and their combination enables integration within mixed-methods approaches [5, 14]. This flexibility underscores the need for researchers to conceptualise instruments not as fixed entities but as adaptable tools aligned with research purposes.

Researchers should also recognise that no single instrument is universally superior. Each

possesses distinct strengths and limitations, and the appropriateness of an instrument depends on the research context and its objectives. In many educational studies, methodological rigor is enhanced through the complementary use of multiple instruments. For example, questionnaire data may be combined with interviews to explore the underlying explanations for survey responses or with observations to compare reported and actual behaviour. Such combinations allow researchers to balance breadth and depth while strengthening the credibility and trustworthiness of their findings.

A key consideration, often overlooked, is the distinction between two independent dimensions of research instruments: (1) mode of administration (e.g. self-administered vs researcher-administered; synchronous vs asynchronous) and (2) response format (e.g. closed/structured vs open/free-response). These dimensions can be combined in multiple ways. For instance, a questionnaire may be self-administered with closed-ended items or researcher-administered with open-ended items. Recognising this distinction is essential for conceptual clarity, as it prevents the conflation of questionnaires and interviews and supports more precise methodological decision-making.

The choice of instrument should be guided by the research approach, whether quantitative, qualitative, or mixed-methods, and the nature of the research questions. Quantitative studies often rely on structured instruments that yield numerical data suitable for statistical analysis, whereas qualitative studies favour flexible instruments that yield rich, descriptive insights. Mixed-methods research combines these approaches using multiple instruments to provide both breadth and depth of understanding [5].

Beyond selection, the quality of research instruments is paramount. Validity and reliability are two key criteria that underpin the quality of an instrument. Validity refers to the extent to which an instrument measures what it is intended to measure, whereas reliability concerns the consistency of measurement across different contexts and time [1]. Although these concepts are explored in detail later in the paper, it is important to recognise that they are central to all stages of instrument development and use.

For novice researchers, understanding the role and characteristics of research instruments is essential for making informed methodological decisions. Poorly selected or poorly designed instruments can lead to inaccurate data and misleading conclusions, regardless of the sophistication of the subsequent data analysis. Therefore, careful consideration of instrument selection and design is critical to ensure the overall quality of educational research.

2.3 Types of research instruments

Educational researchers employ various data collection instruments, each with distinct strengths, limitations, and areas of application. Understanding these differences is important for selecting the most appropriate tool for a given study design.

Interviews are widely used in qualitative research to explore participants' experiences, perceptions, and meanings in depth. They allow for flexibility and interaction, enabling researchers to probe responses and clarify ambiguities [15]. Importantly, interviews can be structured or unstructured. Structured interviews use predetermined questions with minimal deviation, closely resembling questionnaires in their standardisation, whereas semi-structured interviews combine predefined questions with flexibility for probing. Recognising these distinctions is essential, as these forms occupy the conceptual boundary between questionnaires and interviews.

Observations involve systematically recording behaviours and events as they occur in natural settings. This method provides direct evidence of actions and interactions, making it especially valuable in classroom-based research, where researchers seek to understand teaching practices and student behaviour [1]. However, observations are limited to observable phenomena and may not capture the participants' internal thoughts or motivations.

Tests are structured instruments designed to measure knowledge, skills, and abilities. Standardised tests, in particular, are developed using rigorous procedures to ensure reliability and comparability across individuals and groups [3]. While tests are effective in assessing cognitive outcomes, they are less suitable for capturing attitudes, beliefs, or perceptions.

Questionnaires, which are the primary focus of this paper, are structured self-report instruments that collect data through a series of written questions or statements. They are particularly effective in gathering information from large samples and measuring constructs such as attitudes, perceptions, and behaviours [4]. Their strength lies in providing systematic access to respondents' internal perspectives and subjective interpretations of their educational experiences.

However, questionnaires are not equally appropriate for all forms of educational enquiry. Self-report data may provide useful insights into how participants perceive their behaviour, but they do not necessarily reflect actual behaviour. For example, a teacher may report frequent use of student-centred teaching strategies, whereas classroom observations may reveal a different pattern of instructional practice. Similarly, students may overestimate or underestimate their engagement, study habits, and learning behaviours. Consequently, researchers must carefully distinguish between investigating perceptions of behaviour and behaviour itself.

To assist novice researchers in making informed methodological decisions, Table 1 provides a general guide for aligning research objectives with the appropriate research instruments.

Table 1 Matching Research Objectives with Appropriate Research Instruments

Research objective	Most appropriate instrument(s)
Attitudes, beliefs and perceptions	Questionnaire
Self-report experiences	Questionnaire and interview
Actual classroom behaviour	Observation
Teaching practices in action	Observation and interview
Knowledge, achievement and competence	Test
Decision-making processes	Interview
Programme implementation	Questionnaire, interview and document analysis
Causal effects of interventions	Experimental or quasi-experimental methods
Institutional trends and historical patterns	Secondary data and document analysis

This framework is intended as a guide, rather than a rigid prescription. Instrument selection should ultimately be determined by the alignment between the research question, the construct under investigation, and the type of evidence required. By recognising the distinctive strengths and limitations of different instruments, researchers can make more informed methodological decisions and avoid relying on questionnaires when alternative methods may yield more valid evidence.

To enhance conceptual clarity, it is useful to view research instruments along a continuum defined by their structure and the degree of researcher involvement. At one end are highly structured, standardised instruments (e.g., questionnaires and structured tests), while at the other are flexible, exploratory methods (e.g., unstructured interviews). Between these extremes lie semi-structured interviews and mixed-format instruments. This continuum highlights that research instruments are not discrete categories but overlapping methodological configurations, and careful differentiation is required when selecting and designing them.

Each of these instruments serves a distinct purpose, and their selection should be guided by the research objectives, the nature of the required data, and practical considerations, such as time, resources, and access to participants. In many cases, researchers combine multiple instruments to enhance the depth and validity of their results.

3 Questionnaires as a data collection method

3.1 Appropriateness of questionnaires as a research instrument

Before designing a questionnaire, researchers must first determine whether it is an appropriate instrument for addressing their research question. This decision is particularly important because the quality of research evidence depends not only on how well an instrument is designed, but also on whether it can generate valid information about the phenomenon under investigation. A carefully designed questionnaire cannot compensate for a mismatch between the research question and the chosen data collection method.

Questionnaires are most appropriate when researchers seek information about respondents' internal states, including their attitudes, beliefs, perceptions, opinions, motivations, values, intentions, self-efficacy, satisfaction, and self-report experiences. These constructs are often latent and cannot be directly observed. Consequently, self-report instruments provide a practical means of accessing information that would otherwise be unavailable to researchers. For example, a study examining teachers' perceptions of curriculum reform, students' motivation to learn, or parents' attitudes towards school policies is well-suited to questionnaire-based data collection.

Questionnaires are also appropriate when researchers require standardised data from large populations. Their ability to efficiently collect information from numerous participants makes them particularly valuable in surveys, program evaluations, policy research, needs assessments,

and large-scale educational studies, where comparability across respondents is important.

However, questionnaires are less appropriate when the research objective is to investigate actual behaviour rather than the perceptions of behaviour. Respondents may not accurately recall their actions, interpret questions differently, or provide socially desirable responses. Consequently, questionnaire data often reflect individuals’ interpretations of their behaviour rather than objective evidence of what actually occurred. For example, a teacher may report the frequent use of collaborative learning strategies, whereas classroom observations may reveal limited student interaction. Similarly, students may overestimate or underestimate their engagement, study habits, and learning behaviours.

Questionnaires may also be insufficient when researchers seek to understand complex social interactions, classroom processes, or contextual influences in depth. Although open-ended questionnaire items can provide valuable qualitative insights, they generally do not permit the level of probing, clarification, and exploration possible through interviews, focus groups, ethnographic approaches or case studies. Consequently, qualitative methods may be more appropriate when the objective is to understand the meanings, experiences, and processes in greater depth.

In addition, questionnaires are generally not the most suitable instruments for measuring knowledge, competence, or achievement. Such outcomes are more appropriately assessed through tests, performance assessments, and other direct measures. Likewise, studies seeking to establish causal relationships between variables typically require experimental or quasi-experimental designs rather than questionnaire data alone.

Therefore, the suitability of questionnaires depends on the alignment between three key considerations: (1) the research question, (2) the nature of the construct being investigated, and (3) the type of evidence required. Table 2 presents a simplified framework to help researchers determine whether questionnaire-based measurements are appropriate.

Table 2 Determining the Appropriateness of Questionnaires

Question	If Yes	If No
Is the construct primarily an internal state— (e.g. attitudes, beliefs, perceptions, and motivation)?	Questionnaire likely appropriate	Consider alternative methods
Is self-reporting the most direct source of information?	Questionnaire likely appropriate	Consider observation, tests, or records
Are standardised data required from a large sample?	Questionnaire advantageous	Other methods may be feasible
Is the actual behaviour being investigated?	Consider observation alongside questionnaire	A questionnaire may be sufficient
Is an in-depth understanding required?	Consider interviews or mixed methods	A questionnaire may be appropriate
Is causal inference required?	Consider experimental the methods	Questionnaire may be suitable

This framework is intended to guide, rather than replace, methodological judgement. In practice, many educational studies benefit from combining questionnaires with other instruments. Such combinations allow researchers to compensate for the limitations of self-report data while obtaining a more comprehensive understanding of educational phenomena.

3.2 Definition and nature

Questionnaires are structured self-report instruments used to collect data directly from respondents through a series of written questions and statements [1, 4]. They are designed to capture information about individuals’ attitudes, beliefs, perceptions, and behaviours, making them particularly useful in educational research, where many variables of interest are not directly observable.

Importantly, questionnaires should not be defined solely as written or self-administered instruments. Rather, they are more accurately conceptualised as instruments characterised by the standardisation of questions and response options across respondents. They may be administered in multiple modes, including self-administered (paper-based or online) and researcher-administered formats (e.g., orally delivered or structured surveys). This distinction clarifies that the defining feature of a questionnaire is not the mode of administration but the degree of standardisation and structure.

The data generated by questionnaires are primarily subjective, reflecting respondents’ internal states rather than externally verifiable facts. This makes questionnaires especially valuable for examining constructs such as student motivation, teacher beliefs, and perceptions of learning environments, which are central to educational enquiry but difficult to measure through direct observation. Simultaneously, the subjective nature of questionnaire data necessitates careful

interpretation. Responses are influenced not only by respondents' actual attitudes or experiences but also by their understanding of questions, memory, willingness to disclose information, and interpretation of the response options. Consequently, the questionnaire findings should be viewed as representations of respondents' perceptions and self-reports rather than objective accounts of reality.

Questionnaires also vary along a continuum of response formats, ranging from closed- to open-ended items. Closed-ended questions provide predefined response options, enabling standardisation and easier quantitative analysis, whereas open-ended questions allow respondents to express their views in their own words and generate qualitative data. Notably, when open-ended responses are collected asynchronously in written form, they may resemble what are termed "asynchronous written interviews" in the survey methodology literature. This reinforces the need to distinguish questionnaires from interviews, not by format alone, but by the level of standardisation and the degree of researcher intervention. The combination of these item types enables questionnaires to be used in both quantitative and mixed-methods research, providing flexibility in addressing a wide range of research objectives [5].

3.3 Theoretical foundations

The use of questionnaires is grounded in self-report theory, which assumes that individuals can reflect on and report their thoughts, feelings, and behaviours [16]. According to this perspective, responding to a questionnaire involves a series of cognitive processes: interpreting the question, retrieving relevant information from memory, forming a judgement, and selecting an appropriate response. This four-stage cognitive model (interpretation, retrieval, judgement, and response selection) is not merely descriptive; it also has direct implications for questionnaire design. At the interpretation stage, unclear or ambiguous wording can lead to comprehension errors; at the retrieval stage, poorly specified time frames may result in inaccurate recall; at the judgement stage, respondents may rely on heuristics or socially desirable responses; and at the response selection stage, mismatches between respondents' intended answers and available response options can produce measurement errors [16, 17].

The cognitive model also highlights several assumptions that underpin questionnaire use. First, respondents must understand the questions as intended by the researcher. Second, they must possess sufficient knowledge or memory to answer the questions accurately. Third, they must be willing to provide truthful responses. Fourth, the construct being investigated must be consciously accessible to the respondents. When these assumptions are violated, questionnaire data may become inaccurate and misleading.

Therefore, questionnaires are generally less suitable for investigating unconscious processes, implicit attitudes, automatic behaviours, or highly complex social interactions that individuals may be unable to accurately observe or report. Such phenomena often require alternative methodological approaches, including behavioural observation, experimental techniques, or specialised psychological measures.

The central concept underpinning the use of questionnaires is the measurement of latent constructs. Many variables in educational research, such as attitudes, perceptions, and motivation, cannot be directly observed and must be inferred from measurable indicators [18]. Questionnaires operationalise these constructs by translating them into a set of items that collectively represent different dimensions of the concept. Using multiple items to measure a single construct enhances accuracy by reducing the influence of random errors and capturing a broader representation of the underlying phenomenon [19].

Another important consideration is the logical structuring of the questionnaires to support accurate responses. Effective questionnaire design requires aligning items with clearly defined constructs and ensuring that questions are phrased in a manner that is meaningful and interpretable to respondents [9, 20]. Poor alignment between constructs and items can lead to measurement errors and weaken the validity of the data collected. Therefore, theoretical clarity and methodological precision are essential for translating abstract concepts into reliable questionnaire items.

Scaling plays a critical role in questionnaire-based research. Rating scales, particularly Likert-type scales, are widely used to measure the intensity or degree of respondents' attitudes and perceptions. These scales allow subjective responses to be converted into numerical data that can be analysed statistically, thereby bridging the gap between qualitative meaning and quantitative measurement [1]. However, it is important to recognise ongoing methodological debates regarding the treatment of Likert-scale data (e.g. ordinal versus interval assumptions),

as these have implications for statistical analysis and interpretation. Therefore, researchers must select analytical approaches that are consistent with the measurement properties of their data.

3.4 Comparison with other methods and methodological decision-making

The distinctive features of questionnaires can be better understood by comparing them with other commonly used data collection methods. Each method offers unique strengths and is suited to different research objectives.

Questionnaires are particularly effective for collecting standardised information from large samples in a cost-efficient manner. Their primary strength lies in their ability to capture perceptions, attitudes, beliefs, motivations, and self-report experiences in diverse populations.

In contrast, interviews allow researchers to explore participants' experiences and perspectives in greater depth. Through probing and clarification, interviews can uncover meanings, explanations, and contextual influences that may remain hidden in questionnaire responses. Consequently, interviews are often preferred when a rich and detailed understanding is required.

Observations provide direct evidence of behaviour as it occurs in natural settings. Unlike questionnaires, which depend on self-reports, observations allow researchers to document actions, interactions, and environmental conditions directly. This makes observations particularly valuable for investigating classroom practices, student behaviour, and instructional processes.

Tests are designed to assess knowledge, skills, abilities, and achievements through structured performance measures. They provide more objective evidence of competence than questionnaires and are therefore preferable when researchers seek to evaluate learning outcomes or academic performance.

The choice between these methods should be driven by the nature of the evidence required, rather than convenience or tradition. A useful guiding principle is that questionnaires are generally most appropriate for investigating what people think, feel, believe, or report about themselves, whereas observations are more appropriate for examining what people actually do, tests are more appropriate for determining what people know or can do, and interviews are more appropriate for understanding why they think or act in a particular way.

Rather than viewing questionnaires as a default, researchers should regard them as components of a broader methodological toolkit. The most rigorous educational studies often combine questionnaires with complementary methods, allowing researchers to examine educational phenomena from multiple perspectives and strengthen the validity of their conclusions.

4 Types and structure of questionnaires

The effectiveness of a questionnaire depends not only on whether it is an appropriate instrument for the research problem but also on how its questions are constructed and organised. Once researchers have established that questionnaire-based measurement is suitable for their research objectives, they must carefully decide on question format, response structure, sequencing, and overall layout. These decisions directly influence respondents' ability to understand questions, retrieve relevant information, formulate judgements, and provide accurate responses. Consequently, the questionnaire structure should be viewed not merely as a technical matter of presentation but as a methodological process that affects data quality and measurement validity.

4.1 Open-ended and closed-ended questions

Questionnaires typically comprise two main types of items: open-ended and closed-ended questions. Understanding the distinction between these formats is essential for designing questionnaires that effectively capture the required data.

Open-ended questions allow respondents to answer in their own words, without being constrained by predefined response options. These questions are particularly useful when the researcher seeks to explore participants' perspectives in depth or when the range of possible responses is not fully known in advance [1]. For example, an open-ended question such as "*What challenges do you face in implementing classroom assessment in your school?*" invites respondents to provide detailed, context-specific insights. This type of question is especially valuable in exploratory studies and mixed-methods research, where qualitative data can complement quantitative findings. Open-ended questions are particularly useful when researchers seek to understand meanings, experiences, explanations, or contextual factors that

cannot be adequately captured by fixed-response categories. They allow respondents to raise issues that may not have been anticipated by the researcher, thereby contributing to greater conceptual richness and construct development.

However, open-ended questions present practical challenges. Responses can vary widely in length and content, making them time-consuming to analyse and potentially difficult to interpret consistently. In addition, some respondents may provide brief or incomplete answers, particularly if they are not motivated or lack the confidence to express their views in writing. Open-ended questions also place greater cognitive demands on respondents because they require independent generation of responses, rather than selection from predetermined options. Consequently, excessive use of open-ended items may contribute to respondent fatigue and lower completion rates, particularly in large-scale surveys.

In contrast, closed-ended questions provide predefined response options from which respondents must select. These questions are widely used in quantitative research because they facilitate standardisation and allow for efficient data analysis [4]. For instance, a question such as *“How satisfied are you with your learning experience?”* may be accompanied by a Likert scale ranging from *very dissatisfied* to *very satisfied*. Closed-ended questions enable researchers to collect comparable data across large samples and apply statistical techniques to identify patterns and relationships. Closed-ended questions are particularly appropriate when researchers have a clear understanding of the construct being measured and can reasonably anticipate the range of responses. They enhance comparability across respondents, reduce ambiguity, and support the statistical analysis. However, they may also constrain respondents’ ability to express nuanced views, particularly when the available response categories do not fully reflect their experiences.

A balanced questionnaire often combines both formats. For example, a closed-ended Likert-scale item such as *“I feel confident using digital tools for teaching”* may be followed by an open-ended prompt such as *“Please explain your response.”* This combination enhances both breadth (quantitative comparability) and depth (qualitative insight), particularly in mixed-methods research design.

While closed-ended questions offer efficiency and ease of analysis, they may limit respondents’ ability to fully express their views, particularly if the options provided do not capture the complexity of their experience. Therefore, many questionnaires combine both open and closed-ended items to balance depth and standardisation, particularly in mixed-methods research designs [5]. Therefore, the choice between open- and closed-ended questions should be guided by the research objectives, the nature of the construct being measured, and the type of evidence required. Rather than viewing one format as inherently superior, researchers should recognise that each serves different methodological purposes and contributes distinct forms of evidence.

4.2 Types of closed-ended questions

Closed-ended questions can take several forms, each serving a specific purpose depending on the research objectives and the nature of the data required. Selecting the appropriate question type is a critical aspect of questionnaire design because it influences both the quality of responses and ease of analysis.

One of the simplest forms is the dichotomous question, which requires respondents to choose between two alternatives, such as *yes/no* or *true/false*. These questions are easy to administer and analyse, but may oversimplify complex issues and limit the richness of responses.

Multiple-choice questions offer respondents more than two options, enabling greater flexibility in capturing diverse responses. These questions are useful when the researcher seeks to categorise responses into distinct groups. For example, respondents may be asked to select the most frequently used teaching strategies from a list of options. Care must be taken to ensure that response options are comprehensive and mutually exclusive to avoid confusion [9, 21].

Rank-order questions require respondents to arrange a set of items according to specific criteria, such as importance or preference. These questions are particularly useful for identifying priorities or preferences among the multiple factors. However, they can be cognitively demanding, especially when respondents are required to rank many items.

Rating-scale questions are among the most commonly used formats in questionnaire designs. These questions ask respondents to evaluate a statement along a continuum, typically representing the levels of agreement, frequency, or importance. The Likert scale is a widely used rating scale that allows respondents to indicate their degree of agreement with statements [1]. Different forms of closed-ended questions are suited for different measurement purposes. Dichotomous

questions are useful for identifying the presence or absence of characteristics; multiple-choice questions are effective for classification and categorisation; rank-order questions reveal relative priorities; and rating scales measure intensity or degree. Therefore, researchers should select question formats that align with the construct's conceptual properties.

When designing rating scales, researchers must carefully consider the number of response categories. Evidence suggests that 5- to 7-point Likert scales often provide an optimal balance between sensitivity and respondent burden, whereas very short scales (e.g. 2–3 points) may limit variability, and very long scales (e.g. 10 or more points) may increase confusion or reduce reliability [22, 23]. Researchers should also ensure that scale anchors are clearly labelled and conceptually balanced. Unequal spacing between response categories or ambiguous wording may lead respondents to interpret categories inconsistently, thereby reducing the measurement validity.

The effectiveness of rating scales depends on their careful construction. Response categories should be balanced, clearly defined, and appropriate for the construct being measured. Researchers should remain aware of ongoing debates regarding the treatment of Likert-scale data and ensure that their analytical approaches are consistent with the scale's properties. Furthermore, researchers should avoid excessive reliance on a single response format in a questionnaire. Appropriate variation in question types can help maintain respondent engagement while ensuring that different aspects of a construct are measured effectively.

4.3 Questionnaire structure

In addition to selecting appropriate question types, the questionnaire's overall structure also plays a crucial role in determining its effectiveness. A well-structured questionnaire enhances clarity, reduces the respondent burden, and improves the quality of the collected data.

A key principle of questionnaire design is logical sequencing [24]. Questions should be arranged in a coherent order that guides respondents smoothly through the instrument. Typically, questionnaires begin with simple, non-threatening questions to engage respondents and build confidence, followed by more complex or sensitive items as respondents become more comfortable [6]. Abrupt transitions or poorly organised questions can lead to confusion and reduce response quality. The sequencing of questions should also reflect the cognitive processes involved in responding. Questions that are easier to understand and answer should generally precede more difficult items. This progression helps reduce the cognitive burden and supports more accurate responses throughout the questionnaire.

Sectioning is another important structural feature. Grouping related questions under clear headings helps respondents understand the purpose of each section and reduces their cognitive load. For example, a questionnaire may include separate sections for demographic information, attitudes, and behavioural practices. Clear sectioning also enhances the instrument's overall readability and usability. Where questionnaires measure multiple constructs, each construct should be represented within its own clearly defined section. This organisation improves conceptual coherence and reduces the likelihood that respondents will confuse one construct with another.

The placement of demographic questions requires careful consideration. While some researchers include these questions at the beginning, others place them at the end to avoid discouraging respondents. In many cases, placing demographic items at the end is preferable, as it allows respondents to engage with the main content before providing personal information [4].

The clarity of the instructions is equally important. Respondents should be provided with concise, unambiguous guidance on completing the questionnaire, including how to select responses and navigate between sections. Ambiguous or overly complex instructions may lead to errors and incomplete data.

Layout and presentation also influence respondent engagement. Questionnaires should be visually clear, with consistent formatting, appropriate spacing, and easily distinguishable and clear response options. In digital questionnaires, additional considerations include screen design, navigation, mobile compatibility, and the use of features such as progress indicators and branching (skip patterns) to enhance user experience and reduce respondent burden [6, 17]. The visual presentation of questionnaires should not be regarded as merely aesthetic. Poor layout, cluttered screens, inconsistent formatting, and confusing navigation can increase cognitive burden, contribute to response errors, and reduce completion rates. Consequently, presentation and usability should be considered integral components of questionnaire quality.

Finally, researchers should consider the overall length of questionnaires. Excessively long questionnaires can lead to fatigue, reduced attention, and lower-quality responses. Although there is no universal threshold, research suggests that questionnaires exceeding approximately 20–30 minutes of completion time or containing more than 50–60 items may significantly increase respondent fatigue and drop-out rates, particularly in online formats [25, 26]. The questionnaire length should be determined not by the desire to collect as much information as possible but by the principle of measurement efficiency. Each item should serve a clear methodological purpose and contribute directly to addressing the research objectives or measuring the intended construct. Unnecessary items increase the respondent burden without necessarily improving data quality. Conversely, very short questionnaires (e.g. fewer than 5–10 items) may fail to capture the complexity of constructs, reducing reliability and limiting analytical value. Therefore, researchers must strike a balance between comprehensiveness and respondent engagement, ensuring that each item contributes meaningfully to the research objectives.

As a practical guideline, researchers are encouraged to prioritise quality over quantity by including only essential items, grouping related questions efficiently, and pre-testing completion time during pilot studies. This helps ensure that the questionnaires remain both methodologically robust and respondent-friendly. Ultimately, an effective questionnaire structure reflects a balance between methodological rigor, respondent experience, and construct representation. Well-designed questionnaires facilitate accurate responses, minimise measurement errors, and enhance the validity and reliability of research findings.

5 Questionnaire development and validation

The development and validation of questionnaires represent the central methodological focus of this paper, as the quality of the instrument directly determines the accuracy, reliability, and interpretability of the collected data. Poorly designed questionnaires can lead to measurement errors, biased responses, and misleading conclusions, regardless of the sophistication of subsequent data analysis. Therefore, questionnaire development should be approached as a systematic and iterative process that integrates theoretical understanding with practical testing [1, 18]. Importantly, questionnaire development begins only after researchers have established that questionnaire-based measurement is appropriate for the research question and construct under investigation. As discussed in the previous section, not all educational phenomena are suitable for self-reported measurements. Consequently, instrument development should be viewed as a secondary methodological decision that follows the prior determination that questionnaires can generate valid evidence for the intended purpose.

Building on the conceptual and theoretical foundations discussed earlier, this section provides a structured framework for questionnaire development that explicitly links construct definitions, item design, and validation procedures to the cognitive processes underlying survey responses. This responds directly to the need for a more analytically grounded and practice-oriented approach to questionnaire design, as identified in the literature.

5.1 Development process

The development of a questionnaire begins with a clear articulation of the research objectives. Researchers must first identify the information required and how it relates to the research questions. This initial step ensures alignment between the instrument and the overall research design, reducing the risk of collecting irrelevant or incomplete data [2]. A common mistake among novice researchers is to begin writing questionnaire items before clearly defining the constructs to be measured. Effective questionnaire development should proceed from theory to construct, from construct to indicators, and only then from indicators to questionnaire items. This sequence helps to ensure conceptual coherence and strengthens subsequent validity arguments.

The next stage involves identifying and defining the key constructs to be measured. Constructs such as attitudes, perceptions, and motivation are often abstract and cannot be observed directly; therefore, they must be carefully conceptualised and operationalised into measurable components [18]. A well-defined construct provides a foundation for generating meaningful and relevant questionnaire items. For example, if a researcher aims to measure “student engagement”, the construct may be broken down into behavioural (e.g., participation), emotional (e.g., interest), and cognitive (e.g., effort) dimensions. Each dimension should be represented by multiple items to ensure comprehensive coverage. Construct operationalisation is one of the most critical stages of questionnaire development because it establishes a connection between abstract theoretical concepts and observable indicators. Poorly conceptualised constructs often

yield weak instruments, regardless of subsequent statistical validation. Researchers should therefore ensure that construct definitions are grounded in relevant theory and supported by existing literature before item development [18,30].

Item development follows, where researchers create questions or statements that represent different aspects of the construct. Items should be clear, concise, and free from ambiguity or leading language. Double-barrelled questions (those that address more than one issue at a time) should be avoided, as they can confuse respondents and compromise data quality. At this stage, researchers may draw on existing validated instruments or adapt items to suit their specific research context [27,28]. For instance, instead of asking a double-barreled question such as “*Do you find your teacher supportive and well-prepared?*”, it is methodologically preferable to separate this into two items: “*My teacher is supportive*” and “*My teacher is well-prepared.*” This improves clarity and aligns with the cognitive processing requirements of the respondents. Item development should also be informed by the cognitive model of survey responses discussed earlier [16,17]. Researchers should consider how respondents interpret questions, retrieve information, formulate judgements, and select responses. Ambiguous questions, those that require excessive memory recall, or those with poorly defined response options, increase the likelihood of measurement error. Consequently, questionnaire items should be designed not only to represent constructs accurately but also to facilitate respondents’ accurate cognitive processing.

Once items are developed, expert review is conducted to assess the questionnaire’s relevance, clarity, comprehensiveness, and alignment with the intended constructs. Subject specialists, methodological experts, and experienced practitioners can identify potential issues such as ambiguous wording, conceptual gaps, redundancy, or cultural inappropriateness before data collection begins [3].

Where feasible, expert reviews should include systematic evaluation procedures, such as content validity assessment. Techniques such as the Content Validity Index (CVI) can provide structured evidence regarding the relevance and representativeness of questionnaire items [51], [52]. Such approaches strengthen the transparency and rigor of instrument development.

Pilot testing is a crucial step in the development process. The questionnaire is administered to a small, representative sample of the target population to identify practical and methodological issues. Pilot testing helps to assess item clarity, response patterns, completion time, and overall structure. Feedback from pilot participants can be used to refine the questionnaire, ensuring that it is both user-friendly and methodologically sound [6,9]. Importantly, pilot testing also provides an opportunity to detect issues predicted by the cognitive model of survey response [16], such as misinterpretation of items or difficulty recalling information. Beyond conventional pilot testing, researchers are increasingly encouraged to employ cognitive interviewing techniques. During cognitive interviews, participants are asked to explain how they interpret questions, retrieve information, formulate responses, and select response options. This process enables researchers to identify hidden sources of misunderstanding and measurement errors that may not be apparent through statistical analysis alone [21,53]. Importantly, questionnaire development is an iterative process rather than a linear one. Researchers may need to revise items multiple times, based on feedback and preliminary analyses, to ensure the instrument accurately captures the intended constructs.

5.2 Validity

Validity refers to the extent to which a questionnaire measures what it is intended to measure. Establishing validity is essential to ensure that the data collected accurately represent the constructs of interest and support meaningful interpretation [18]. Contemporary measurement theory increasingly views validity not as a property of the questionnaire itself but as the strength of evidence supporting the interpretation and use of the scores generated by the instrument [30,54]. Consequently, validity should be viewed as an ongoing process of evidence gathering rather than a single procedure or a statistical test.

Content validity involves ensuring that the questionnaire adequately covers all the relevant aspects of the construct. This is typically established through an expert review, where specialists assess whether the items represent the full domain of the concept being measured. Inadequate content coverage can result in incomplete or biased measurements [1,29].

Construct validity refers to the degree to which an instrument accurately reflects the theoretical construct that it is intended to measure [30]. This involves examining whether the relationships between the variables align with theoretical expectations. Establishing construct validity often

requires both theoretical justification and empirical testing, such as factor analysis [19, 31].

Face validity, although considered the most basic form of validity, refers to whether the questionnaire appears to be appropriate and relevant to respondents. While it does not provide strong scientific evidence, it is important for ensuring respondent engagement and acceptance of the instrument [3, 29].

Criterion validity assesses how well a questionnaire correlates with an external criterion or established measure. This can include concurrent validity, in which the instrument is compared with an existing validated tool, or predictive validity, in which it is used to predict future outcomes. Criterion validity provides additional evidence of the effectiveness of an instrument [4, 32].

In addition, contemporary research emphasises the importance of cross-cultural validity, particularly in diverse educational contexts. Instruments must demonstrate equivalence across different linguistic and cultural groups to ensure that items are interpreted consistently and measure the same constructs [33, 34].

Researchers should also consider measurement invariance when questionnaires are administered across different demographic groups, educational settings, languages and cultures. Measurement invariance examines whether a construct is measured in the same manner across groups and is increasingly regarded as an important component of rigorous questionnaire validation [55, 56]. Without evidence of invariance, group comparisons may be misleading. Establishing validity is a continuous process that requires both theoretical alignment and empirical evidence. A questionnaire that lacks validity cannot produce meaningful or trustworthy data, regardless of its reliability.

5.3 Reliability

Reliability refers to the consistency and stability of a questionnaire in measuring constructs. A reliable instrument produces consistent results under consistent conditions, thereby enhancing confidence in the collected data [1].

One of the most commonly used measures of reliability is internal consistency, which assesses the extent to which items within a scale correlate with one another. Cronbach's alpha is widely used to assess internal consistency, with higher values indicating greater consistency among the items [35]. Values of 0.70 or higher are generally considered acceptable for research purposes, although higher thresholds may be required depending on the instrument's context and purpose [18, 36]. Although Cronbach's alpha remains widely reported, contemporary psychometric literature increasingly recommends supplementing or replacing alpha with alternative reliability coefficients, such as McDonald's omega, particularly when the assumptions underlying alpha are not fully satisfied [57, 58]. Therefore, researchers should consider multiple indicators when evaluating internal consistency.

Test-retest reliability examines the stability of responses over time by administering the same questionnaire to the same group of respondents at two different points in time. Consistent results across administrations suggest that the instrument is stable and not influenced by temporary factors [3, 37].

Inter-item reliability focuses on the relationships among individual items within a scale, ensuring that they measure the same construct. Strong inter-item correlations indicate coherence within the scale [38], whereas weak correlations may suggest that certain items are not aligned with the construct [1, 39]. For example, in a scale measuring teacher self-efficacy, items such as "*I feel confident managing classroom behaviour*" and "*I can effectively engage students in learning tasks*" should demonstrate moderate-to-strong correlations, indicating consistency in measuring the underlying construct. Researchers should remember that reliability is necessary, but not sufficient, for validity. An instrument may consistently measure a construct while simultaneously measuring an incorrect construct. Consequently, reliability should always be interpreted alongside validity.

Ensuring reliability is essential for producing dependable data. However, it is important to note that reliability alone does not guarantee validity; an instrument can be consistent without accurately measuring the intended construct.

5.4 Statistical validation

Statistical validation techniques play a crucial role in evaluating and refining questionnaires. These techniques provide empirical evidence of the instrument's validity and reliability and help

identify areas for improvement.

Factor analysis is one of the most widely used statistical methods for questionnaire validation. Exploratory Factor Analysis (EFA) is used in the early stages of development to identify underlying factor structures and determine how items are grouped together. Confirmatory Factor Analysis (CFA), on the other hand, is used to test whether the data fit a hypothesised model based on theoretical expectations [40, 41]. Where possible, researchers should view EFA and CFA as complementary procedures rather than interchangeable procedures. EFA assists in identifying potential factor structures, whereas CFA provides stronger evidence regarding whether the proposed measurement model is supported by empirical data.

Scale development involves combining multiple items into composite measures that represent specific constructs. This process requires careful consideration of item selection, scoring, and weighting to ensure that the scale accurately reflects the intended concept [1, 42].

Item refinement is an iterative process based on statistical results and practical considerations. Items with low factor loadings, weak correlations, or ambiguous wording may be revised or removed to improve the instrument's overall quality. Additional statistical techniques, such as Item Response Theory (IRT) and Differential Item Functioning (DIF) analysis, can further strengthen instrument validation by examining how individual items perform across different groups and levels of ability [43, 44]. These approaches are particularly useful for identifying biased or poorly functioning items.

Moreover, researchers should transparently report key statistical indicators, including factor loadings, reliability coefficients, model fit indices (e.g., CFI, TLI, RMSEA, and SRMR), and evidence supporting construct validity. Transparent reporting enhances the credibility, reproducibility, and interpretability of questionnaire-based studies.

Statistical validation should not be viewed as a purely technical exercise undertaken after questionnaire development. Rather, it forms part of an integrated validation process that combines theoretical reasoning, expert judgement, cognitive evidence, and empirical analysis. Together, these sources provide a more comprehensive basis for evaluating questionnaire quality and supporting the interpretation of research findings.

Therefore, statistical validation complements theoretical reasoning and practical testing, providing a robust foundation for high-quality questionnaire design and implementation.

6 Advantages of questionnaires

Questionnaires offer several advantages, making them among the most widely used data-collection instruments in educational research. Their strengths are particularly evident in their ability to generate structured, comparable, and scalable data across diverse contexts. However, these advantages should not be understood as inherent properties of the questionnaires themselves, but rather as outcomes that depend on the alignment among the questionnaire, the research question, and the construct being investigated. When questionnaires are used to measure appropriate constructs and are carefully designed and validated, they can provide highly valuable evidence for educational research.

Therefore, the advantages discussed in this section should be interpreted within the broader methodological framework developed earlier in this paper. Questionnaires are most beneficial when researchers seek information about attitudes, beliefs, perceptions, motivations, experiences, and other forms of self-report data. However, their strengths may be diminished when used to investigate phenomena that are more appropriately examined through direct observation, performance assessment, or experimental methods. Understanding these advantages enables researchers, particularly those new to educational research, to make informed decisions regarding when and how questionnaires can contribute effectively to the research process.

6.1 Efficiency and scalability

One of the most significant advantages of questionnaires is their efficiency in collecting data from a large number of participants within a relatively short period. Unlike methods such as interviews or observations, which require substantial time and resources, questionnaires can be administered simultaneously to many respondents [2]. This makes them particularly suitable for large-scale studies, national assessments and programme evaluations.

The use of digital platforms further enhances this efficiency. Online questionnaires can be distributed quickly, completed remotely, and automatically recorded for analysis, thereby

reducing both time and administrative burden [6, 7, 45]. This scalability is particularly valuable for researchers working in geographically dispersed or remote contexts.

In educational contexts, such as geographically dispersed island communities, questionnaires provide a practical way to reach participants who might otherwise be inaccessible due to logistical or financial constraints. This scalability supports inclusive data collection and enables a broader representation in research studies. From a methodological perspective, efficiency should not be confused with methodological superiority. Although questionnaires allow researchers to collect data from large samples more rapidly than many alternative methods, efficiency alone does not justify instrument selection. Rather, efficiency becomes an advantage only when questionnaire-based measurements are appropriate for the research objectives and constructs under investigation.

6.2 Standardisation

Questionnaires provide a high level of standardisation, as all respondents receive the same set of questions in a consistent format. This uniformity reduces the variability in data collection procedures and enhances the comparability of responses across individuals and groups [1]. Standardisation is particularly important in quantitative research, where consistency is necessary for statistical analysis and generalisation of the findings.

In addition, the limited interaction between the researcher and the respondent reduces the likelihood of interviewer bias, thereby increasing the objectivity of the collected data. Standardisation also contributes to fairness in measurement by ensuring that all participants are exposed to the same questions, instructions, and response options. This consistency enhances comparability across educational settings, demographic groups, and geographic locations. However, this advantage is maximised only when items are clearly worded and consistently interpreted by respondents, reinforcing the importance of careful questionnaire design. It is important to recognise that standardisation does not automatically guarantee validity. Respondents may interpret identical questions differently due to cultural, linguistic, educational, or contextual differences. Consequently, standardisation should be accompanied by careful attention to construct definitions, item clarity, and cultural appropriateness.

6.3 Quantifiability and ease of analysis

Another key advantage of questionnaires is their ability to produce data that can be readily quantified and statistically analysed. Closed-ended questions, such as Likert-scale items, generate numerical data that can be subjected to a wide range of statistical techniques, enabling researchers to identify patterns, relationships, and trends [4].

This quantification capacity supports evidence-based decision-making and facilitates comparisons across groups, settings, and time periods. For novice researchers, questionnaires also offer practical advantages, as many statistical software packages are designed to handle survey data efficiently.

Furthermore, advances in statistical software and data analytics tools now enable increasingly sophisticated analyses, including multivariate modelling, structural equation modelling, and latent variable analysis, thereby enhancing the analytical potential of questionnaire data when appropriately designed and validated.

The ability to quantify subjective constructs is one of the major contributions of questionnaire methodology. Through carefully developed scales, latent constructs such as motivation, self-efficacy, perceptions, and attitudes can be transformed into measurable variables that can be systematically analysed and compared. This capacity enables researchers to investigate complex educational phenomena that would otherwise be difficult to examine empirically.

6.4 Anonymity and reduced social pressure

Questionnaires often allow anonymous participation, which can encourage respondents to provide more honest and candid responses. This is particularly important when addressing sensitive topics such as attitudes towards teaching practices, institutional policies, or personal experiences [3].

The absence of face-to-face interaction reduces social pressure and the likelihood of socially desirable responses, thereby improving the accuracy of self-report data. Anonymous questionnaires can be especially useful in educational contexts, where participants may be hesitant to openly express critical or negative views. For example, students may feel more

comfortable reporting concerns about teaching quality, bullying, well-being, or school climate when responding anonymously than they would in face-to-face interviews. Similarly, teachers may be more willing to discuss professional challenges or concerns about policy implementation when their identity is protected. However, anonymity does not eliminate all forms of response bias, particularly when questions involve sensitive or socially normative issues. Therefore, careful item wording and ethical assurances remain essential.

6.5 Geographic reach and accessibility

Questionnaires are highly effective in reaching geographically dispersed populations. This is particularly relevant in educational research conducted in rural, remote, or island communities, where access to participants may be limited. Online and mobile-based questionnaires enable researchers to collect data from participants who might otherwise be difficult to reach because of logistical or financial constraints [7, 45].

This broad reach enhances inclusivity and enables researchers to collect data from diverse populations, resulting in more representative and generalisable findings. In resource-constrained research contexts, questionnaires offer practical and cost-effective solutions for large-scale data collection. Moreover, digital platforms increasingly support multilingual surveys, mobile access, and offline data collection, enabling researchers to engage participants across diverse linguistic and technological contexts. These features are particularly valuable in culturally diverse educational settings. The geographic flexibility of questionnaires is especially relevant in contemporary educational research, where policymakers and researchers increasingly seek evidence from multiple schools, districts, regions and countries. Questionnaires facilitate the collection of comparable information across large populations while keeping costs and logistical feasibility reasonable.

6.6 Flexibility in research design

Questionnaires are versatile instruments that can be adapted to a wide range of research designs. They are commonly used in quantitative studies to collect standardised data, but can also be incorporated into mixed-methods research by including open-ended questions that capture qualitative insights [5].

This flexibility allows researchers to design questionnaires that align with their specific research objectives, whether they aim to measure attitudes, explore perceptions or evaluate programs. The ability to combine different types of questions within a single instrument enhances the overall usefulness of questionnaires in educational research.

Additionally, questionnaires can be adapted for longitudinal studies, enabling researchers to track changes over time, or integrated into experimental and quasi-experimental designs as pre- and post-intervention measures. Questionnaires can serve different methodological functions within a single study. For example, they may be used as primary instruments for data collection, screening tools for participant selection, supplementary instruments alongside interviews or observations, or outcome measures within intervention studies. This adaptability contributes significantly to their continued popularity across educational research traditions.

6.7 Advantages of digital questionnaire tools

The rapid development of digital technologies has significantly enhanced the functionality and effectiveness of questionnaires. Modern survey platforms offer a range of features that improve data collection and quality. These include automated data capture, real-time data monitoring, branching (skip patterns), randomisation of items to reduce order effects, and integration with data analysis software [6, 17].

Digital tools also enable researchers to track response rates, send automated reminders, and efficiently manage large datasets. Features such as progress indicators, user-friendly interfaces, and mobile compatibility improve respondent engagement and completion rates. In addition, built-in validation checks (e.g. mandatory responses and range restrictions) can reduce data entry errors and enhance data accuracy. Digital platforms also enable innovative forms of questionnaire administration, including adaptive surveys, multilingual delivery, personalised branching pathways, and integration with learning management systems and educational databases. These developments have expanded the potential applications of questionnaires in educational research and evaluation.

However, while digital tools enhance efficiency and functionality, their effectiveness depends on thoughtful design and ethical use. Poorly designed digital questionnaires may increase

respondent fatigue or introduce new biases associated with differential access to technology. Therefore, researchers should view technological enhancements as tools that support, rather than replace, sound methodological principles. Regardless of whether questionnaires are administered in paper-based or digital formats, their effectiveness ultimately depends on construct clarity, item quality, validity, reliability, and appropriate alignment with the research objectives. Therefore, technological advantages must always be balanced with methodological rigor, inclusivity considerations, and ethical responsibility.

7 Limitations and methodological challenges

Despite their widespread use and practical advantages, questionnaires are associated with several limitations and methodological challenges that can affect the quality, accuracy, and interpretation of research findings. A critical understanding of these limitations is essential, particularly for novice researchers, to ensure that questionnaires are used appropriately and that potential sources of error are minimised.

Importantly, some limitations arise from poor questionnaire design and can be reduced through careful instrument development, whereas others are inherent to self-report measurement. Recognising this distinction is critical for making informed methodological decisions. Even a well-designed questionnaire cannot entirely eliminate certain limitations associated with respondents' memory, self-awareness, interpretation, and willingness to disclose information.

The limitations discussed in this section should, therefore, not be viewed simply as technical problems to be corrected but as methodological considerations that influence decisions about whether questionnaires are appropriate for a particular research purpose. In some situations, these limitations can be mitigated through improved design and validation procedures; in others, they may indicate the need for alternative or complementary methods, such as observations, interviews, tests, or document analysis.

Many of these challenges can also be understood through the cognitive model of survey responses discussed earlier. Difficulties in interpreting questions, retrieving information from memory, forming judgments, and selecting responses all contribute to measurement error and affect the quality of questionnaire data.

7.1 Response bias

One of the most significant challenges in questionnaire-based research is response bias, which occurs when respondents provide answers that do not accurately reflect their true thoughts, attitudes or behaviours. Social desirability bias is particularly common in educational contexts, where participants may respond in ways they perceive as socially acceptable or professionally desirable, rather than truthfully [1]. For example, teachers may overreport the use of effective pedagogical strategies, while students may provide responses that align with perceived expectations rather than their actual experiences. Such tendencies can distort the findings and create misleading representations of educational practices.

Another form of response bias is acquiescence bias, in which respondents tend to agree with statements regardless of their content. This is especially problematic in questionnaires that rely heavily on agreement scales such as Likert-type items [4]. Additionally, recall bias may occur when respondents are asked to remember past events or behaviours, leading to inaccurate or incomplete responses. Participants often reconstruct memories rather than retrieve them exactly as they occurred, resulting in potential inaccuracies [9].

Other forms of response bias include extreme response bias, in which respondents consistently select the most extreme response categories, and central tendency bias, in which respondents avoid extreme responses and cluster around the middle categories. These response styles can introduce systematic distortions unrelated to the constructs being measured. Importantly, response bias reflects a fundamental limitation of the self-report methodology. Because questionnaire responses are filtered through respondents' perceptions, memories, and social contexts, researchers can rarely assume that responses represent entirely objective accounts of reality. These biases can significantly distort findings and reduce the validity of collected data [9, 16].

Several strategies can reduce response bias, including assuring anonymity, using neutral wording, avoiding leading questions, balancing positively and negatively worded items where appropriate, and triangulating the questionnaire data with alternative sources of evidence. However, researchers should recognise that response bias can be minimised but rarely eliminated

entirely.

7.2 Limited depth of data

While questionnaires are effective for collecting data from large samples, they often lack the depth required to fully capture complex educational phenomena. Unlike interviews or observations, questionnaires do not generally allow researchers to probe responses, seek clarification, or explore emerging themes in detail [3]. As a result, responses may be superficial or fail to reflect the underlying reasons for participants' views or behaviours. This limitation is particularly significant when studying nuanced issues such as classroom dynamics, teaching practices, leadership processes, student experiences, or organisational culture, where context and interpretation are important.

Even when questionnaires include open-ended items, the depth of information obtained is often constrained by respondents' willingness, ability, and the time available to provide detailed written responses. Consequently, open-ended questionnaire responses rarely achieve the richness of data generated through in-depth interviews or prolonged observations. This limitation highlights an important distinction between the breadth and depth of the data. Questionnaires excel at generating broad patterns across large populations but are generally less effective in capturing the detailed contextual understanding often associated with qualitative enquiries. Therefore, questionnaires are often most effective when used alongside qualitative methods in mixed-methods research designs.

7.3 Misinterpretation of questions

The misinterpretation of questionnaire items is one of the most pervasive and often underestimated methodological challenges. Respondents may interpret questions differently based on their linguistic abilities, cultural backgrounds, or prior experiences [46]. Ambiguous wording, technical terminology, and poorly structured questions can exacerbate this issue, leading to inconsistent or inaccurate responses [6].

From a cognitive perspective, misinterpretation occurs primarily at the comprehension (interpretation) stage of the response process [16]. If respondents do not understand the question as intended, all subsequent stages—retrieval, judgement, and response selection—are compromised, resulting in invalid data. To minimise misinterpretation, researchers should adopt several practical strategies:

- (1) Use simple, clear, and unambiguous language appropriate to the target population's literacy level;
- (2) Avoid jargon, technical terms, and culturally specific references unless clearly explained;
- (3) Avoid double-barrelled and negatively worded questions;
- (4) Specify time frames and contexts explicitly (e.g., "during the past month");
- (5) Conduct pilot testing and cognitive interviews to identify problematic items;
- (6) Translate and back-translate questionnaires in multilingual contexts to ensure equivalence.

For example, a vague question such as "*Do you regularly use technology in teaching?*" may be interpreted differently by the respondents. A clearer alternative would be: "*How often do you use digital tools (e.g., PowerPoint, online platforms) in your teaching each week?*"

Misinterpretation is particularly problematic because it often remains undetected by researchers. Unlike interviews, where misunderstandings can be clarified immediately, questionnaires typically provide no opportunity for such real-time clarification. Consequently, respondents may answer questions that differ substantially from those that the researcher intended to ask. This highlights the importance of careful wording, pilot testing, and cognitive validation in questionnaire development.

7.4 Non-response bias

Non-response bias occurs when certain individuals or groups are less likely to participate in a questionnaire, resulting in a sample that is not fully representative of the target population [2]. Low response rates or systematic differences between respondents and non-respondents can lead to biased findings and limit the generalisability of results. For example, individuals who are less engaged, less literate, less motivated, or less satisfied may be underrepresented, whereas those with strong opinions may be overrepresented.

The implications of non-response bias extend beyond the sample size. A large sample affected by systematic non-response may produce less valid findings than a smaller sample that accurately reflects the target population. Consequently, the response rate alone should not be

treated as the sole indicator of survey quality. Addressing non-response bias requires strategies such as follow-up reminders, simplifying questionnaire design, reducing respondent burden, and ensuring accessibility for all participants.

Digital surveys introduce additional dimensions of non-response bias, including survey fatigue, email filtering, technology access issues, and declining willingness to participate in online surveys. Therefore, researchers should evaluate not only whether respondents participated but also whether those who did not participate may differ systematically from those who did.

7.5 Literacy and contextual constraints

Questionnaires rely heavily on respondents' ability to read, interpret and respond to written questions. This can pose challenges in contexts where literacy levels vary or participants are not proficient in the questionnaire language. In such cases, respondents may misinterpret questions, provide incomplete answers, or avoid participating altogether.

These challenges are particularly relevant in diverse, resource-constrained research settings. Cultural differences may also influence how questions are understood and answered, further complicating the data collection process [8,47]. Educational researchers increasingly recognise that questionnaires are not culturally neutral instruments. The wording of items, the interpretation of response scales, the assumptions embedded in questions, and expectations regarding participation may vary across cultural contexts. Consequently, instruments developed in one setting should not be assumed to function equivalently in another setting without appropriate adaptation and validation. To address these constraints, researchers should adapt questionnaires to the local context by simplifying the language, providing translations, using culturally relevant examples, and, where appropriate, employing interviewer-assisted administration. Ensuring cultural and linguistic equivalence is essential for maintaining validity in diverse populations.

7.6 Sensitivity to design quality

The effectiveness of a questionnaire depends heavily on its design. Poorly constructed instruments are characterised by unclear wording, leading questions, inappropriate response formats, weak construct definitions, or excessive length, which can generate unreliable and invalid data [8,9]. Even minor design flaws can have significant implications for data quality and interpretation. As respondents interact directly with questionnaire items, weaknesses in item construction are often directly transmitted into the collected data. This sensitivity to design quality means that questionnaires are simultaneously powerful and vulnerable as research instruments. Their apparent simplicity often conceals the substantial methodological expertise required for their effective development and validation.

In recent years, the increasing use of artificial intelligence (AI) tools in questionnaire design has introduced both opportunities and challenges. AI-assisted tools can quickly generate questionnaire items and suggest attractive layouts; however, they may also produce questions that appear well written but are conceptually weak, ambiguous, culturally inappropriate, or poorly aligned with the research constructs. Additionally, AI-generated questionnaires may inadvertently introduce bias, overgeneralisation, or hidden assumptions if they are not critically reviewed by the researchers.

The growing availability of automated questionnaire-generation tools may create a false impression that developing questionnaires is a simple technical task. In reality, effective questionnaire design requires theoretical knowledge, construct clarity, contextual understanding, and methodological expertise that cannot be fully automated. Therefore, while AI tools can enhance efficiency, they should always be supplemented with theoretical reasoning, expert review, pilot testing, and empirical validation. For novice researchers, this sensitivity underscores the importance of following systematic development and validation procedures. Careful attention to design principles, pilot testing, and refinement is essential to minimise errors and enhance instrument quality.

7.7 Limitations inherent to self-report measurement

Beyond the specific challenges discussed above, questionnaires share a broader limitation arising from their reliance on self-report data. Self-report measures assume that respondents possess accurate knowledge of the information being requested, can recall it reliably, are willing to report it honestly, and interpret questions as intended by the researcher. However, these assumptions are not always satisfied.

Furthermore, respondents may be unaware of some aspects of their behaviour, attitudes, or

decision-making processes. Consequently, questionnaires are often less effective in investigating implicit attitudes, unconscious biases, habitual behaviours, or complex social interactions. In such situations, alternative methods may provide more valid evidence. This limitation does not diminish the value of the questionnaires but reinforces the importance of aligning methods with research purposes. Questionnaires are particularly effective for examining perceptions, beliefs, attitudes, motivations, and self-report experiences; however, they should not be regarded as universal solutions to all research problems.

8 Ethical considerations

Ethical considerations are fundamental to questionnaire-based research, particularly in educational contexts, where participants may include students, teachers, school leaders, parents, and other potentially vulnerable groups. Adherence to ethical principles protects participants and enhances the credibility, integrity, and trustworthiness of the research process [1,2]. Importantly, ethics in questionnaire research extend beyond compliance with institutional requirements. Ethical responsibility encompasses the entire research process, including instrument selection, questionnaire design, data collection, data management, analysis, interpretation and reporting. Researchers have an obligation not only to protect participants but also to ensure that the data collected are meaningful, valid, and used responsibly. Questionnaire ethics involves both procedural ethics (e.g., consent and confidentiality) and methodological ethics (e.g., ensuring that questionnaires are appropriate, valid, and unlikely to yield misleading conclusions). Collecting invalid or poorly designed data may result in inaccurate findings that misrepresent participants' views and potentially influence educational decisions. Consequently, ethical practice and methodological rigor are closely interconnected. Positioning ethics centrally within the research process reinforces its role as a guiding framework, rather than a final procedural checkpoint.

8.1 Informed consent

Informed consent is a central ethical requirement in research. Participants must be provided with clear and comprehensive information about the purpose of the study, the nature of their participation, and how the collected data will be used. This includes details regarding the expected time commitment, potential risks and benefits, and the voluntary nature of participation [4].

In questionnaire-based research, informed consent is often obtained through an introductory section at the beginning of the instrument, where participants are asked to indicate their agreement before proceeding. This information should be presented in a language appropriate to the participants' ages, educational levels, and cultural contexts.

Effective informed consent requires more than just obtaining a signature or checking a box. Participants should genuinely understand what participation involves, what information is being collected, how their data will be used, and the potential implications of participation. Therefore, researchers should prioritise comprehension rather than merely documenting consent.

In digital questionnaires, consent procedures may include electronic checkboxes or digital signatures. However, researchers must ensure that participants fully understand what they are consenting to, rather than simply clicking through screens of information.

In educational settings involving minors, additional ethical safeguards are required, including obtaining parental or guardian consent and ensuring that participation is appropriate for the participants' age and developmental level. Researchers should also recognise that consent is an ongoing process rather than a single event. Participants should remain free to ask questions, seek clarification, and reconsider their participation throughout the study.

8.2 Confidentiality and anonymity

Confidentiality and anonymity are closely related but distinct ethical principles. Confidentiality refers to protecting participants' identities by ensuring that the information they provide is not disclosed in a manner that could identify them. This involves secure data storage, restricted access to information, and careful reporting of findings [3].

In contrast, anonymity means that no identifying information is collected, and responses cannot be linked to individual participants. Anonymous questionnaires often encourage more honest and candid responses, particularly when sensitive topics are investigated [1]. Researchers must clearly communicate whether a questionnaire is anonymous or confidential, as these concepts are often misunderstood. Misrepresentation may undermine participants' trust and

raise ethical concerns. In practice, complete anonymity is not always possible, particularly in small educational settings, specialised professional groups or digital survey environments where indirect identifiers may exist. Researchers should therefore avoid making unrealistic promises of anonymity and provide transparent explanations regarding the level of confidentiality that can realistically be achieved.

In digital environments, maintaining confidentiality requires additional safeguards, including secure servers, password-protected storage systems, encryption, and restricted access protocols. Researchers should also recognise that combinations of demographic variables may sometimes allow participant identification even when names are not collected. Consequently, care must be taken when reporting findings from small sample sizes or highly specific participant groups.

8.3 Voluntary participation and right to withdraw

Participation in research must always be voluntary. Participants should not be coerced, pressured, or unduly influenced to participate in a study. They must also be informed of their right to withdraw from the research at any stage without penalty or negative consequences [2]. This principle is particularly important in educational settings, where power relationships may exist between teachers and students, principals and teachers, or researchers and participants.

Educational researchers should be especially attentive to situations in which participants may feel obliged to participate because of institutional expectations, professional relationships or perceived authority structures. Even subtle forms of pressure may compromise the voluntary nature of participation. Researchers must therefore ensure that participation is genuinely voluntary and that individuals feel free to decline or discontinue their involvement.

In questionnaire-based research, particularly in online surveys, participants should be able to exit the questionnaire at any point without being forced to complete all the items. Researchers should exercise caution when using mandatory response settings. While such features may reduce missing data, they may also restrict participants' ability to decline to answer questions they find uncomfortable, sensitive, or irrelevant. Mandatory response settings should therefore be used judiciously, with careful consideration of participants' autonomy.

8.4 Data protection and security

In the digital age, data protection has become an increasingly important ethical consideration in research. Researchers are responsible for ensuring that data collected through questionnaires are securely stored, managed, and used in accordance with ethical guidelines and relevant regulations [6]. This includes protecting electronic data through secure platforms, password protection, encryption, and access control. Researchers must also consider how long data will be retained and ensure it is disposed of securely once no longer required. In addition, researchers should be transparent about data management practices, including where data will be stored, who will have access to it, and how it will be used in future research. Educational researchers must also consider issues of data governance, ownership, and secondary use. Participants should be informed if their data may be archived, shared with other researchers, used in future studies, or incorporated into larger databases. Transparency regarding these possibilities enhances trust and supports ethical data management. In field-based research, practical challenges related to data collection and storage may arise, requiring careful planning to maintain ethical standards [48].

8.5 Minimising harm and ensuring respect

Researchers have a responsibility to minimise any potential harm to participants, whether physical, psychological, social, professional, or reputational. Questionnaire items should be designed to avoid causing unnecessary discomfort, distress, embarrassment, or offence. Sensitive questions should be handled carefully, and participants should have the option to skip items they do not wish to answer. Respect for participants also involves using clear and appropriate language, being culturally sensitive, and recognising the diversity of participants' backgrounds and experiences.

Ethical questionnaire design also requires respect for respondents' time, effort and cognitive burden. Excessively long, repetitive, or poorly designed questionnaires may create unnecessary fatigue and frustration among participants. Therefore, researchers have an ethical responsibility to ensure that every questionnaire item serves a meaningful research purpose. In multicultural and multilingual contexts, questionnaires should be adapted to ensure inclusivity and respect for diverse cultural perspectives. Researchers should also avoid deficit-oriented, discriminatory, or culturally insensitive wording that may marginalise particular groups or reinforce stereotypes. Careful attention to language and representation is essential for maintaining ethical and

methodological quality.

8.6 Ethical approval and institutional requirements

Most educational research requires formal ethical approval from an institutional review board or ethics committee before data collection begins. This process helps ensure that studies meet the established ethical standards and that potential risks are carefully considered.

For novice researchers, obtaining ethical approval is an important step that reinforces responsible research practices. It also provides an opportunity to critically reflect on the ethical implications of a study and ensure that appropriate safeguards are in place.

Ethical review processes encourage researchers to consider issues such as participant vulnerability, data sensitivity, cultural appropriateness, confidentiality, and informed consent at an early stage of research. However, ethical approval should be viewed as the beginning, rather than the completion, of ethical responsibility. Approval confirms that a study meets the minimum ethical standards; however, researchers remain responsible for addressing unforeseen ethical issues that may arise during data collection, analysis, and dissemination. Consequently, ethical reflection should continue throughout the life of a research project rather than end once formal approval is obtained.

8.7 Ethical considerations in digital and AI-assisted questionnaires

The increasing use of digital platforms and artificial intelligence (AI) tools in questionnaire design and administration introduces additional ethical considerations. Researchers must ensure that digital tools do not compromise participants' privacy, data security, or informed consent processes.

AI-assisted questionnaire design tools may generate items or suggest structures that appear methodologically sound but may not align with the research context, theoretical framework or ethical requirements. Researchers must critically evaluate such outputs to ensure that questions are appropriate, unbiased, and respectful of participants. Furthermore, issues such as digital access inequality, algorithmic bias, automated profiling and data ownership require careful consideration. Researchers should be particularly cautious when using AI-generated questionnaire items. While such tools may improve efficiency, they may also reproduce cultural assumptions, stereotypes, and hidden biases embedded within the training data. The ethical responsibility for questionnaire quality remains with the researcher rather than the technology used to generate the content.

Participants should also be informed if AI tools are used in data processing or analysis, particularly when automated procedures influence the interpretation or decision-making. Researchers must also consider the ethical implications of platform selection. Online survey platforms may collect metadata, such as IP addresses, device information, location data, and usage patterns. Researchers should understand the data practices of the platforms they use and ensure that participants are appropriately informed about any additional information that may be collected. These emerging considerations highlight the need for ongoing ethical reflection as research practices evolve alongside technological developments.

8.8 Ethical responsibility for methodological quality

An often-overlooked ethical obligation in questionnaire research is the responsibility of ensuring methodological quality. Poorly designed questionnaires may waste participants' time, generate misleading findings, and contribute little meaningful knowledge. Consequently, methodological rigor should be regarded as an ethical and scientific responsibility.

Researchers must ensure that questionnaires are appropriate for the research objectives, grounded in relevant theory, carefully developed, adequately validated, and interpreted responsibly. This obligation is particularly important in educational research, where findings may influence teaching practices, curriculum decisions, policy development and educational opportunities. Therefore, ethical questionnaire research requires a commitment to both participant welfare and the quality of evidence. Protecting participants while generating trustworthy, meaningful knowledge is the ultimate goal of ethical practice in educational research.

9 Applications in educational research

Questionnaires are widely used in educational research because of their flexibility, efficiency, and ability to capture diverse perspectives from educational stakeholders. Their use spans

multiple domains, providing valuable insights that inform teaching practices, curriculum development, program evaluation, and policy decisions. However, their application should always be guided by methodological alignment between the research objectives, the nature of the construct being investigated, and the type of evidence required. As discussed earlier, questionnaires are particularly well-suited for measuring attitudes, beliefs, perceptions, motivations, self-efficacy, satisfaction, and self-report experiences. Their effectiveness is reduced when researchers seek direct evidence of behaviour, performance or causal processes. Consequently, the examples presented in this section illustrate not only how questionnaires are used in educational research but also why they are appropriate for particular contexts.

9.1 Teacher perception and practice studies

Questionnaires are commonly used to examine teachers' beliefs, attitudes, perceptions, and self-report instructional practices. Researchers frequently use questionnaires to explore how teachers perceive curriculum changes, assessment reforms, professional development programs, educational technologies, leadership practices, and classroom challenges [1]. These studies are important because teachers' beliefs often influence their pedagogical decisions and classroom practices.

Questionnaires enable researchers to collect data from large groups of teachers across schools, districts, or regions, allowing them to identify patterns, trends, and variations in professional perspectives [4]. For example, a questionnaire investigating teachers' readiness for digital learning might include Likert-scale items such as "*I feel confident integrating digital tools into my teaching,*" alongside open-ended questions that invite teachers to describe barriers to technology integration. In such studies, questionnaires are particularly appropriate because the constructs being measured - confidence, perceptions, attitudes, readiness, and beliefs are internal states that cannot be directly observed. Therefore, self-report measures provide an efficient means of accessing information that would otherwise be difficult to obtain. Nevertheless, researchers should exercise caution when interpreting the self-report teaching practices. Teachers' descriptions of their instructional behaviours may not always align with their actual classroom practice. Consequently, studies examining enacted pedagogy often benefit from combining questionnaires with classroom observations, lesson artefacts, or interviews. These findings can inform teacher education programmes, professional development initiatives, and policy decisions aimed at improving instructional quality.

9.2 Student engagement and learning experiences

Questionnaires are widely used to investigate students' engagement, motivation, well-being, learning experiences, self-regulation, and perceptions of classroom environment. Through structured items, researchers can assess the behavioural, emotional, and cognitive aspects of engagement, providing insights into how students interact with educational settings [49]. For example, students may be asked to respond to statements such as "*I actively participate in classroom discussions*" or "*I find my lessons interesting and relevant*" using rating scales. These data can help educators identify factors that enhance or hinder engagement and inform strategies for improving learning outcomes. Open-ended items such as "*What helps you stay engaged during lessons?*" allow students to elaborate on their experiences and provide contextual information that complements quantitative findings.

Questionnaires are especially useful in this area because engagement, motivation, and perceptions of learning environments are largely subjective constructs. Students themselves are often the most direct source of information regarding these experiences. However, researchers should recognise that self-report engagement may not always correspond to observed engagement. Students who report high levels of participation may demonstrate different behaviours in classroom settings. Consequently, some studies supplement questionnaire findings with observations, attendance records, learning analytics and academic performance data. The ability to gather data from large numbers of students makes questionnaires particularly valuable for identifying trends across classes, schools, and educational levels.

9.3 Curriculum evaluation

Questionnaires play a significant role in curriculum evaluation by providing systematic feedback on curriculum design, implementation, relevance, and effectiveness. Teachers, students, school leaders, and other stakeholders can provide perspectives on curriculum content, instructional resources, assessment requirements, and learning outcomes [50]. In practice, questionnaires are frequently used to assess whether curriculum reforms have achieved their

intended objectives. For example, researchers may use questionnaires to evaluate a new literacy initiative, assess the implementation challenges associated with curriculum reform, or examine perceptions of curriculum relevance. A curriculum evaluation questionnaire might include statements such as “*The curriculum supports the development of critical thinking skills*” or “*The learning activities are relevant to students’ everyday experiences.*”

Questionnaires are particularly appropriate for curriculum evaluation because they allow researchers to simultaneously collect perspectives from multiple stakeholder groups. Such feedback can provide valuable evidence regarding how curricula are experienced by those directly involved in their implementation and learning. However, stakeholder perceptions represent only one dimension of curriculum effectiveness. Comprehensive curriculum evaluation often requires additional evidence, including student achievement data, classroom observations, document analyses, and implementation studies. Therefore, questionnaires contribute important but incomplete evidence within broader evaluation frameworks. The standardised nature of questionnaire data enables comparisons across schools, regions, and educational contexts, thereby supporting evidence-informed curriculum development.

9.4 Policy research and programme evaluation

In educational policy research, questionnaires are widely used to gather information regarding the implementation, acceptance, and perceived effectiveness of policies and programs. Policymakers and researchers often seek feedback from teachers, students, school leaders, parents, and community members on educational initiatives [2]. For example, questionnaires may be used to evaluate policies related to technology integration, inclusive education, assessment reform, teacher professional development, school leadership, and student well-being. A policy evaluation study might include items such as “*The new policy has improved access to learning resources in my school*” or “*The programme has positively influenced teaching and learning practices.*”

Questionnaires are particularly useful in policy research because they enable the collection of standardised information from large and geographically dispersed populations. This allows policymakers to identify broad patterns of implementation and stakeholder perceptions across the educational systems. Simultaneously, the questionnaire findings should not be interpreted as direct evidence of policy effectiveness. Stakeholders may perceive policies positively or negatively, without such perceptions necessarily reflecting actual outcomes. Consequently, rigorous program evaluations often combine questionnaire data with performance indicators, administrative records, observational data, and qualitative evidence. When integrated with other sources of information, questionnaire findings can contribute significantly to evidence-based policy development and program improvement.

9.5 School climate and organisational research

Questionnaires are frequently used to investigate school climate, organisational culture, leadership practices, collaboration, communication, and stakeholder relationships. Such studies often seek to understand how students, teachers, and school leaders perceive the social and organisational environment within educational institutions. Examples include questionnaires measuring perceptions of school safety, collegial relationships, leadership effectiveness, organisational trust, teacher morale, and student belonging.

These applications are particularly well-suited to questionnaire-based measurement because organisational climate and culture are experienced subjectively by participants. Understanding how individuals perceive their environment is often as important as understanding objective organisational conditions. Findings from such studies can support school improvement planning, leadership development, and organisational change initiatives.

9.6 Educational technology and online learning research

The rapid expansion of educational technology has created new opportunities for conducting questionnaire-based research. Questionnaires are widely used to examine technology acceptance, digital competence, online learning experiences, attitudes towards artificial intelligence, learner satisfaction, and perceptions of virtual learning environments. For example, researchers may investigate students’ perceptions of online learning platforms, teachers’ confidence in using educational technologies, or stakeholders’ attitudes towards emerging digital innovations. Because many technology-related constructs involve perceptions, beliefs, confidence, readiness, and satisfaction, questionnaires are often particularly appropriate instruments in this area. They enable researchers to rapidly and efficiently capture large-scale feedback within rapidly

changing technological environments. However, studies examining actual technology usage behaviours may benefit from supplementing questionnaire data with learning analytics, usage logs or observational data.

9.7 Mixed-methods applications

Questionnaires play an important role in mixed-methods research, where they are used alongside qualitative and other quantitative methods to provide complementary evidence. Within such designs, questionnaires often provide breadth by identifying general patterns, trends, and relationships, whereas interviews, focus groups, observations, or document analyses provide depth and contextual understanding. For example, a researcher investigating teacher well-being may first administer a questionnaire to identify broad trends and subsequently conduct interviews to explore the reasons underlying those findings. Similarly, a study examining student engagement may combine questionnaire data with classroom observations to compare students' reported experiences with their observed behaviours.

Mixed-methods applications are particularly valuable because they help address some of the limitations of self-report measurements discussed earlier in this paper. By integrating multiple sources of evidence, researchers can strengthen the validity, credibility, and interpretability of their findings. Consequently, many contemporary educational researchers regard questionnaires as components within broader methodological frameworks rather than as standalone instruments.

10 Discussion and implications

The purpose of this paper was to provide a comprehensive examination of questionnaires as data collection instruments in educational research. While questionnaires remain among the most frequently used methods for collecting educational data, their effectiveness depends not only on technical considerations of design and administration but also on broader methodological decisions concerning their appropriateness for specific research purposes. The discussion presented throughout this paper highlights that questionnaire research is most effective when researchers adopt a systematic approach that integrates instrument selection, construct definition, questionnaire development, validation, ethical considerations, and appropriate interpretation of the findings.

A central contribution of this paper is the recognition that questionnaire design should not be viewed as the starting point of questionnaire-based research. Rather, questionnaire development is preceded by the more fundamental methodological decision of determining whether questionnaire-based measurement is appropriate for the research question and the construct under investigation. This distinction is particularly important for novice researchers, who may be inclined to view questionnaires as default instruments owing to their convenience, accessibility, and familiarity. However, convenience alone does not justify the methodological choice. Effective research requires alignment between the nature of the research question, the characteristics of the construct being investigated, and the type of evidence required.

This discussion reinforces the importance of conceptual clarity in questionnaire development. Educational research frequently examines latent constructs such as attitudes, perceptions, beliefs, motivation, self-efficacy, and satisfaction, which cannot be directly observed. Questionnaires provide a practical means of measuring these constructs by translating theoretical concepts into quantifiable indicators. However, this process requires careful conceptualisation and operationalisation to ensure that the questionnaire items accurately represent the intended constructs [18, 30].

The analysis also highlights the importance of distinguishing between constructs that are appropriately measured through self-report and those that require alternative evidence. Questionnaires are particularly well-suited for investigating participants' perceptions, beliefs, experiences, and self-report behaviours because respondents themselves are often the most direct source of information regarding these constructs. In contrast, educational phenomena such as actual classroom practices, observed behaviours, instructional interactions, achievement outcomes, and causal relationships may require observational, experimental, assessment-based, or mixed-method approaches. Failure to recognise these distinctions can result in method–construct mismatches that weaken the validity and interpretability of research findings.

This paper further emphasises the role of theoretical foundations in questionnaire design. Self-report theory and cognitive models of survey responses provide valuable insights into how respondents interpret questions, retrieve information, formulate judgements, and select responses [16, 17]. Understanding these processes enables researchers to design questionnaires

that minimise ambiguity, reduce measurement errors, and improve response quality.

Importantly, the cognitive perspective presented in this paper demonstrates that questionnaire responses are not direct reflections of reality but are mediated through respondents' interpretation, memory, judgment, and response-selection processes. Consequently, the questionnaire findings should be interpreted as representations of respondents' perceptions and self-reports rather than objective accounts of educational phenomena. This distinction is critical for ensuring the appropriate interpretation of questionnaire data and avoiding the overstatement of research conclusions.

A review of questionnaire development and validation procedures demonstrates that effective questionnaire design requires a systematic and iterative process. Construct definition, item development, expert review, pilot testing, reliability assessment, and validation procedures contribute to the production of high-quality instruments [1, 18, 29]. The discussion highlights that questionnaire quality is not determined by any single procedure but rather by the cumulative strength of the evidence supporting the interpretation and use of questionnaire scores.

This paper also reinforces contemporary perspectives that conceptualise validity as an ongoing process of evidence gathering rather than a single statistical outcome. Validity evidence emerges from theoretical justification, content relevance, cognitive testing, construct analysis, reliability assessment and empirical evaluation. Consequently, questionnaire development should be viewed as an iterative refinement process rather than a one-time technical activity.

However, the discussion acknowledges that questionnaires have inherent limitations. Response bias, recall errors, social desirability effects, non-response bias, and limitations in depth represent persistent challenges that researchers must address [9, 16]. Although many of these issues can be reduced through careful design and implementation, some limitations are intrinsic to self-report measurements and cannot be eliminated entirely.

Recognising these limitations does not argue against the use of questionnaires. Rather, it reflects a nuanced understanding of their methodological role. Questionnaires are powerful tools when used appropriately, but they are not universal solutions to all research problems. Awareness of these limitations enables researchers to make more informed decisions regarding method selection, instrument design, and interpretation of findings.

The discussion also highlights the growing importance of mixed-methods approaches in educational research. Increasingly, researchers are combining questionnaires with interviews, observations, document analysis, learning analytics, and other forms of evidence to provide a more comprehensive understanding of educational phenomena. Such methodological integration allows researchers to capitalise on the strengths of questionnaires while compensating for some of their limitations.

From this perspective, questionnaires should be viewed as components of broader methodological systems rather than as isolated research tools. Their greatest value often emerges when they are integrated with complementary methods that provide additional contextual, behavioural, or explanatory evidence. Such integration strengthens the credibility and robustness of educational research by allowing multiple perspectives on the same phenomena.

The increasing use of digital technologies and artificial intelligence has further transformed the research on questionnaires. Online survey platforms provide opportunities for rapid data collection, automated data management, adaptive questioning, and large-scale administration [6, 7]. However, these developments introduce new methodological and ethical considerations relating to data security, privacy, digital access, algorithmic bias, and the responsible use of AI-assisted questionnaire development tools.

Therefore, the discussion suggests that future developments in questionnaire methodology will require researchers to balance technological innovation with methodological rigor. While emerging technologies offer new possibilities for data collection and analysis, they do not eliminate the need for sound theoretical foundations, careful construct development, validation procedures, or ethical responsibility. Technological sophistication cannot compensate for weaknesses in the research design or measurement quality.

10.1 Implications for educational researchers

The findings and arguments presented in this paper have several implications for educational researchers, particularly those new to questionnaire-based research.

First, researchers should evaluate whether a questionnaire is the most appropriate instrument

for their research objectives before proceeding to questionnaire development. This requires careful consideration of the nature of the construct being investigated, the type of evidence required, and the strengths and limitations of the alternative methods. Instrument selection should be treated as a substantive methodological decision rather than a procedural choice.

Second, researchers should invest substantial effort in defining and operationalising constructs before writing the questionnaire items. Clear construct definitions provide a foundation for meaningful measurements and strengthen subsequent validity evidence.

Third, questionnaire development should be approached as an iterative process that involves expert review, pilot testing, cognitive evaluation, and empirical validation. Relying solely on face validity or adopting existing instruments without critical evaluation may compromise the measurement quality.

Fourth, researchers should remain aware of the limitations of self-report data and avoid interpreting questionnaire responses as direct evidence of behaviour, performance, or causal relationships unless supported by additional evidence. Distinguishing between perceptions and observable realities is essential for an accurate interpretation.

Fifth, researchers should consider integrating questionnaires with complementary methods whenever possible. Mixed-methods approaches can provide richer and more comprehensive understanding of educational phenomena and strengthen the validity of research conclusions.

Sixth, educational researchers should view methodological quality as both a scientific and an ethical responsibility. Careful instrument selection, rigorous validation, transparent reporting, and responsible interpretation of findings are essential for producing trustworthy evidence, respecting the contributions of research participants, and ensuring that educational decisions are informed by credible data.

Finally, researchers must remain responsive to emerging methodological developments, including advances in digital technologies, online data collection, artificial intelligence and contemporary psychometric approaches. Continuous professional learning is essential to ensure that questionnaire research remains rigorous, relevant, and ethically responsible.

10.2 Implications for teacher education and research training

The arguments presented in this paper also have implications for research methods instruction within teacher education and postgraduate programmes. Questionnaire development is often taught primarily as a technical skill, involving item writing, scale construction, and statistical analysis. However, the findings of this paper suggest that greater emphasis should be placed on instrument selection, construct-method alignment, self-report theory, and the limitations of questionnaire-based measurements.

Research training programs should therefore encourage students to critically evaluate whether questionnaires are appropriate for particular research problems before focusing on instrument construction. Such an approach would promote stronger methodological reasoning and reduce the risk of inappropriate reliance on questionnaire-based methods. By strengthening methodological decision-making at the earliest stages of the research process, teacher education institutions and postgraduate programmes can better prepare emerging researchers to select, develop, and use questionnaires effectively and responsibly.

11 Conclusion

Questionnaires remain among the most widely used and versatile data-collection instruments in educational research. Their capacity to efficiently collect standardised information from large numbers of participants has made them indispensable tools for investigating educational phenomena across diverse contexts. When carefully designed and appropriately implemented, questionnaires can provide valuable insights into attitudes, beliefs, perceptions, motivations, self-efficacy, experiences, and other constructs central to educational enquiry.

However, the central argument advanced throughout this paper is that effective questionnaire research begins not with questionnaire design but with methodological decision-making. Before constructing a questionnaire, researchers must first determine whether questionnaire-based measurement is appropriate for the research question, the construct under investigation, and the type of evidence required. Therefore, instrument selection is a foundational methodological decision that shapes the validity, usefulness, and interpretability of research findings.

This paper has highlighted the conceptual foundations of questionnaire-based research,

emphasising the importance of construct clarity, theoretical grounding, systematic development procedures, validation processes, and ethical responsibility. Effective questionnaires do not emerge from item writing alone; rather, they result from an iterative process that integrates conceptual reasoning, methodological rigor, empirical testing, and continuous refinement.

The discussion also demonstrated that questionnaires are particularly well-suited for measuring latent constructs such as attitudes, perceptions, beliefs, motivations, and self-reported experiences, as these constructs are often inaccessible to direct observation. However, questionnaires have limitations that must be acknowledged. Self-report data are influenced by respondents' interpretations, memories, judgements, and willingness to disclose information. Consequently, questionnaires may be less appropriate for investigating actual behaviour, complex social interactions, achievement outcomes, or causal relationships without complementary methods.

The review of the questionnaire development and validation procedures underscored the importance of ensuring both reliability and validity. High-quality questionnaires require clear construct definitions, carefully developed items, expert reviews, pilot testing, and appropriate statistical evaluations. These processes contribute to the production of instruments capable of generating trustworthy and meaningful evidence.

A further contribution of this paper is the emphasis on construct–method alignment. Educational researchers should recognise that no single data collection instrument is universally appropriate for all research purposes. The choice of instrument should always be informed by the relationship between the research question, the phenomenon being investigated, and the type of evidence sought. Questionnaires represent one component of a broader methodological toolkit that also includes interviews, observations, tests, document analysis, and experimental approaches.

This paper also demonstrated that questionnaires continue to evolve in response to technological developments. Digital survey platforms, online data collection systems, and emerging artificial intelligence applications offer new opportunities for efficiency, accessibility, and innovation. Nevertheless, these advances do not diminish the need for sound methodological principles, ethical practices, and rigorous validation procedures.

Ultimately, the value of questionnaires lies not in their convenience but in their appropriate and informed use. Questionnaires are most effective when they are selected for suitable purposes, grounded in clear theoretical frameworks, developed systematically, validated rigorously and interpreted responsibly. Their strengths are maximised when researchers understand both what questionnaires can measure effectively and what they cannot.

For novice and experienced researchers alike, the challenge is therefore not simply learning how to design questionnaires but developing the methodological judgement required to determine when questionnaires should be used, how they should be developed, and how their findings should be interpreted. By integrating considerations of instrument selection, construct alignment, self-report theory, questionnaire development, validation, ethics, and application, this paper provides a comprehensive framework for the responsible use of questionnaires in educational research.

In conclusion, questionnaires are powerful and indispensable research instruments. However, their contribution to educational knowledge depends on thoughtful methodological choices, rigorous development practices, and critical awareness of their strengths and limitations. When employed appropriately within coherent research designs, questionnaires can make substantial contributions to generating credible, meaningful, and actionable educational evidence.

Conflicts of Interest

The author declares no conflicts of interest.

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