

Methodological Insights of Action Research in Doctoral Studies within Education Disciplines: A Systematic Review

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ABSTRACT

Action research (AR) has emerged as a preferred methodology among practice-based doctoral candidates, particularly in education. In conjunction, having a thorough understanding of AR methodology in doctoral studies is a must. Thus, this article investigated the methodology of AR used in doctoral studies within the education disciplines from January 2013 to October 2024. The study included eight ProQuest doctoral dissertations and twelve articles from the Scopus database, selected based on relevance to AR methodology, focus on education disciplines, and methodological rigour. This study focuses on theoretical frameworks, AR models and types, data collection methods, sampling techniques, and sample sizes employed by action researchers. The findings revealed that Grounded Theory was the most commonly utilised theoretical framework, supporting iterative theory development to address complex educational challenges. The flexibility of AR models allows researchers to adapt methodologies to specific contexts, enhancing study efficacy and responsiveness. Traditional AR methods remain widely used due to their seamless integration into professional practices. The duration of AR projects varied, but at least one AR cycle was needed to tailor timelines to issue complexity. Interviews emerged as the primary data collection method, supplemented by questionnaires and focus groups. Most studies employed convenience sampling, with quantitative samples ranging from 25 to 275 participants and qualitative cohorts comprising eight to eleven individuals. This approach aligns with AR's focus on addressing practical problems and fostering self-improvement, ensuring researchers balance data collection with meaningful insights. Although AR findings are not widely generalisable, their adaptability enables researchers to develop context-specific interventions tailored to the unique needs of educational settings. The iterative nature of AR fosters evidence-based improvements, reflective practice, participatory engagement, and real-time problem-solving. Future research should integrate structured frameworks, adopt mixed-methods approaches, and engage stakeholders to enhance the credibility and applicability of findings, contributing to a deeper understanding and more effective implementation of AR in educational research.

Keywords: Action research, methodology, doctoral, education

INTRODUCTION

Action research (AR) effectively integrates theoretical and practical elements to promote academic-practitioner collaboration and practical improvement. Rauch, Zehetmeier, and Posch (2019) stated that AR is becoming more popular as a methodology that empowers educators to manage their work and contexts. AR's rigorous data collection, analysis, and verification make it more systematic (Zuber-Skerritt, 2018). A meta-analysis of 2000–2018 articles found that AR can be used with qualitative and quantitative methods (Erro-Garcés & Alfaro-Tanco, 2020). Moreover, Alfaro-Tanco et al. (2023) emphasised that teaching PhD students AR methodology is a priority to increase its use in doctorate theses. Through AR, doctoral candidates can enrich their academic disciplines and demonstrate practical applications in solving real-world problems.

A simple search for “Action Research” doctorate dissertations on ProQuest Dissertations and Theses Global yielded 1,661,657 studies from January 1782 to October 2024. Next, the search began in 2013, yielding 607,411 studies. The findings above comprehensively showed the growing use of this AR approach within academic contexts. Although AR studies are growing, AR-based PhD theses are less common than research

(Alfaro-Tanco et al., 2023). According to Kerekes et al. (2024), many AR studies investigated educators' teaching approaches, assessment processes, and student learning outcomes. Thus, much research still needs to be done to synthesise the current information on AR as a method for doctoral candidates' context. Therefore, conducting a systematic literature review (SLR) that explicitly targets doctoral-level research employing AR as a methodological approach is imperative. This study seeks to identify the characteristics of AR as a methodological approach within the context of PhD and EdD students to provide essential insights regarding the popular methodologies of AR, its theory, model, type, data collection method, sampling technique, sample size and identified gaps. Thus, this SLR promotes informed discourse and advances knowledge about doctoral candidates in education using AR as a research approach. Table 1 justifies the three research questions formulated to achieve precise and comprehensible findings.

Table 1: SLR Research Questions and Rational

Research Questions	Rational
1. What theories and models are most frequently employed in doctoral action research within education disciplines?	Investigate previous action research studies' theories, models, and basic steps of action research. Theoretical knowledge aids in exploring the conceptual frameworks that direct action research and aids in the creation of a solid methodological strategy.
2. Which types of action research are most commonly applied in doctoral studies within education disciplines?	Investigate the type of action research methodologies used in previous studies, including the number of cycles and timeframe, to identify prevailing trends and preferences by action researchers.
3. What data collection methods, sampling techniques, and sample sizes are typically used in doctoral action research studies within education disciplines?	Identify and analyse the common data collection methods, sampling techniques, and sample sizes utilised most frequently in past studies for data collection.

Action Research

Action research (AR) is a methodology that offers both the dynamism and iterative nature for framing issues, generating practical insights into problems, and facilitating movement towards positive change through cycles. According to Zuber-Skerritt (2018), AR employs a continuous cycle of planning, action, observation and reflection in order for researchers to gain more insight into work practices and the development process. The participatory approach entails a collaborative engagement between researchers and practitioners, commonly employed in various domains, including education, social work, healthcare, business, management and others (Erro-Garcés & Alfaro-Tanco, 2020; Moreno-Poyato et al., 2023). Initially, the four fundamental steps of the AR approach are known as 'Plan-Act-Observe-Reflect' in the spiral model Lewin (1946) created to improve social science problems. Researchers are said to follow these steps iteratively during the research process (Carr & Kemmis, 1986). These steps, however, are rearranged depending on the context and objectives of the researchers. For instance, Caine et al. (2022) employed the 'Act-Observe-Reflect-Plan' cycle to analyse and integrate their practice-based scenarios. Farhan (2017) used the 'Observe-Reflect-Plan-Act' cycle to make more sense of the management issues. Additionally, McMahon (2023) used the 'Reflect-Plan-Act-Observe' cycle in a slightly different context to address gender equity. This is corroborated by Johnson and Christensen (2020); the AR cycle is not static, and the action researcher could start from any point of the cycle, finish all the steps and seamlessly begin the cycle for improvement.

In AR, the data collection and information-gathering instruments mainly depend on the research objectives and questions. Action researchers may also use different instruments to triangulate the data and comprehensively understand the research topic (Fraenkel et al., 2023). The results of Erro-Garcés and Alfaro-Tanco (2020) indicated that interviews, questionnaires, and focus groups were the most commonly used tools in the AR methodology. Moreover, observation and performance tests are other common tools in classroom-based AR (Padalia & Yatim, 2020). The AR method not only improves the credibility and dependability of the research outcome but also, in turn, develops more profound knowledge of the research topic and aids in improving

evidence-based practice. Thus, in AR, validity is gained by following the instructions of Whitehead and McNiff (2006) on data interpretation, evidence generation, and setting the quality of AR accounts judging standards. On the other hand, the reliability check in AR implies the evaluation of possible drawbacks and challenges, the involvement of participants as co-researchers who supply different and ample data, the creation of an open and trustworthy partnership, the resolution of the initial contradictions due to the sincere discussions, and the use of the cyclical process of AR to get to a mutual objective of beneficial change and confirm understanding through a cycle (Coghlan & Brydon-Miller, 2014).

Fundamental research typically involves a large population and a specific sample selected from a wide area. In contrast, AR focuses on a specific group, school or local organisation where the problem is being studied (Duesbery & Twyman, 2020). The units for AR can be limited and local, such as a particular classroom or group of students (Kumar, 2014). According to Mhandara (2017), trusting and communicating with the change targets can be built up with only twelve subjects. Furthermore, the emphasis in AR is not on generalisation but primarily on understanding and addressing issues within the action researcher's specific settings, aiming to bring about positive change and improvement (Fraenkel et al., 2023). AR differs because it is more specific and personalised; it simply evaluates the action researcher's group to determine what works for them. Thus, AR assumes that the group remains similar, making findings applicable in subsequent years (Duesbery & Twyman, 2020). Through localised focus and smaller sample sizes, AR establishes trust and communication, which identifies effective group strategies and implies stability over time to make the findings applicable in the future. According to Raelin (1999) and other special issue contributors, AR includes:

1. The scientific method underpins the philosophical foundation of AR.
2. AR emphasises the significance of experiential knowledge in determining meaning.
3. AR aims to promote self-awareness and change through action and reflection.
4. AR works in a cycle of issue formulation, action, reflection, and conclusion. Besides, iterative cycles promote learning, adaptability, and lasting change.
5. AR epistemologically emphasises problem-solving through behavioural change analysis.
6. The AR change timeframe is usually mid or long-term to enable continuous development.
7. AR has the potential to impact instrumental, interpersonal, and systemic aspects.
8. Participants' perceptions heavily impact the AR ideology during the research process.

METHOD

A systematic literature review (SLR) employs a rigorous and transparent research synthesis method to identify and minimise bias in the findings. Liberati et al. (2009) described SLR as characterised by clear objectives, a reproducible methodology, a comprehensive search to identify relevant studies, an assessment of the validity of included studies, and a systematic presentation and synthesis of the characteristics and findings of the included studies. These characteristics ensure systematic review rigour, transparency, and reliability. The following procedure summary uses suggested reporting items for systematic reviews (Liberati et al., 2009) to conduct the SLR for AR:

- i. **Formulation of the research question:** Specify the research question or objective of the SLR in Table 1, which corresponds to the particular focus on AR methodology.
- ii. **Develop the Review Protocol:** This protocol determines the literature's topic, databases, search terms, and scopes (search field, publication year, and literature source type). A transparent review process reduces bias and specifies the systematic review approach, as shown in Figure 1.
- iii. **Establish inclusion and exclusion criteria:** The journal articles and doctoral dissertations selected for inclusion in the literature review are based on predetermined criteria, as in Figure 1, Stage 2. However, exclusion criteria eliminate irrelevant studies using Microsoft Excel for database evaluation in comma-separated values (Scopus) and Microsoft Excel format (ProQuest).

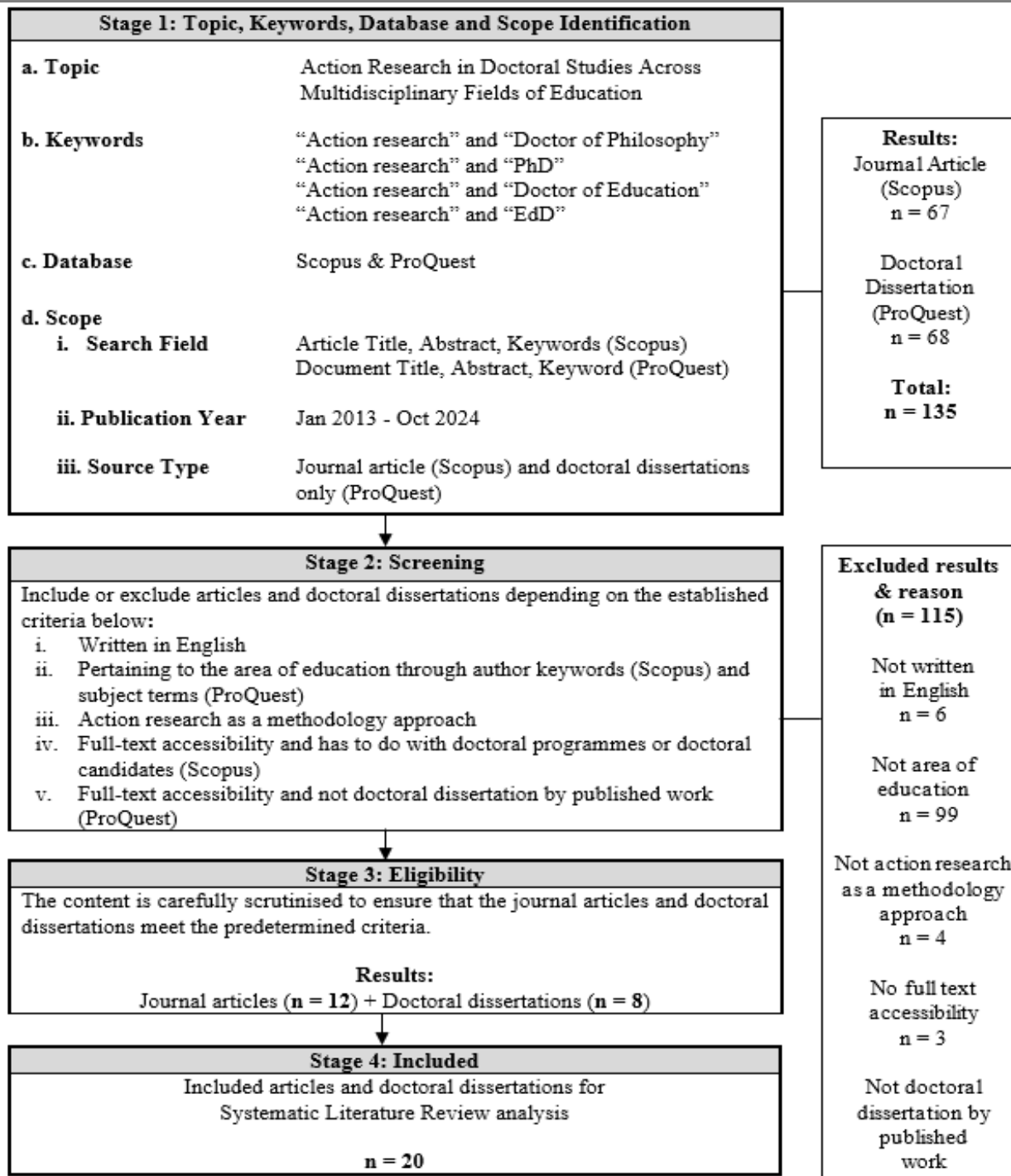


Fig. 1 Review Protocol

- iv. **Study selection:** Conduct an initial screening based on titles and abstracts according to inclusion and exclusion criteria. Then, perform a more detailed examination of full-text articles to determine their eligibility for inclusion in the review.
- v. **Quality assessment:** Each study's AR theory, model, type, data collection methods, sampling techniques and sample sizes were carefully examined based on their appropriateness and alignment with the research objectives.
- vi. **Data extraction:** All the studies' information was extracted and organised in Figure 2 based on the research questions.
- vii. **Data synthesis and analysis:** Comparing methodologies across studies and synthesising the findings to identify trends and gaps in AR methodology.
- viii. **Reporting:** The results and discussion employed VOSviewer and figures to convey findings and propose future studies.

Source Type (DD - Doctoral dissertation; JA - Journal article)	Authors	Year	Theory Used	Model Action Research Used	Consist of Basic steps (Example: Reflect-Plan-Act-Observe)	Action Research Type (Number of Cycles & Duration)	Data Collection Methods	Sampling Techniques (Number of Samples)
DD (PhD)	Ai, Wenbo	2023	Grounded Theory	Not stated	See-Plan-Act-Refine-Communicate	Participatory action research and ethnographic research (2 cycles & Not stated)	Interviews, focus groups & participatory observation	Not stated (2 case studies -7 interviewees -12 participants)
DD (PhD)	Jannesari, S	2022	Grounded Theory	Not stated	Plan-Research-Act-Evaluation	Participatory action research (1 cycle & 6 months)	Ethnographic observation & qualitative interviews	Purposive sampling (38 participants)
DD (PhD)	Page, T.	2021	Grounded Theory	Model Coghlan and Brannick (2014)	Plan-Implementation-Evaluation-Reflect	Collaborative action research (3 cycles & 3 years)	Questionnaire, reflective logs, interviews, focus group, & world café approach	Convenience sampling (237 respondents)
DD (EdD)	Balboa, Y.	2020	Action and Living Theory	Model Elliot (1991)	Plan; Act; Observe; Reflect	Participatory action research (1 cycle & Not stated)	Questionnaire, open survey, & semi-structured interviews	Purposive sampling (41 respondents and 1 interviewee)
DD (EdD)	Bailey, L. A.	2018	Grounded Theory	Not stated	Planning-Acting-Developing-Reflecting	Traditional action research (2 cycles & 3 semesters)	Pre- and post-tests	Convenience sampling (25 participants)
DD (EdD)	Ismael, D. A. I.	2016	Critical Theory	Model Bachman (2001) & Model Riel (2007)	Planning-Action-Observation-Reflection	Traditional action research (3 cycles & 2 years)	Survey, interview, & focus group interviews	Probability sampling (90 participants and 12 interviewees)
DD (EdD)	Cason, J.	2016	Kolb's Experiential Learning Theory & Social Cognitive Career Theory	Meta-model	Identify problem areas-Identify alternatives-Take action-Evaluate-Learn from findings	Traditional action research (4 cycles & 8 weeks)	Online survey, electronic assignment, open-ended survey questions & unstructured discussions with themed topic	Convenience sampling (275 respondents and 8 participants)
DD (EdD)	Argento-Smith, C.	2013	Change Theory	Not stated	Planning-Action-Evaluating-Identifying the outcome	Traditional action research (1 cycle & Not stated)	Semi-structured interview questions, focus group, researcher's journal documents	Convenience sampling (11 participants)
JA	Mammino, L.	2022	Not stated	Not stated	Research-Implementation	Traditional action research (Not stated)	Observation & written works	Not stated
JA	Govender, N.	2022	Not stated	Not stated	Not stated	Participatory action research (1 cycle & 12 weeks)	Questionnaire, interviews, field-notes & observations	Purposive sampling (100 respondents and 25 interviewees)
JA	Tammeleht et al.	2021	Not stated	Not stated	Not stated	Traditional action research (Not stated & 5 training sessions)	Group-work recordings & group presentation	Not stated (46 participants)
JA	Jenkins et al.	2020	Not stated	Not stated	Notice-Interpret-Act-Reflect	Participatory action research (Not stated & 3 semesters)	Focus group & interpretive description	Not stated (11 participants)
JA	Bezeau et al.	2020	Not stated	Models McNiff and Whitehead (2011) & Model Stringer (2007)	Clarification-Negotiation - Discussion-Action-Reflection-Evaluation	Collaborative action research (2 cycles & 1 year)	Interview, observation & logbooks	Not stated (2 participants)
JA	Siekman & Webster	2019	Cultural-Historical Activity Theory	Not stated	Not stated	Participatory action research and ethnographic research (1 cycle & 4 weeks)	Field notes, observations, recorded discussions, & interviews	Not stated (2 subjects)
JA	Gittins, P.	2019	Not stated	Not stated	Design-Delivery-Evaluation	Participatory action research (Not stated & 9 months)	Semi-structured interviews, focus groups, learning journals, & classroom observation	Not stated (17 research collaborators)
JA	Asirifi, M. A.	2019	Not stated	Not stated	Looking (observation)-Thinking (reflection)-Action (planning & implementation)	Participatory action research (4 cycles & Not stated)	Survey, interviews, focus group interviews & interpretive description	Not stated (6 interviewees and 6 to 8 focus group members)
JA	Zuber-Skerritt, O.	2018	Grounded theory	Model Zuber-Skerritt (2012)	Planning-Acting-Observing-Reflecting	Participatory action learning and action research (Not stated & 2 years)	Case examples	Not stated (22 participants)
JA	Cicek et al.	2017	Situated Cognition Theory	Not stated	Planning-Implementing-Observing-Critically reflecting	Ethnographic action research (Not stated & 7 weeks)	Interviews	Not stated (7 participants)
JA	Mello, L. V.	2016	Not stated	Not stated	Planning-Execution-Evaluation	Traditional action research (2 cycles & 4 years)	Questionnaire, focus groups, formative feedback, online test	Not stated (16 to 45 participants per year)
JA	Satchwell et al.	2015	Not stated	Not stated	Problem-Intervention-Reflection	Traditional action research (Not stated & 1 year)	Group analysis of written and spoken reflections	Not stated (6 participants)

Fig. 2 Key Information from Selected Studies on Action Research as Methodology Approach

FINDINGS

Based on the inclusion criteria, only 20 out of 135 journal articles and doctoral dissertations that dealt with action research (AR) as a methodology utilised by or done for doctoral candidates were included in the synthesis. Below are the findings for each research question derived from these all-inclusive studies.

Research Question 1: What theories and models are most frequently employed in doctoral action research within education disciplines?

The findings highlighted various theories and models used in past AR studies, demonstrating diverse frameworks. Grounded Theory emerged as the most utilised framework in five studies to analyse complex social processes and address educational challenges. As shown in Figure 3, an analysis of the doctoral dissertations revealed that all explicitly stated the theories and models utilised in their studies. In contrast, most analysed articles did not specify the theories or models employed, with only a few exceptions. In Zuber-Skerritt's (2018) journal article, the Grounded Theory with the Zuber-Skerritt model provides a precise methodological alignment in the journal article. Moreover, the review of the literature shows that the Elliot (1991) model applies to the design of instruction and training, while the Bachman (2001) model direct AR spiral expands upon the recurring phase, and the Riel (2019) model focuses on progressive solutions to problems. The findings also showed that Cason (2016) applied meta-models in his Doctoral of Education dissertation. The McNiff and Whitehead (2011) model promotes enhancing learning and engaging in social action. Then, the Stringer (2007) model provides an approach to undertaking participatory social change inquiries. The Zuber-Skerritt (2012) model facilitates organisational growth and lifelong learning. This is followed by the Coghlan and Brannick (2014) model, which applies the theory to internal inquiry in one's organisation. Moreover, the findings showed that many AR studies followed the basic implementation steps of planning, acting, observing, and reflecting. Some studies used notice-interpret-act-reflect or plan-research-act-evaluate, while others used clarification-negotiation- discussion-action-reflection-evaluation. Besides, iterative basic steps like design-delivery-evaluation and identify problem areas-identify alternatives-take action-evaluate-learn from findings emphasising continuous improvement. These findings clearly showed that AR has many approaches for different contexts. While dissertation studies demonstrated precise alignment between theories and models, other journal articles lacked specificity, underscoring a need for greater consistency in articulating methodological choices within education disciplines.

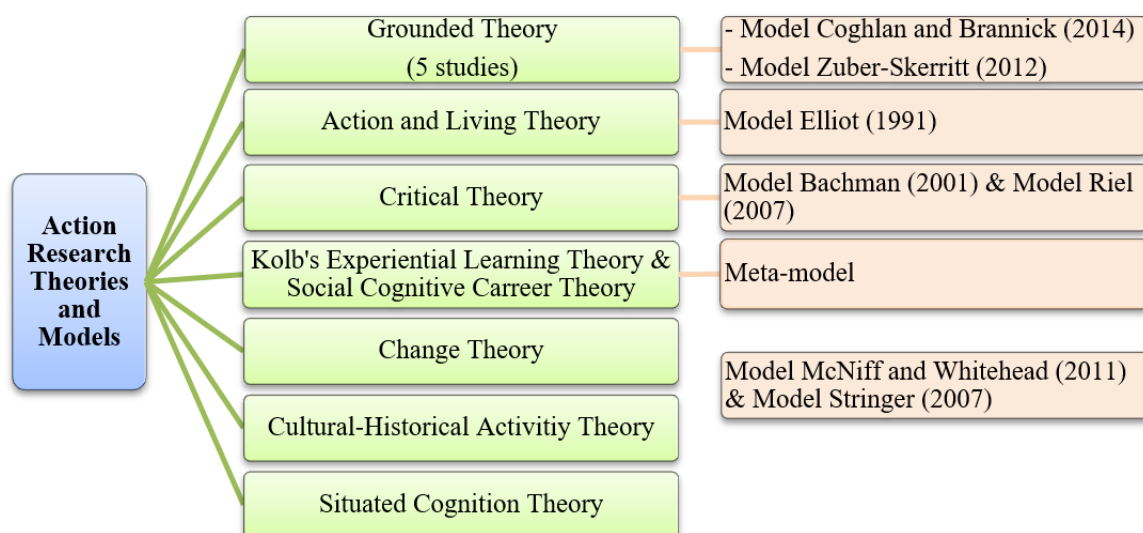


Fig. 3 Theories and Models Employed in Action Research Studies Within Education Disciplines

Research Question 2: Which types of action research are most commonly applied in doctoral studies within education disciplines?

The findings indicated a diverse application of AR type in doctoral studies within education disciplines. Traditional AR (TAR) emerged as the most commonly employed type, with eight studies adopting this

approach. Based on the findings, TAR implementation involved two to four cycles and durations ranging from eight weeks to four years. For instance, the TAR's adaptability to short-term and longitudinal research in education disciplines was emphasised by the fact that one study was conducted over three semesters and involved two cycles, while another involved three cycles over two years. Next, Participatory AR (PAR) was the six studies' second most frequently applied methodology. PAR studies demonstrated varying durations, from twelve weeks to nine months or three semesters, and involved between one and four cycles. A notable subset combined PAR with ethnographic research, as evidenced in two studies with one to two cycles and durations spanning from four weeks to an unspecified timeframe. Furthermore, the results indicated that two studies of Collaborative AR (CAR) implemented three cycles over three years, while another implemented two cycles within a single year, underscoring the extent of collaboration in these environments within education disciplines. Participatory Action Learning and AR (PALAR) and Ethnographic AR (EAR) are additional AR types used to demonstrate applications tailored to specific research contexts. For instance, PALAR was conducted over two years, while EAR was conducted over seven weeks. The results generally emphasise the primacy of TAR and PAR in doctoral studies, with CAR and integrated methodologies such as PAR and EAR offering supplementary opportunities for nuanced research. These variations emphasise the importance of aligning AR methodologies with the research scope, duration, and context to optimise outcomes in education disciplines. Figure 4 summarises the AR types and the range of their implementation durations.

Note. *DD* refers to the doctoral dissertation, and *JA* refers to the journal article.

MinC refers to the minimum cycle, and *MaxC* refers to the maximum cycle.

MinD refers to minimum duration, and *MaxD* refers to maximum duration.

Traditional action research (4DD & 4JA)

MinC = 1 cycle; MaxC = 4 cycles
MinD = 8 weeks / 5 training sessions;
MaxD = 4 years

Participatory action research and ethnographic research (1DD & 1JA)

MinC = 1 cycle; MaxC = 2 cycles
MinD / Max D = 4 weeks

Participatory action research (2DD & 4JA)

MinC = 1 cycle; MaxC = 4 cycles
MinD = 12 weeks;
MaxD = 9 months / 3 semesters

Participatory action learning and action research (1JA)

MinC / MaxC = Not stated
MinD / Max D = 2 years

Collaborative action research (1DD & 1JA)

MinC = 2 cycles; MaxC = 3 cycles
MinD = 1 year; MaxD = 3 years

Ethnographic action research (1JA)

MinC / MaxC = Not stated
MinD / Max D = 7 weeks



Fig. 4 Summary of the Types of AR and Implementation Duration Range

Research Question 3: What data collection methods, sampling techniques, and sample sizes are typically used in doctoral action research studies within education disciplines?

The findings showed that educational doctoral AR studies use various data collection methods, sampling techniques, and sample sizes, demonstrating the methodology's versatility. A network visualisation illustrated in Figure 5 using VOSviewer showed that the size of each circle and its corresponding label indicate the frequency with which action researchers employ various data collection methods. Larger circles and labels represent the most utilised data collection method, whereas smaller ones indicate less frequent usage. The network lines connecting the circles indicate that the same study frequently used two data collection methods. Besides, the circles' locations indicate the relationships between the data collection methods. Circles closer together indicate greater data collection method relatedness. More distant circles indicate a weaker relationship between data collection methods. Thus, interviews were the most common data collection methods, followed by questionnaires, focus groups, and observations, a mix of mixed-method data collection methods; these core data collection methods include reflective logs, pre-and post-tests, field notes, and world café approaches. Moreover, Figure 6 illustrates the sampling techniques and corresponding sample sizes used in doctoral dissertations (*DD*) and journal articles (*JA*) within education-focused AR. Convenience sampling was used

mainly in four *DDs* with quantitative sample sizes of 25 to 275 and qualitative cohorts for eight to eleven participants. Next, purposeful sampling was used in two *DDs* and one *JA* with quantitative sample sizes of 41 to 100 participants and qualitative data collection of one to 38 participants to meet specific research needs. Besides, probability sampling, rarely used in Doctoral of Education dissertations, was representative but limited in applicability, with 90 quantitative and 12 qualitative participants. In studies where the sampling technique was not explicitly stated (One *DD* and 11 *JAs*), quantitative surveys had 16 to 45 participants, qualitative interviews had two to 22 participants, and six to eight focus groups had 11 to 46 participants. A two-case study design was adopted for only one doctoral dissertation with an unstated sampling technique involving seven interviewees and 12 participants. Overall, the quantitative sample sizes ranged from a minimum of 25 participants to a maximum of 275 participants. In comparison, the qualitative sample sizes ranged from a minimum of one participant to a maximum of 46 participants.

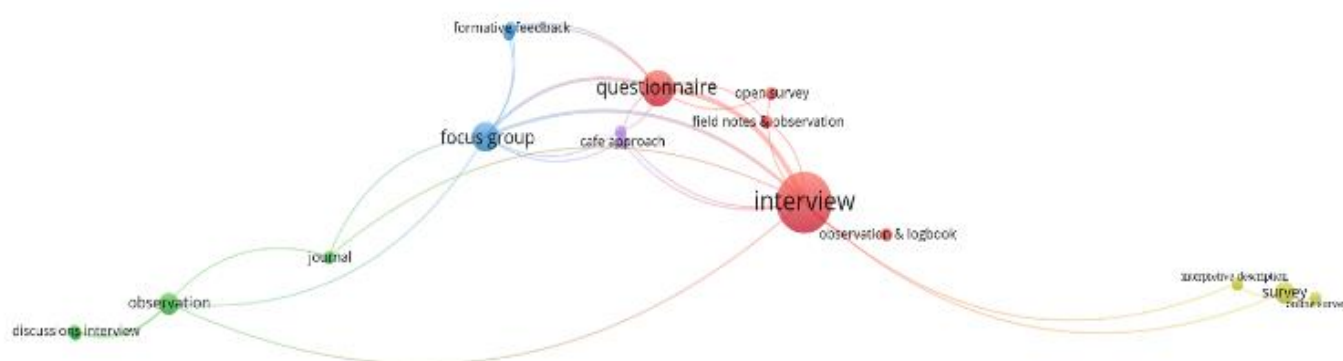


Fig. 5 Network Visualisation of Common Action Research Data Collection Methods

Note. Figure illustrates the sampling techniques and their respective quantitative and qualitative sample sizes used in doctoral action research studies within education disciplines. *DD* refers to Doctoral Dissertations, and *JA* refers to Journal Articles.

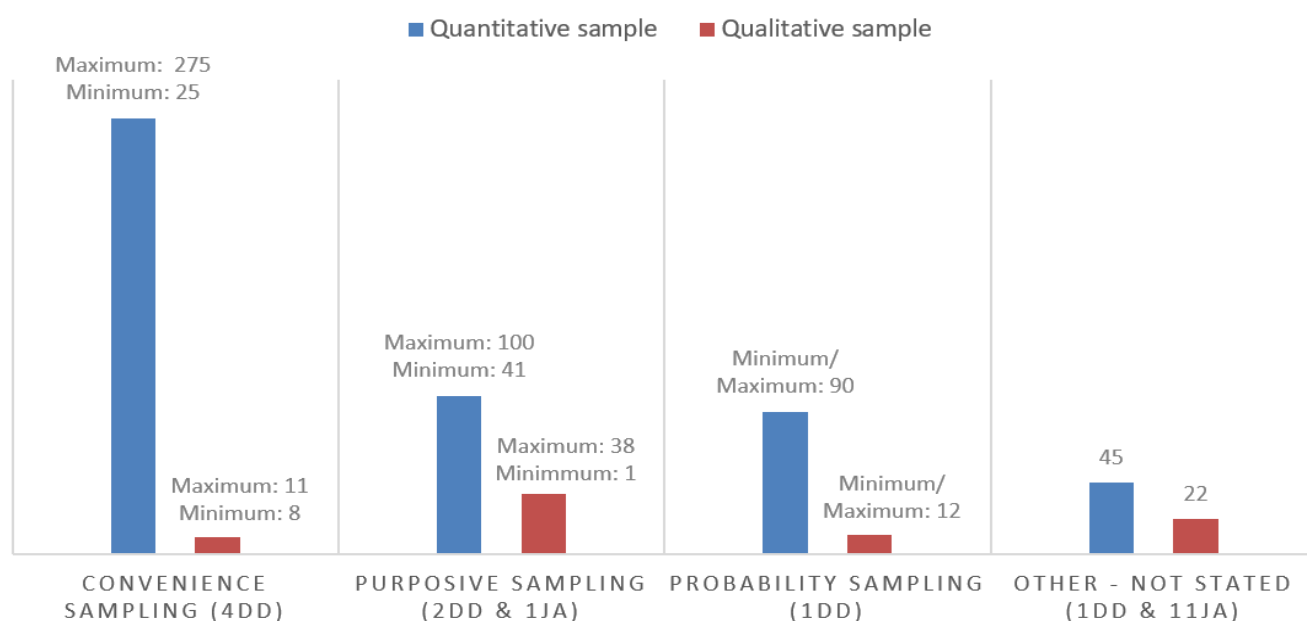


Fig. 6 Distribution of Sampling Techniques and Sample Sizes in Doctoral Action Research Studies

DISCUSSION

In addressing three research questions, this study examined action research (AR) as a methodological approach for doctoral AR studies within education disciplines.

Theories and Models Used

The findings highlighted that the Grounded Theory is the most prevalent theory for evaluating complex social processes in education disciplines. Additionally, various AR models, such as Elliot's (1991), Riel's (2019), and Zuber-Skerritt's (2012), demonstrated the flexibility of AR in addressing diverse challenges across disciplines. According to Glaser and Strauss (1967), Grounded Theory is a widely recognised qualitative research strategy that develops theory from empirical evidence through simultaneous data collection and analysis. Charmaz and Belgrave (2015) further explained that Grounded Theory focuses on comparing fundamental social and psychological processes. Researchers initiate the process by coding and comparing data, thereby identifying analytic leads and preliminary categories. These categories are subsequently refined through additional data collection. The development of an explanatory theory is the culmination of the iterative process, which commences with concrete data. Thus, most action researchers utilise Grounded Theory to evaluate complicated social processes or issues. Typically, AR lacks a specific theory; however, the theory is developed concurrently with its implementation (Monkevičienė & Galkienė, 2021). Similarly, Model AR is crucial to provide researchers with a logical framework for examining their problems and developing practical solutions. Besides, Crawford (2022) emphasised that the AR model epistemology interprets reflective inquiry processes to empower and improve educators' effectiveness. The findings demonstrated that action researchers use different AR models in their studies. The variety of model AR selection reflects the adaptability of AR as a methodology. According to Clark et al. (2020), numerous AR models exist; each model employs these basic steps: Plan a change-Act to implement the change-Observe the process and results of the transformation-Reflect the process and the results; process Plan-Act-Observe-Reflect repeatedly. Most researchers used various terminology, but they all followed the basic steps of the AR process. For example, AR can be linked to the PDSA (Plan-Do-Study-Act) phases in the Lelani et al. (2023) study. This connection arises from the shared emphasis on both methodologies' iterative planning, implementation, evaluation, and continuous improvement cycles. In conjunction, diverse AR models provide a robust and adaptable method for addressing complex issues in various domains. Henriques and O'Neill (2020) also emphasised that the meta-model will show crucial facts and processes to solve a multifaceted challenge. It will promote organisational development, transformation, and learning, create meaningful artefacts, undertake research, and generate knowledge internally and externally. Thus, researchers strategically select models and decide their AR phases to correspond with their distinct research objectives and address the particular complexities of their respective contexts. However, most articles' lack of theoretical and model specificity highlights a gap in methodological transparency, contrasting with the dissertations that consistently reported their theoretical underpinnings. In this case, the findings underscored the need for greater rigour and clarity in articulating the theoretical and model foundations in published AR studies, especially in journal articles. Such transparency is essential for advancing the methodological robustness of AR within doctoral and academic contexts.

Types of Action Research

The results indicated a range of AR methodologies encompassing traditional, participatory, collaborative, and ethnographic approaches, with traditional AR being the most prevalent. Nevertheless, participatory action learning and AR, which integrate participatory AR with ethnographic research, were also employed, showcasing adaptability to various research contexts. Besides, implementation durations varied widely, from four weeks to four years. Duesbery and Twyman (2020) stated that AR is iterative and never ends once it begins. Learning more about a topic raises more questions and curiosities, leading to more research. Therefore, every AR project has a different timeframe and number of cycles. It must depend on the action researcher, and the nature of the investigated problem will determine the time frame and the number of cycles necessary to conclude. Crawford (2022) emphasised that AR is a systematic and non-linear process that involves strategically repeating steps in response to research findings. Thus, every cycle was unique. Study knowledge grew gradually from past cycles, guiding the planning, behaviour, and introspection in subsequent cycles. AR is a perfect approach to reach the objectives of the present study since it is used more and more to guide changes and improvements in practice. Besides, the findings also illustrated the diversity of AR methodologies, from traditional AR to collaborative, participatory, and ethnographic variations. Each type of AR has its characteristics, as in Figure 7, and is best suited to particular research contexts, emphasising participant engagement, reflective practice, and actionable outcomes. The right type of AR must be chosen by

following a systematic process that considers the research objectives, the nature of the problem, and the specific setting where the research will be conducted. Furthermore, Carr and Kemmis (1986) classified three categories of AR in general: Technical AR, Practical AR, and Critical AR. Therefore, Figure 7 describes the characteristics of different AR types and better explains how each type fits into the broader spectrum of research approaches. Besides, Duesbery and Twyman (2020) emphasised that AR can combine the three categories, typically beginning with Technical AR; however, individual contexts and existing programs may need to be generalised, necessitating adaptation for various participants and structures. Generally, the absence of theoretical and model specificity in most journal articles indicates a methodological transparency gap. Still, the doctoral dissertations usually presented their theoretical and models. Thus, the findings underscore the need for greater rigour and clarity in articulating the theoretical and model foundations in published AR studies, especially in journal articles, to enhance the methodological robustness of AR within doctoral and academic contexts.

Action Research Category	Focus	Types of Action Research	Characteristics	Approach	Time-frame
Technical Action Research - Emphasises specific problem-solving - Aims for implementation - Uses existing knowledge and standardised methods	Evaluating the effectiveness of a new practice or instrument	• Traditional Action Research	- Generate actionable knowledge and implement significant changes - Planned change, Acting and observing the change, reflecting on these processes and outcomes, re-planning, acting, observing, reflecting on further iterations.	- Apply scientific or technical methods - Gather data and analyse the situation - Make incremental changes	Short-term (weeks/months)
Practical Action Research - Involves participants actively	Designing the procedure rather than simply adopting an existing one	• Participatory action research • Collaborative action research • Participatory action learning and action research	- Strong emphasis on active participation and empowering participants as co-researchers - All participants are practitioners who can contribute to research and knowledge production. - Co-create knowledge and solutions; joint problem-solving and decision-making. - Build capacity and foster mutual learning to promote positive change within collaborating groups. - The primary focus of PAR is to examine the integration of this process within the context of social action by adopting an ethnographic perspective. - Implement meaningful changes based on ethnographic insights.	- Engage participants with the researcher - Co-create knowledge and solutions or improve the participants' practice	Medium-term (months / 1 year)
Critical Action Research - Seeks to change existing structure or system - Concerned with empowerment and social change	Addressing systemic issues	• Ethnographic action research • Participatory action research and ethnographic research	- Deep immersion in a specific setting to understand culture or society - Ethnography guides the research being conducted, whereas action research connects the research findings to the developing undertaking. - The primary focus of PAR is to examine the integration of this process within the context of social action by adopting an ethnographic perspective. - Implement meaningful changes based on ethnographic insights.	- Participants take charge of the research process to implement new systems or procedures in changing their practices. - Collaboration in transformative actions - The researcher observes and evaluates the participant's practice	Long-term (1 year/years)

Fig. 7 Categories and Key Features of Action Research Types

Note. Adapted from Anderson (2020); Carr and Kemmis (1986); Cicek et al. (2017); Duesbery and Twyman (2021); Gittins (2019); Kemmis and McTaggart (2000, 2005); Lewin (1946); MacColl (2005); McNiff and Whitehead (2010); Nehez (2024); and Zuber-Skerritt (2018).

Data Collection Methods, Sampling Techniques, and Sample Sizes

The findings found that interviews were the most common method in past doctoral AR studies. Questionnaires, focus groups, and observations came in second through fourth. The findings were aligned with Erro-Garcés and Alfaro-Tanco (2020), who found that interviews, questionnaires, and focus groups were the common data collection methods employed in AR methodology. Besides, convenience sampling was the most common technique, with quantitative sample sizes ranging from 25 to 275 and qualitative cohorts from 8 to 11 participants. Next, purposive sampling with different sample sizes was also used, but probability sampling was rare. Therefore, Duesbery and Twyman (2020) stated that AR must combine qualitative and quantitative methods to investigate a study problem comprehensively. Mills (2007) also recommended using in-depth interviews, group discussions, observations, a field journal, and field notes as common data collection methods for the situations in which the activities and acts took place. In AR, researchers and participants collected data using various instruments to document all activities. Quantitative data from a survey on the research environment were analysed using values. In contrast, qualitative data from observations and interviews were verified for reliability and presented objectively with evidence of multiple perspectives (Thawinwong & Sanrattana, 2022). Etikan et al. (2016) asserted that the primary purpose of convenience sampling is to capture data from participants who are readily accessible to the researcher. According to Van De Venter et al. (2023), purposive sampling can capture data-rich contextualised perspectives from participants. Etikan et al. (2016) also stated that purposive sampling involves selecting participants based on relevant traits without a predetermined participant count. Typically, quantitative studies use probability sampling, while qualitative studies use non-probability sampling (Lopez & Whitehead, 2013). AR data collection methods, sampling techniques, and sample sizes rely on the action researcher's study goals. Therefore, action researchers must refer to a systematic, reflective, and participatory process involving researchers and participants in addressing real-world problems. It integrates qualitative and quantitative methods to gather data, analyse situations, and implement changes. Central to AR is the cycle of planning, acting, observing, reflecting, and re-planning, allowing continuous improvement and self-development. It emphasises collaboration, co-creation of knowledge, and empowerment of participants, focusing on practical solutions that lead to meaningful change in the community or educational settings. Thus, the AR methodological flexibility makes it suitable for addressing complex, context-specific challenges in a participatory and iterative manner. This dynamic approach ensures that AR generates actionable knowledge and empowers individuals and organisations to respond effectively to immediate challenges, facilitating sustainable improvements in practice.

CONCLUSION

In conclusion, this study highlighted the various uses of action research (AR) in doctoral studies within education disciplines. Various theories, models, and kinds of action research make a point for the power of AR in solving challenges and in the area of self-development. Besides, the AR methodologies, data collection methods, and sampling techniques differed, illustrating the adaptability of AR in addressing diverse research contexts and aims. These findings imply the need for greater awareness and training on AR methodologies for better application in practice-based doctoral programmes. In addition, higher education institutions may take advantage of the fact that AR can be promoted as a multifunctional methodology for cooperative and practical-oriented solutions to the problems of doctoral studies. On top of that, the range of theories and models used provides the possibilities for the design of specific AR frameworks for specific research issues. Thus, AR is a valuable research method for doctoral candidates because it encourages collaboration among researchers and participants to develop more meaningful findings. This comprehensive literature provides a critical new understanding of the AR methodology approach along with implementation recommendations as below:

- i. **Research theory framework:** Specify a research framework based on relevant theories, such as Grounded Theory or others suited to the study's context.
- ii. **AR type and model:** Determine the AR type and choose a model that includes essential steps (plan-act-evaluate-reflect) aligned with the research objectives and time frame.
- iii. **AR cycles:** Engage the participants in at least one cycle to assess the process and outcomes and suggest areas for improvements and revisions in further AR cycles.

- iv. **Data collection method:** Employ a mixed-methods approach with varied instruments to enhance data collection and guarantee comprehensive results.
- v. **Sampling technique and Sample Size:** Apply either convenience/ purposive sampling techniques with relevant sample sizes for the investigation to allow for at least 25 respondents or entire samples for quantitative data and a minimum of two participants for qualitative data.

Integrating structured AR frameworks, adopting mixed-methods approaches, and actively involving stakeholders enhances the credibility and applicability of findings. These strategies contribute to a deeper understanding and more effective implementation of AR in educational research. Despite its contributions, this study has certain limitations. First, the review is restricted to sources from only two databases: ProQuest doctoral dissertations and Scopus journal articles. Second, the review only focuses on the application of AR in education, which may have restricted its potential in other sectors. To enhance the diversity and comprehensiveness of findings, it is necessary to broaden the database and investigate the application of AR beyond the educational field. A comparative study can be conducted to investigate the strengths and weaknesses of AR in doctoral studies. Further research can explore the institutional support structures that facilitate or inhibit AR implementation in the doctoral programme, which can yield areas for policy improvement.

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