



Development and Validation of Instruments for Assessing Action Research

Awareness

Narendrakumar Chhaganbhai Parmar

Principal Primary School, Simdhara, Ta. Zaghadia, Bharuch

Ph.D. Scholar, Faculty of Education,
Gujarat Vidyapith, Ahmedabad, Gujarat

Prof. Mahesh Narayan Dixit

Faculty of Education,
Gujarat Vidyapith, Ahmedabad, Gujarat

Abstract

Action research is one of the most suitable methodologies for teachers. Despite the suitability of action research in teaching, there is a lack of awareness among teachers in primary schools in India. There is a lack of valid instruments that can be used to measure the level of awareness of teachers regarding action research and the obstacles preventing them from using such a methodology in their classrooms. One such instrument is the Action Research Awareness Scale (ARAS). The ARAS consists of 42 items divided into five components concerning action research with five-point Likert scales to assess teachers' level of awareness. The content validity of the instrument was obtained from reviewing the instrument by 16 experts in the field of education and psychology. The pilot test of the instrument conducted on 183 teachers from five districts in Gujarat obtained a Cronbach's alpha of .837, indicating a high level of internal consistency of the scale. The ability of each item of the instrument to discriminate between teachers with different levels of awareness was determined using an independent samples t-test at $p < .05$; as a result, only 42 items of the initial 50 items included in the instrument were retained. Thus, the development of the ARAS ended up in a 42-item scale.

Keywords: *action research awareness, instrument development, primary school teachers, Gujarat, content validity, Cronbach alpha, item discrimination, psychometric validation*



Introduction

The use of action research as a powerful instrument to connect theories of education with educational practices in school settings has been advocated since long back. Teachers who research their own working environment find ways of becoming change agents in their classrooms who work to resolve issues that arise in the classroom and improve the educational results for their students and the country as a whole (Mertler, 2021). The National Education Policy 2020 of India intends to make teachers agents of change in the classroom through the use of these reflective and research-based practices. However, studies show that there are a significant number of primary school teachers in the country who are either not aware of the process of action research or do not have the support to carry it out in their classrooms.

In order to take the initial step of understanding this problem and creating solutions for it, there must be available to the researchers the appropriate tools to measure the level of teacher awareness regarding action research. Tools used internationally for the measurement of action research awareness is not appropriate to use in the primary classroom in India due to the distinct characteristics of the Indian classroom (Caingcoy, 2020).

This paper presents the process and validation of the tool that can be used to measure the level of awareness of action research among primary teachers in Gujarat. The tool was developed following a multi-step scientific procedure to ensure that it was developed according to best practices in the measurement of educational variables.

The importance of this research paper is not just based on the instruments that will be utilized in measuring the level of awareness of action research by primary teachers. It also relies upon the process of creating these research instruments. The use of good research instruments will lead to the collection of good data, which will produce valid research study results. However, the use of an invalid research instrument will produce inconclusive research study results. The objective of this paper will be to demonstrate the various stages that were undertaken in the creation of this research instrument to ensure its validity and reliability.



Literature Review

Action Research as a Professional Practice

Action research cannot be defined as one method but an array of methods of inquiry that share one distinctive feature - the dedication to the problem-solving process (Messikh, 2020). Mertler stated that teacher inquiry can be defined as the process of implementing action research in relation to the educational issues that face the teachers; the usefulness of this process is in taking action research in relation to those problems by the teachers themselves. Thus, classroom action research allows for the teachers to research the issues that exist within the classroom, to test solutions to those problems, and to gain useful knowledge from the research that is conducted in their classrooms (Lubis et al., 2024).

The literature regarding professional development for teachers revealed that action research is one of the more effective forms of job-embedded learning for teachers, as it allows the teacher to act upon the problem that exists within their classroom and teaching practice, rather than learning about it (Salmeron Aroca et al., 2022). Furthermore, viewing teaching as an inquiry process allows teachers to remove the distinction between research and teaching. Related studies from different countries in the world have revealed the positive impact that can result from teachers implementing action research in their classrooms regarding the competence of teachers and the achievement of their students (Ulvik et al., 2022).

Instrument Development in Educational Research

The creation of reliable and valid measures is one of the key considerations of educational research in the present day. According to The Standards for Educational and Psychological Testing (AERA et al., 2014), three main criteria must be satisfied to ensure that a research measurement tool is able to reliably measure the concept that is being assessed: the validity of its content, the validity of its structure, and the reliability of the tool itself. Content validity can be established through an review by experts in the field of the knowledge domain to ensure that the questions included in the test are representative of that domain (Roebianto et al., 2023).

Reliability can be established through the calculation of measures of internal consistency, such as Cronbach's alpha. Cronbach's alpha measures the degree of internal consistency of a number of



items that measure the same construct (Zakariya, 2022). In order to utilize Cronbach's alpha statistic, the requirements of essential tau-equivalence must first be met, which means that each of the test items must measure the same concept and with the same strength. Furthermore, Cronbach's alpha will indicate that the test has high internal consistency if the calculated value is higher than 0.80, provided that the other assumptions of tau-equivalence have been met (Zakariya, 2022). In the instance of multi-componental Likert-type scales, however, additional reliability measures beyond Cronbach's alpha may be required. For instance, item discrimination analysis can be used, which examines the ability of the items to differentiate between individuals with high levels of awareness of the concept versus those with low levels of awareness (Metsämuuronen, 2020). Additionally, analysis of the means of the upper and lower 27% of respondents with regard to the items can help determine whether items should be dropped from the test (Olipas & Luciano, 2024). Items that are statistically not significant within this upper and lower 27% analysis at $p < .05$ are considered to have no discernable discriminating properties for the items, and thus may be dropped from the test item pool (Olipas & Luciano, 2024). Each of these steps will be taken in the development of the Action research awareness Scale.

Methodology

Research Context and Objectives

This study forms part of a PhD dissertation that investigated the awareness and obstacles to action research amongst primary school teachers in Bharuch District of Gujarat State in India. The initial aim of the development of the research instruments was to develop and test the ARAS.

Action Research Awareness Scale

The ARAS were developed to measure the awareness towards conducting action research among primary teachers. There were five components which include: (1) conceptual awareness, that is the teacher's understanding of what action research is; (2) procedural awareness about action research, or knowledge of the procedures and sequences necessary for doing action research; (3) researcher role awareness or knowledge of one's ability and moral responsibility as a practitioner-researcher; (4) importance awareness, that is how much one values action research and its contribution to education quality; and (5) resource awareness, that is knowledge of available resources such as



instruments and people needed in action research. Development of these five components was guided by a comprehensive review of the literature and consultations with experts of the subject matter.

Each item for the questionnaire was developed to have the potential for either positive or negative valence. For instance, in the Likert technique for scaling an instrument for measurement, it is important to include items that have negative meanings for the responses to action research, as this will prevent teachers from tending to agree with all of the items for the questionnaire without reading them carefully. Thus, for the questionnaire, 44 items were positively worded and 28 items were negatively worded. Each of the items were written in the Gujarati language, the first language of the teachers to be surveyed.

Five-point Likert scales were used to gather the responses from the teachers to be surveyed, with the teachers being asked to rate themselves as either strongly agree or strongly disagree with each of the items for the questionnaire. For each of the positively worded items, a code of 5 to 1 was assigned to each response, and each of the opposite responses were coded in reverse.

Instrument Development Procedure

Stage 1: Conceptualisation and Item Generation

The process of item development started with a thorough review of the literature related to the topic of awareness of researchers. Further to this, research instruments that had been used by other researchers on similar topics were reviewed. Experts in the field of education and research were consulted for their input on the items to be included in the instrument. A blueprint was developed for the items to be included under each component of the instrument, the format of each item and the scoring of each item. According to DeVellis & Thorpe (2021), this process will assist in the avoidance of conceptual drift during the item development process. As a result of this process, 72 items were developed for the instrument.

Stage 2: Cognitive Interview Review

Before exposing the instrument to content experts for validation, the items for the instrument were tested for clarity using cognitive interviewing by 15 teachers from primary schools. During cognitive interviewing, as recommended by experts in the field of psychometrics, the clarity of the



language, concepts and semantics of the items were tested. The teachers were asked to read each item and indicate which items were found to be ambiguous, irrelevant or redundant. Based on the outcomes of this process, 15 items were eliminated from the item pool of 72 items. Hence, 57 items were developed for the awareness scale.

Stage 3: Expert Content Validity Review

The content validity of the items was tested by experts in the field of education. A panel of 16 educational psychologists and pedagogues reviewed the items in the questionnaire. Each expert was provided with a pre-designed form containing a three-point scale where they were to provide scores to each item for the components in the questionnaire. Experts were to score each item as either +1 for relation to the component, 0 for unclear relation to the component and -1 for no relation of the item to the component. The process of obtaining expert opinions for the items of a research instrument is similar to that of the Content Validity Index as recommended in the literature in psychometrics (Roebianto et al., 2023; Jalal Khidhir & Hussein Rassul, 2023).

Items that received predominantly low scores from experts were eliminated from the instrument. Items that received zero scores were reviewed by the researchers to make any changes to the item to ensure the experts understood the item. Following this process, the instrument contained 50 items.

Stage 4: Pilot Testing

The instrument was pilot tested on 200 primary school teachers from five districts of Gujarat (Vadodara, Surat, Navsari, Narmada and Tapi) in order to gain statistic measures at the item level from a sufficient number of test subjects for the discrimination analysis of each item of the scale. Out of the 200 teachers that were to participate in the research study, 183 sheets were returned for the ARAS. Hence, the response rate for the questionnaire was 91.5% which is considered satisfactory.

All responses were entered into the Microsoft Excel program. Both questionnaires were coded as per the guidelines provided. For items in the ARAS, the five point likert items were scored from 5 (for Strongly Agree) to 1 (for Strongly Disagree). Hence, negative items were reverse scored. The items in the ARPIQ were scored dichotomously as Yes (1) and No (0).



Stage 5: Item Discrimination Analysis

Item discrimination analysis for the items in the ARAS was performed as recommended by Metsämuuronen (2020). Based on the scores obtained by the teachers for each item, they were divided into two groups; the high awareness group and the low awareness group. Each group consisted of 27% of the total respondents. The mean and standard deviation scores for each item for each group were calculated. An independent sample t-test was performed to determine whether there were any significant differences between the high awareness teachers and the low awareness teachers for each item individually ($t > 1.96$).

Out of the 50 items in the questionnaire, 46 items had statistically significant t-values which indicated a discriminating ability of each item between high and low awareness teachers of research practices. Four items which were not significant (items 3, 9, 10 and 11) were eliminated from the research scale. The remaining items which passed the discrimination analysis had t-values ranging from 2.02 to 8.90. As the table demonstrates, some items had very high t-values. For instance, item 23 had a t-value of 8.90 indicating excellent discriminating ability for awareness of research practices by teachers. Item 36 had a t-value of 7.62 indicating the same.

Stage 6: Final Instrument Construction

Based on the outcomes of the discrimination analysis, 46 items were retained for the research instrument. Four more items were eliminated in order to ensure that each component contained the same number of positive and negative items. Hence, there were 42 items for the final version of the awareness scale. Each component was divided equally into positive and negative items. The item distribution for each component consisted of 26 positive items and 16 negative items. There were 7 positive items in Conceptual Awareness, 8 positive items in Procedural Awareness, 11 positive items in Researcher Role Awareness, 9 positive items in Importance Awareness and 7 positive items in Resource Awareness. The negative items for each component were equal to the positive items in that component.



Reliability Estimation

The reliability of the scales based on internal consistency was determined for each of the scales using pilot data. The Cronbach's alpha value for the ARAS scale was determined to be .837. This value indicates the reliability of the tool meets the threshold level of .80 indicating that the measurement tools used in this research study met the standards for reliability in measurement in educational contexts (Zakariya, 2022).

Content Validity and Expert Consensus

The validity of the ARAS was assured through the analysis of the 16-person expert panel, as discussed in stage 3. Through the final round of analysis of the 42 items of the ARAS by the experts in the panel, no expert indicated that any of the items were unrelated to the component of the study. Thus, all experts indicated that all items of the ARAS were valid and related to the study objectives through the action research awareness. The consensus of the experts after two rounds of analysis assures the face and content validity of the study (Jalal Khidhir & Hussein Rassul, 2023).

Discussion

The development and validation of the ARAS contributes importantly to the literature on educational measurement, specifically in the context of primary schools in India. A lack of validated instruments to measure action research awareness had been a limitation in the research that had previously been published on this topic. The research that had been conducted using unvalidated and non-piloted research instruments had, consequently, led to the publication of research that was potentially based upon unreliable results (Messikh, 2020). The instruments that have been developed in this study help to fill this gap in the literature by employing a systematic development procedure for the instrument.

The instrument consists of five components that measure the theoretical perception of action research awareness. These items focus upon aspects of action research awareness, such as the knowledge that teachers have of the procedures of action research, the researcher's role and abilities in the research process, the importance of action research in the educational environment, and the availability of the resources necessary to perform such research. The importance of



utilizing such a multicomponent instrument is that those teachers who score low on, for instance, awareness of the importance of action research may require different educational interventions than those teachers who score low on the component of procedural awareness of action research. The values for the reliability coefficients of the instrument are both .837, values that indicate reliability, as they are consistent with those obtained in other research studies that have utilized the same or similar research instruments within international educational measurement literature. For example, authors Zakariya (2022) reported that an alpha coefficient value of .80 or higher is considered to be reliable in studies in which there are no reasons to doubt the consistency of the instrument.

Limitations and Future Directions

It is important to acknowledge some of the limitations of the current study. First of all, although pilot testing has been done in five districts of Gujarat, the instruments have not yet been used outside of Gujarat or in any languages other than Gujarati. Thus, the instruments are in Gujarati only and cannot be used directly for people who do not speak the Gujarati language. Secondly, the instruments have been tested only among the teachers of primary schools. Their validity among the teachers of secondary and higher secondary schools needs to be studied in future research in this area. Finally, evidence for the construct validity of the instruments (as indicated by factor analysis, convergent validity, or criterion validity studies) is not yet available.

Conclusion

Scales were developed and validated in this study to explore the action research awareness amongst primary school teachers in the state of Gujarat in India. The 42 items Action Research Awareness Scale was developed through a process that included reviewing the literature on the topic, generating items for the survey, cognitive interviews with primary school teachers, content validation from 16 experts in the field of educational research, piloting the survey, determining item discriminative validity, and estimating reliability. All three scales revealed high degrees of psychometric soundness. The content validity for the scales was determined with the help of 16 experts in the field. The item discriminative validity for the scales was also found to be significant.



The internal consistency reliability coefficients for both instruments were found to be at .837 levels.

The use of this scale helps to fill an important gap in the measurement techniques that are currently used within the Indian education sector. With India's primary education system working toward the aspirations of the National Education Policy 2020, it is essential for the policymakers and the developers of educational programs within the country to have research instruments that accurately reflect the state of the teachers conducting research in their classrooms.

References

- American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). Standards for educational and psychological testing. American Educational Research Association.
- Bongcayao, A. (2023). Capacitating teachers' research skills through collaborative action research buddies. *International Journal of Multidisciplinary Applied Business and Education Research*, 4(4), 1137-1142. <https://doi.org/10.11594/ijmaber.04.04.11>
- Burns, A. (2021). *Doing action research in English language teaching: A guide for practitioners* (5th ed.). Routledge. <https://doi.org/10.4324/9780367331858>
- Caingcoy, M. E. (2020). Research capability of teachers: Its correlates, determinants, and implications for continuing professional development. *Journal of World English and Educational Practices*, 2(5), 1-11. <https://doi.org/10.2139/ssrn.3631867>
- Cum, S. (2021). Examining the discrimination of binary scored test items with ROC analysis. *International Journal of Assessment Tools in Education*, 8(4), 948-958. <https://doi.org/10.21449/ijate.942220>
- DeVellis, R. F., & Thorpe, C. T. (2021). *Scale development: Theory and applications* (5th ed.). SAGE Publications.
- Elangovan, N., & Sundaravel, E. (2021). Method of preparing a document for survey instrument validation by experts. *MethodsX*, 8, 101326. <https://doi.org/10.1016/j.mex.2021.101326>



- Jalal Khidhir, R., & Hussein Rassul, T. (2023). Assessing the validity of experts' value judgment over research instruments. *Zanco Journal of Human Sciences*, 27(5), 324-343. <https://doi.org/10.21271/zjhs.27.5.21>
- Kilic, A. F., & Uysal, I. (2022). To what extent are item discrimination values realistic? A new index for two-componental structures. *International Journal of Assessment Tools in Education*, 9(3), 728-740. <https://doi.org/10.21449/ijate.1115553>
- Labastida, R., & Luciano, R. G. (2021). Challenges and difficulties encountered by teachers in the conduct of educational research: Basis for teachers' enhancement program. *International Journal of Research Studies in Education*, 10(10), 57-68. <https://doi.org/10.5861/ijrse.2021.630>
- Lubis, A. H., Samsudin, D., Triarisanti, R., & Megasari, J. (2024). Strengthening the implementation of classroom action research for language teachers in the Greater Bandung area. *Indonesian Civil Servants*, 1(2), 26-32. <https://dmi-journals.org/jai/article/view/226>
- Mertler, C. A. (2021). Action research as teacher inquiry: A viable strategy for resolving problems of practice. *Practical Assessment, Research, and Evaluation*, 26(1), Article 19. <https://doi.org/10.7275/22014442>
- Mertler, C. A. (2022). *Introduction to educational research* (3rd ed.). SAGE Publications.
- Messikh, D. (2020). A systematic review of the outcomes of using action research in education. *Arab World English Journal*, 11(1), 482-488. <https://doi.org/10.24093/awej/vol11no1.33>
- Metsämuuronen, J. (2020). Generalized discrimination index. *International Journal of Educational Methodology*, 6(2), 237-257. <https://doi.org/10.12973/ijem.6.2.237>
- Ministry of Education, Government of India. (2020). *National Education Policy 2020*. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- Olipas, C. N. P., & Luciano, R. G. (2024). Analyzing test performance of BSIT students and question quality: A study on item difficulty index and item discrimination index for test question improvement. *International Journal of Information Technology and Computer Science*, 16(3), 1-11. <https://doi.org/10.5815/ijitcs.2024.03.01>



- Roebianto, A., Savitri, S. I., Aulia, I., Suciyan, A., & Mubarakah, L. (2023). Content validity: Definition and procedure of content validation in psychological research. *TPM: Testing, Psychometrics, Methodology in Applied Psychology*, 30(1), 5-18. <https://doi.org/10.4473/TPM30.1.1>
- Salmeron Aroca, J. A., Moreno Abellan, P., & Martinez de Miguel Lopez, S. (2022). Teachers' professional development and intelligent ways of coping with it: A systematic review in elementary and middle school education. *Journal of Intelligence*, 11(1), 1-26. <https://doi.org/10.3390/jintelligence11010001>
- Sharma, P., & Patel, D. (2022). Bringing in teaching-learning practices through action research. *International Journal for Research in Applied Science and Engineering Technology*, 10(2), 1-6. <https://doi.org/10.22214/ijraset.2022.40019>
- Toquero, C. M. D. (2021). Real-world: Preservice teachers' research competence and research difficulties in action research. *Journal of Applied Research in Higher Education*, 13(1), 126-148. <https://doi.org/10.1108/JARHE-07-2019-0172>
- Ulvik, M., Riese, H., & Roness, D. (2022). Action research and professional development in schools: Reflection as quality development and knowledge production. *Nordic Journal of Educational Research*. <https://doi.org/10.18261/npt.107.4.5>
- Ulla, M. B. (2018). Benefits and challenges of doing research: Experiences from Philippine public-school teachers. *Issues in Educational Research*, 28(3), 811-830. <https://www.iier.org.au/iier28/ulla.pdf>
- Wang, Y., Chen, J., Li, G., Zheng, X., & Liu, X. (2026). Development and validation of the primary school students' perceived teacher trust behaviors scale. *Behavioral Sciences*, 16(1), 74. <https://doi.org/10.3390/bs16010074>
- Zakariya, Y. F. (2022). Cronbach's alpha in mathematics education research: Its appropriateness, overuse, and alternatives in estimating scale reliability. *Frontiers in Psychology*, 13, 1074430. <https://doi.org/10.3389/fpsyg.2022.1074430>