

Development of Computerized Adaptive Testing (CAT) for Assessing the Scholastic Talent Abilities of Prospective High School Students

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ABSTRACT

Determining the specialization of majors for prospective high school students is still a problem for schools or local governments using several components of grouping criteria. The current specialization grouping by the local government for state schools uses the requirements for report cards, scores from local government standardized assessment tests, and student choices. Another grouping criterion for private schools uses academic test scores, the results of specialization questionnaire responses by students with parental approval. In addition, the requirements for using psychological tests using the pencil and paper method and computer-based. The phenomenon is that some students in public and private schools cannot adjust their abilities to their chosen specialization, so they decide to change majors. In addition, the development of aptitude tests is more for assessing the ability of prospective students to determine majors. The following phenomenon is related to test testing using both forms of the test with the principle of working on the items that require each test taker to complete all the things. Therefore, to answer some of these problems, this study developed a scholastic aptitude test (SAT) with adaptive computer-based testing (CAT) integrated with cluster analysis for determining major grouping based on assessing the talent abilities of prospective high school students. TBS consists of verbal and numerical abilities with an adaptive test design for distributing questions based on the difficulty level of the questions and students' abilities. Testing with an assessment system can be carried out immediately, measuring students' abilities more efficiently and accurately and improving exam security. This research aims to produce valid and reliable aptitude test instrument products. Apart from that, to create products, the CAT program is integrated with cluster analysis for grouping prospective high school students' majors using scholastic aptitude assessment. The research stage consists of the product development and implementation stages. Product development involves selecting and analyzing existing needs, prototyping, formalization, implementation, evaluation, and repairs and improvements. The first stage, problem revision, determines and analyzes existing system requirements. The construct design of the scholastic aptitude test instrument consists of verbal and numerical abilities, each obtained based on a literature review. In contrast, the development team designed the CAT program design based on literature studies by researchers related to cluster analysis. The second stage, formalism revision, develops the test instrument design and algorithm design by creating a systematic work of the CAT program based on the first stage. The third stage, evolutionary revision, empirically validates the test instrument using Rasch model analysis and confirmatory factor analysis to obtain a scholastic aptitude test instrument that is feasible and reliable in measuring the scholastic abilities of prospective high school students. Then, for the product implementation stage with a CAT-based assessment in limited scale trials on a wide scale.

The research results show that the psychometric properties of the numerical aptitude test instrument using the Rasch model analysis approach obtained feasible and consistent criteria for measuring the numerical abilities of prospective high school students. The manuscript of the results of psychometric properties analysis is titled Measurement of Psychometric Properties Numerical Aptitude Assessment Scale for Prospective High School Students: A Rasch Model Analysis as a mandatory research output in 2023. The manuscript status was accepted on September 13, 2023, in a reputable international journal. Identify the quality of other scholastic aptitude test instruments, namely verbal ability, using the Rasch model analysis approach and confirmatory factor analysis. The manuscript of the research results is an additional output with the title Psychometric Properties of Verbal Aptitude Assessment Instruments for Prospective Senior High School Students: Rasch Model and Confirmatory Factor Analysis with manuscript status in the process of being revised for resubmission to a reputable international journal on September 30, 2023. Quality analysis results The verbal aptitude test instrument obtained valid and reliable synonym, antonym, and analogy ability items to measure the verbal abilities of prospective high school students.

Kata Kunci: *Confirmatory factor analysis, Rasch model analysis, Computerized adaptive testing, Scholastic aptitude test, Computer-based test*