The Use of Rasch Wright Map in Assessing Conceptual Understanding of Islamic Economics

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ABSTRACT

This article looks at how the Rasch-Wright map can be used to see how well students understand Islamic economics. This is why the Exit Survey Test (EST) questionnaire was made. 104 second-year Islamic Banking students at UiTM Puncak Alam, Selangor, took a 12-item Exit Survey Test (EST) that was split into four main parts: general concepts, theoretical foundations, microeconomics, and macroeconomics. The Rasch model analysis showed that the EST was very reliable, with item reliability at +0.73 and person reliability at +0.96. This showed that the EST was good at telling the difference between students' cognitive abilities. The Wright map clearly showed how well students understood concepts by showing which items were easy and which were hard and where each student stood on a competence continuum. The findings indicate that while students exhibited proficiency in practical domains such as Islamic microeconomics, they encountered difficulties with the theoretical frameworks and foundational concepts of Islamic economics. The Rasch Wright map is a helpful psychometric tool for Islamic education that gives detailed information for improving lessons and developing new ones. This study enhances the literature by combining psychometric mapping and statistical testing, providing a holistic methodology for evaluating conceptual comprehension in Islamic economics.

Keywords: Conceptual understanding, Islamic Economics, Rasch Model, Wright map

INTRODUCTION

Islamic economics, as a separate discipline, seeks to provide an alternative framework for economic activity grounded in Islamic principles and values (Mustafa et al., 2016). This field emerged as a result of growing dissatisfaction with conventional economic systems and a desire for an alternative model that was in line with Islamic law (Shari'ah) (Ibrahim, 2019). By incorporating ethical, social, and spiritual aspects, it goes beyond the strictly materialistic considerations typical of mainstream economics (Santoso, 2016). With a focus on justice, equity, and sustainability, this multidisciplinary field seeks to address economic issues holistically using resources such as the Quran and Sunnah (Hakim et al., 2020). But the development of Islamic economics as a distinct field has faced several challenges, particularly in defining exactly what an "Islamic" economic framework is and developing reliable techniques for evaluating and implementing it (Susamto, 2020). Despite extensive scholarly discussion and a large number of publications, the discipline's progress has been hindered by a lack of consensus regarding its basic methodology and guiding principles (Susamto, 2020).

The maturation and broad acceptance of Islamic economics depend on the establishment of a strict methodology that guides the development, evaluation, and practical application of its theories (Mubarrok et al., 2021). This methodological clarity, according to Furqani and Haneef (2012), is essential for distinguishing between valid and invalid theories as well as for separating fact from fiction in the field. This includes addressing the methodological issues that have historically complicated the study and application of Islamic economic theory (Bhuiyan et al., 2020). Such clarity is necessary for the theoretical underpinnings of Islamic economics to be robust and capable of guiding the development of practical, equitable, and sustainable economic systems (Rafikov & Akhmetova, 2020).

Assessing students' conceptual understanding of these concepts is crucial for both academic advancement and practical application, given the normative and ethical foundations of Islamic economics, which place a high value on justice, equity, and the avoidance of exploitative behavior (Abdullah & Sarwar, 2013). Because Islamic economic theory strongly emphasizes a normative approach and actively discourages any exploitative means or methods of profit maximization, this assessment is especially important (Abdullah & Sarwar, 2013). In order to prevent injustice, exploitation, inequality, unfairness, and immorality, the field supports the state's active role in regulating and governing market functions based on moral values and ethical considerations (Abdullah & Sarwar, 2013).

Even though Islamic economics education is expanding, there aren't many reliable, validated methods for evaluating students' conceptual knowledge. Current tests rarely incorporate statistical testing to assess relationships between conceptual domains and frequently rely on summative measures without psychometric validation. Curriculum designers run the risk of maintaining learning outcome imbalances if these gaps are not filled, which could result in graduates who are strong in application but shallow in theory.

Therefore, this paper attempts to investigate the difficulties of assessing conceptual understanding within Islamic economics by examining the existing frameworks and proposing enhanced methodologies for a more comprehensive assessment. To meet this challenge, robust psychometric tools that can reliably evaluate item difficulty and learner ability are needed. The Rasch Measurement Model (RMM), in particular the Wright map, offers a powerful approach for this type of assessment. The Rasch model offers more diagnostic insights into learning outcomes than traditional test theories because it allows students' abilities and item difficulties to be simultaneously mapped on a common scale (Bond & Fox, 2015). Rasch Wright maps are still not widely used in Islamic economics, despite their growing use in education. To fill this gap, this study uses the Rasch Wright map to assess students' conceptual knowledge of Islamic economics, making a methodological and contextual contribution to the field of Islamic economics education research.

This study's primary goal is to evaluate how well Islamic banking students comprehend the foundational ideas of Islamic economics. This study offers empirical insights into which curriculum areas students understand well and which continue to be difficult by using a Rasch-based Exit Survey Test (EST). In addition to helping to improve curriculum design and instruction, the Wright map analysis provides a replicable model for comparable assessments in Islamic education.

LITERATURE REVIEW

Conceptual understanding is the deep understanding of ideas, frameworks, and connections among concepts in a given field (Smith, 2005). Unlike procedural knowledge, which is more focused on performing tasks or calculations, conceptual understanding emphasizes the cognitive structures that enable students to transfer knowledge and apply it to new problems. Conceptual understanding in economics education, and particularly in Islamic economics, includes knowledge of the ethical aspects of economic activity, the differences between Islamic and conventional financial systems, and the maqasid al-shariah (the objectives of Islamic law).

Research indicates that students often struggle to comprehend abstract economic concepts, especially when the curriculum includes normative frameworks such as those found in Islamic economics (Khan & Watson, 2003). Therefore, it is crucial for Islamic education to assess conceptual understanding effectively, particularly in universities where Islamic finance and economics are gaining traction (Dusuki, 2008).

Despite the growth of Islamic economics education, there are still not many diagnostic and standardized assessment tools available. Most assessments that are currently in use primarily use summative methods, like assignments, final exams, and midterms, and do not adequately measure how well students have understood the underlying concepts. Furthermore, the reliability and interpretability of assessment results are limited by the lack of psychometric validation in traditional test construction.

Islamic economics ought to foster moral and social consciousness in its students. However, using conventional assessment techniques to determine how well students align with these values is inherently difficult. Scholars argue that Islamic economics pedagogy should integrate modern psychometric models to bridge this gap between

curriculum goals and assessment methods.

Islamic economics has not gotten as much attention as science and engineering education, where assessments of students' conceptual understanding have been extensively studied. Conceptual understanding goes beyond factual recall and includes the ability to build mental models, synthesize information, and apply concepts to new situations (Smith, 2005). Such understanding is crucial in the context of Islamic economics, given the ethical and axiological foundations that underpin the discipline.

The Rasch Measurement Model is increasingly being used in educational assessment because it can convert ordinal data into interval measures and offers higher accuracy in evaluating test item functionality and student performance. According to the Rasch model, the difference between a student's ability and the difficulty of the item determines the logistic function of the likelihood that the student will correctly answer the item (Linacre, 1999). The Wright map, developed from Rasch analysis, illustrates this relationship graphically by putting person and item measures on the same scale (Kay, Bundy, & Clemson, 2008). It is particularly well-suited for identifying knowledge gaps and differentiating between various levels of cognitive mastery due to its dual representation.

Rasch models have already been applied to conceptual evaluations in electrical and physics education. For example, Abdullah, Noranee, and Khamis (2017) examined the use of the Rasch Wright map in assessing students' conceptual understanding of electricity using the Parallel Circuit Conceptual Understanding Test (PCCUT). When evaluating the students' conceptual grasp of electricity, the Wright map proved to be quite helpful. However, there aren't many comparable studies in Islamic economics.

In order to evaluate the efficacy of curriculum design and instructional strategies in higher education, Azrilah (2009) and Saidfudin et al. (2008) promoted Rasch-based tests in Malaysia. However, very few have applied it particularly to Islamic economics. This study closes that knowledge gap by utilizing the Rasch Wright map on an exit survey test administered to students studying Islamic banking. By doing this, the study contributes to the growing body of research on Rasch applications in education and provides new perspectives on teaching and learning Islamic economics.

RESEARCH METHODOLOGY

In order to provide a thorough diagnostic of students' conceptual understanding of Islamic economics, this study uses a dual methodological approach that combines statistical hypothesis testing with Rasch analysis. In order to investigate domain-based performance differences, the research framework integrates inferential statistical analysis with psychometric mapping, which uses the Rasch Wright Map to graphically depict conceptual mastery. In order to ensure participant familiarity with the subject matter, a 12-item Exit Survey Test (EST) was administered to 104 second-year Islamic Banking students at university Technology MARA, Puncak Alam. The 12-item EST is divided into four sections:

Section 1 – General Concept of Islamic Economics: items 1 to 3.

Section 2 - Understanding Theory and Methodology of Islamic Economics: items 4 to 6

Section 3 - Application of Islamic Microeconomics: items 7 to 9.

Section 4 - Application of Islamic Macroeconomics: items 10

According to the study's conceptual framework, the section domain—which can be classified as either theoretical or applied—is the independent variable, and the dependent variable is the scores of the students, which are represented by Rasch logit measures. In order to provide a psychometrically validated picture of students' mastery levels, the Rasch model in WINSTEPS version 3.71.0.1 was used to analyze the data and produce person–item maps, reliability indices, and item difficulty rankings. This method makes it possible to comprehend performance differences across domains both statistically and visually.

Rasch Measurement Model

The Rasch Measurement Model shows how a person and an object are related based on a shared latent trait. It can predict how likely it is that someone with a certain skill will be able to answer a question of a certain level of difficulty correctly. The probability of success is based on how hard the item is compared to how good the person is (Bond & Fox, 2015). The Rasch Measurement Model is based on two important theorems:

• People are more likely to get the right answer to an easier question, and

• A more capable person is more likely to get all the questions right.

In other words, the Rasch Model says that an individual's ability affects the item difficulty estimates, while the item difficulty is what affects how the individual responds (Linacre, 1999). A common scale (logit) could be used to guess how a person would feel about an item. You can use WINSTEPS version 3.71.0.1, the software used in the Rasch Model, to make charts of both the person and item positions.

Rasch modeling uses the ordinal scores to make a linear measure (Sick, 2009). The degree of goodness of fit is shown by how well people and things are arranged along a continuum (range). This Wright map (Kay, Bundy, & Clemson, 2008; Jacobs et. al, 2014) shows that the things on one side of the band are arranged by how hard they are and the people on the other side are arranged by how skilled they are. Figure 1 Wright map shows where the people and things are at the top and bottom. If something is at the top of the person-item map, it's hard to support it; if it's at the bottom, it's easy to support it. Putting someone at the top of the Rasch Wright Map means that they are very comfortable with the items that measure constructs. People and item measure analysis is used to find out where things and people are on the map. The indicators in the summary statistics above are what the Rasch Wright Map uses to divide respondents and items. Moreover, in assessing conceptual knowledge of Islamic economics, the Rasch Wright Map may assist in elucidating the response.
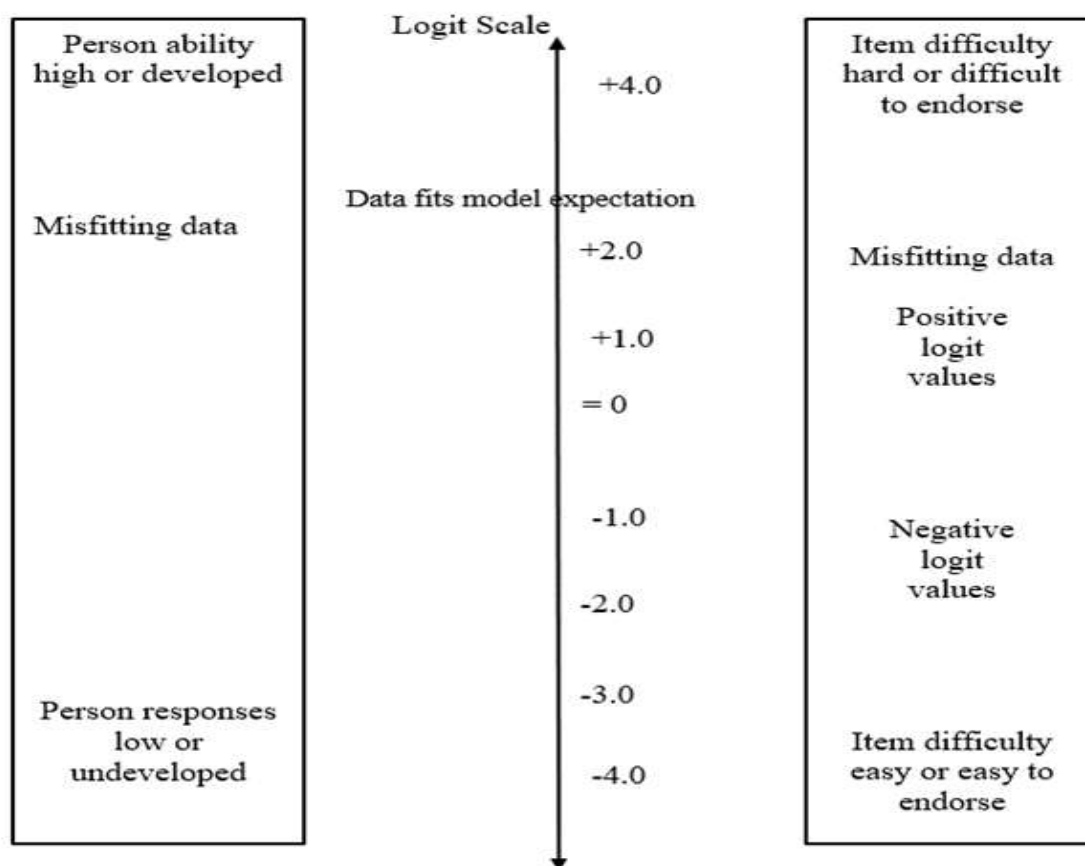
Figure 1: Rasch Wright Map

Sources: Bond and Fox (2015)

FINDING AND ANALYSIS

An appraisal of data fit to EST was conducted as a way of observing the extent that the students' responses to each item are consistent with responses to other items on the assessment (Smith, 2005). Table 1 presents the overall statistics of the instrument with 12 items.

Summary Statistics

Table 1: Summary Statistics

Persons Measured

	Total Score	Count	Measure	Model S.E.	Infit MNSQ	Infit ZSTD	Outfit MNSQ	Outfit ZSTD
Mean	34.7	12	47.74	5.41	0.96	-0.9	0.97	-0.86
S.D	9.8	0	27.91	0.63	1.02	2.62	1.03	2.63
Max	51	12	90.35	6.59	6.17	4.65	6.2	4.64
Min	17	12	-8.24	4.85	0.02	-4.5	0.02	-4.55
Model RMSE				5.45				
True SD				27.23				
Separation				5				
Person Reliability				0.96				
S.E. of Person Mean				2.78				

Person RAW SCORE-TO-MEASURE CORRELATION = .99
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .97

Items Measured

	Total Score	Count	Measure	Model S.E.	Infit MNSQ	Infit ZSTD	Outfit MNSQ	Outfit ZSTD
Mean	307	104	50	1.83	0.99	-0.1	0.97	-0.23
S.D	11	0	3.71	0.01	0.22	1.51	0.21	1.45
Max	323	104	59.59	1.84	1.38	2.53	1.38	2.47
Min	279	104	44.8	1.82	0.7	-2.2	0.69	-2.23
Model RMSE				1.83				
True SD				3.05				
Separation				1.66				
Item Reliability				0.73				
S.E. of Person Mean				1.07				

The results showed that EST had "very good" item reliability (Fisher, 2007) of +0.73. Fisher (2007) says that the Person reliability is "excellent" at +0.96. Additionally, the reliability of the Cronbach Alpha (KR-20) Person Raw score test is slightly higher at +0.97. With a reliability of +0.97, these groups would likely exhibit a

comparable pattern of ability in the person measure order table and a similar position on the Wright distribution map if provided with an analogous set of instruments assessing their conceptual understanding of Islamic economics (Azrilah, 2009). This also shows that this tool can sort and tell the difference between the respondents' levels of conceptual understanding.

Student performance in EST according to the Wright Map

Table 1 shows that the Mean$_{item}$ was at +54.00logit and the Mean$_{person}$ was at +47.47logit. The table also shows that the person's maximum value was +90.35logit, and the minimum was -8.24logit, while the maximum item value was +59.59logit, and the minimum value was +44.80logit. Since the Mean$_{person}$ value is positive, it can be confidently said that the 12 items in EST were challenging for these respondents since the mean value for the item is slightly higher than the mean value for person. By observing the items on the right of the map and taking note that the items above the mean value are the most difficult ones, it can be said that the 12 items can be categorized as easy and difficult based on their location on the map.

Easy Items

1. 5 items (**IE7, IE8, IE9, IE10, and IE11),** which are located below the mean value, are the easiest items for the students to endorse. This is an indication that the majority of the students had no difficulty in understanding the concept and application of economics and the Islamic aspect.
2. All 3 items (**IE7, IE8, and IE9) in section 3,** which are items dealing with the application of Islamic microeconomics, are also located below the mean value. Hence, this shows that the students had no problem in recognizing microeconomics connected with Islamic perspectives. This is not surprising because students already have knowledge related to the concept of microeconomics that has been studied previously.
3. Item **IE11** from the section on the application of Islamic macroeconomics is also the easiest item for the students to endorse. This is because this section describes the macroeconomics connected with Islamic perspectives.

Difficult Items

1. 7 items were located above the mean value and considered difficult to agree with due to lower endorsability by the students. 3 items represent section 1 (general concept of Islamic economics), 3 items represent section 2 (understanding theory and methodology of Islamic economics), and 1 item represents section 4 (Application of Islamic macroeconomics).

2. 3 items (**IE1**, **IE2 and IE3**) was located above the mean value. They measured the students' ability to understand the concept of Islamic economics, especially the philosophy, objectives, values, characteristics, and many more. Even though the students had experience learned about economics previously, when it comes to Islamic economics, it's slightly different. Some of them find it hard to understand how to combine Islamic aspects with economics.

3. Item **IE1** on the top part of the map (above item max +59.59logit), indicating that it was considered challenging because the students did not have enough knowledge and understanding of the principles of economics. Without a good understanding of principles, it becomes the biggest obstacle for students to understand the basic discussion on Islamic economics.

4. Items **IE4**, **IE5**, and **IE6** related to understanding the theory and methodology of Islamic economics were also considered difficult. They measured the students' ability to discuss theory and methodology in conventional and Islamic perspectives. The majority of students feel that discussion about the theory and methodology of Islamic economics is very challenging and difficult for them to understand.

Category of Students

The Wright Map, as shown in Figure 2, reveals that students could be divided into two categories: those who have a good understanding of Islamic economics and those who have less understanding based on the Person$_{Mean}$

indicator and their location on the map. Students who are above the Person$_{Mean}$ constitute the group who have a good understanding of Islamic economics (**group A**). Conversely, the students below Person$_{Mean}$ constitute the group who are less understanding of Islamic economics, and probably some section of EST did not contribute to that (**group B**). Group "A" has 63 students, or 61 percent (63/104 x 100), who have a good understanding of Islamic economics because they have the ability to understand the concept, theory, and methodology, as well as Islamic micro and macroeconomics. Among 63 students, 2 students were placed at the top of the map (above Person Max +50.35logit), indicating that both of the students showed good conceptual understanding of Islamic economics. While group "B" has 41students or 39 percent (41/104 x 100) who have less understanding of Islamic economics and EST, probably each section did not influence them to enhance their understanding and knowledge. One student indicated low agreement on the items measuring the understanding of Islamic economics because it was stated at the bottom of the map (below Person Min -8.24logit).
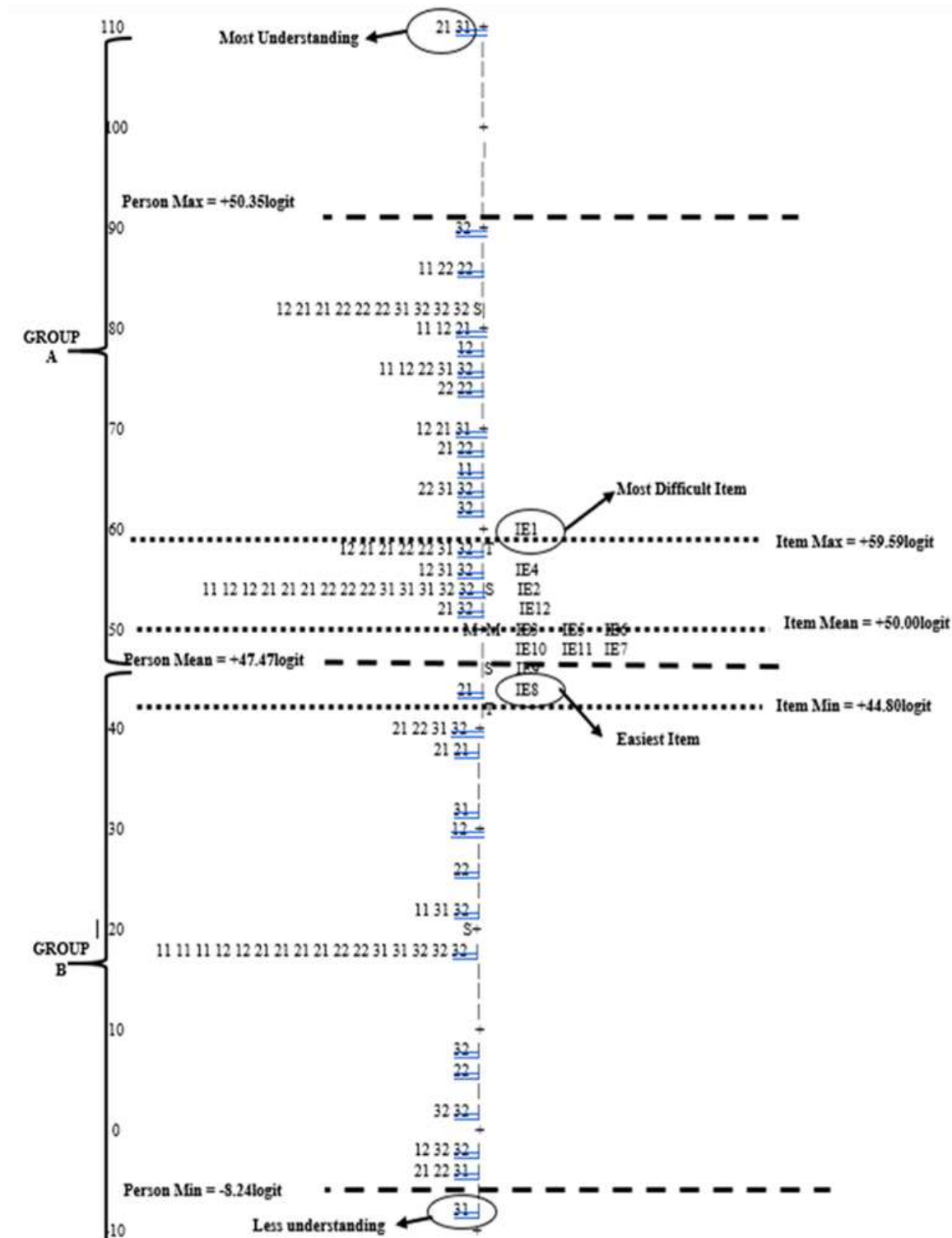

Figure 2: Rasch Wright Map

DISCUSSION AND CONCLUSION

The findings of this study highlight the efficacy of the Rasch Wright Map as a valuable instrument for assessing and distinguishing students' understanding of Islamic economics. The tool gives teachers useful information about how to improve curriculum design and teaching methods by letting them see how hard an item is compared to how well a student does on a common scale. The high person reliability score (+0.81) and item reliability score (+0.73) show that it is psychometrically strong and can tell the difference between different levels of conceptual understanding.

The Wright Map's item distribution gives a clear picture of students' strengths and weaknesses in their performance, building on this overall reliability. Students did well on questions about Islamic microeconomics and macroeconomic applications (IE7–IE11) because they had already learned about traditional economic ideas. This pattern indicates that procedural knowledge from traditional economics can be effectively modified for Islamic contexts, possibly facilitated by analogical learning and the practical applicability of the concepts.

Conversely, the data indicate that items pertaining to the theoretical and foundational aspects of Islamic economics (IE1–IE6) presented more significant challenges. This difficulty shows that students have trouble understanding the methodological differences, philosophical bases, and normative principles that make Islamic economics a separate field of study. Item IE1 was the hardest, which shows that there is a big gap in understanding how to combine economic reasoning with an Islamic worldview. These challenges may arise from insufficient focus on these themes within the curriculum or the lack of specialized pedagogical strategies for abstract and axiological content.

These results bolster the argument for differentiated instruction. The Wright Map shows that there are two groups of students: 61% have a strong understanding of concepts, while 39% have a weaker understanding. Targeted remediation that meets the needs of the second group, along with engaging, value-oriented teaching, can help close learning gaps. The Wright Map is also a useful formative assessment tool that lets teachers keep track of how students' understanding is growing over the course of the school year and change their lessons as needed.

The overarching implication is that Islamic economics education must transcend mere content delivery to foster higher-order thinking and ethical reasoning. Using the Rasch model in tests not only makes them more accurate, but it also makes people think about how clear the curriculum's methods and knowledge are. This integrated approach guarantees that learning outcomes are consistent with the philosophical and ethical underpinnings of the discipline.

This study presents substantial evidence regarding the efficacy of the Rasch Wright Map in assessing undergraduate students' conceptual comprehension of Islamic economics. The analysis shows a clear trend: students are better at applied subjects than at theoretical and philosophical ones. The Exit Survey Test's high reliability scores show that it is a valid diagnostic tool. The Wright Map's analytical power lets teachers find specific gaps and use targeted teaching methods to fill them.

These findings bolster the assertion that the Rasch Wright Map serves as an effective diagnostic instrument for facilitating curriculum enhancements. The incorporation of hypothesis testing validates that practical concepts are more easily comprehended than theoretical ones, indicating a necessity to recalibrate the curriculum. Active learning and case-based discussions can help students build stronger theoretical and methodological foundations. Differentiated instruction for students who are not doing as well can also help them learn both theory and application more evenly. It is also suggested to use Rasch-based tools for periodic formative assessments to keep track of progress and improve teaching methods.

In the future, research should use a longitudinal design to follow how concepts change over time and expand the use of Rasch-based assessments to other schools. Improving the way items are made to better capture axiological and normative dimensions will make the evaluation of this changing and complicated field even better. This will make sure that Islamic economics graduates are not only knowledgeable but also have a strong moral and conceptual foundation.

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