

# Evaluating the Psychometric Properties of Economic Literacy Measures: A Systematic Review

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## **Abstract**

Prior studies often misinterpreted economic literacy concepts, constructs, and psychometric properties as related but distinct ideas. This often led to inaccurate measurement choices and poor generalisation of research outcomes. This research investigates economic literacy's conceptual clarity, factors influencing it, psychometric properties of measures, and suggests suitable instruments for its assessment. The PRISMA protocol was used in the study, while data were collected from WOS, Scopus, and Google Scholar. Out of the 126 publications from 2014 to 2023, 24 studies met inclusion criteria. The quality of the articles that met the inclusion criteria was assessed using MMAT tools. The result indicated that the measurement of economic literacy's depends on theoretical perspectives. Psychometric qualities of economic literacy assessment are influenced by theoretical perspectives, social context, and the chosen unit of analysis. Additionally, criterion-based measurements tend to focus on knowledge and may not provide an accurate measure of economic literacy. The provide guidelines to operationalize, and measure economic literacy while preventing confusion with related concepts. The study stressed the need for validation of the TEL scale across countries due to curriculum and socioeconomic variations.

**Keywords:** *Economic Literacy, Financial literacy, Psychometric, Test of Economic Literacy, Systematic Review*

## **INTRODUCTION**

Economic literacy is essential for individuals to handle diverse economic situations and apply basic concepts in their daily lives. Economic literacy is understood in various ways, encompassing knowledge of scarcity, trade-offs, markets, and pricing mechanisms (Bamiro, et.al., 2024). This involves understanding the economy, markets, goods, taxes, inflation, services, work, economic clusters, trade blocs, and their direct impact on every individual's life (Al-Rabaani, 2019). Economic literacy is crucial for the socioeconomic growth of a nation because it enables individuals to comprehend their place in both local and global economic trends (Aarab, 2017). It also gives people a historical framework for economic concerns and equips them to deal with shifting political and economic policies. In order to foster more social participation in an economic setting, it is necessary for every country to promote economic literacy (Al- Rabaani, 2019). Additionally, having a strong understanding of economic concepts such as taxation, interest rates, investment, and savings, profits, inflation, competition, and markets is a benefit of economic literacy (Aarab, 2017).

Understanding fundamental economic processes and concepts is critical (Happ, 2020). This knowledge is important not only for individuals making well-informed economic decisions about their personal finances, but also for society as a whole. The economic decisions made by an economy's members have a significant impact on its stability and strength (Sebastian & Happ, 2023). Thus, the importance of economic literacy is necessary conditions for holistic societal wellbeing. McCowage & Dwyer (2022) posited that the concept of economic literacy has been a challenging term to define because economics is a broad discipline that incorporates a wide range of concepts, the understanding of which is difficult to observe. Also, measuring economic literacy is increasingly vital and pertinent, given its connection to the pressing requirement for informed financial decision-making and comprehending their implications for the future (Haupt, 2022). modern economic literacy researchers struggle with the choice of topic orientations and methodological techniques when developing new measurement tools (Welandt and Abs, 2023). Also, (McCowage & Dwyer, 2022) argued further that determining appropriate criteria to measure what constitutes economic literacy has been a tough debate, and as such future research should be directed to the measurement of economic literacy.

There are scanty of measurement-based systematic review (Paul & Criado, 2020). Happ, Kato & Ruter (2021) claimed that future research should investigate factors leading to variability in the level of economic literacy among various population strata. According Welandt and Abs, (2023), there are scanty of studies that have reviewed economic literacy measures, this is the gap this study intend to fill. McCowage & Dwyer expatiated further that future studies must address the issues of how can we measure a phenomenon like economic literacy that is 'lifelong' in nature? What are the benefits and drawbacks of different measurement options, such as standardized tests or surveying individuals about their own sense of capability or engagement with economics? Given this, the research will begin with a systematic literature review because of its ability to aggregate the present level of knowledge within a subject to provide future direction, identify issues within previous studies that require correction in subsequent investigations; and they have the potential to assess theories concerning the mechanisms underlying a phenomenon (Page, et al., 2021). The following are the objectives of the study which are;

1. What does the concepts of economic literacy connote?
2. What factors account for the variability of economic literacy?
3. What are the psychometric properties of economic literacy measurement?
4. How can we measure economic literacy appropriately?

## 1. Economic Literacy: Theoretical Perspective

Defining economic literacy has proved challenging due to its lifelong, adaptive nature and interconnectedness with various aspects of human life. However, establishing a conceptual benchmark for literacy is vital to evaluate ideas' accuracy. Clarity is needed to distinguish an economically literate individual, set a minimum economic knowledge level, and outline essential analytical skills (McCowage & Dwyer, 2022). Economic knowledge and mental comprehension, one's attitude toward economics, and a moral reflection on economic issues make up the three main dimensions Beck and Krumm identify as being essential to economic literacy. This concept views economic literacy as a crucial precondition for making ethical decisions. Economic attitudes significantly affect how events are viewed, and economic moral reflectiveness includes the standards and principles that guide judgment in economic settings (Beck & Krumm, 1998).

According to Dubs (2011) and Ackermann (2019), economic literacy can be divided into two broad categories: civic and vocational education. Vocational economic literacy primarily focuses on competencies related to specific occupations, while civic economic literacy pertains to general economic knowledge. Effectively addressing the specific needs within distinct professional domains requires both occupation-specific and general economic competencies (Winther et al., 2016). Economic literacy is viewed from two perspectives: criterion-based and behavioral-based (McCowage & Dwyer, 2022). This classification is similar with the classification of (Beck & Krumm, 1998). However, this study will be guided by the classification of (McCowage & Dwyer, 2022).

## 2. Criteria-Based Definition

According to McCowage and Dwyer (2022), who offer a functional definition of the term, an individual demonstrates economic literacy when, even years after receiving instruction, they are able to successfully apply the four fundamental economic principles and the seven core economics topics in circumstances that are different from classroom scenarios. The seven core economics topics and four fundamental economic principles are derived from the United State Council of Economic Education (CEE, 2010) twenty standards of content to be mastered to be regarded as an economically literate person. The content of the CEE Standards was summarized as follow in Table 1.

**Table 1** CEE Economics Content

	<b>CEE Standards covered</b>
<b>Micro economics</b>	
Scarcity	Scarcity
Economic behaviour	Decision making Incentives Specialization Trade Role of prices
Allocation of goods and services	Allocation Markets and prices Trade
Markets	Competition and market structure Markets and prices Role of prices
Factors of Production	Income Entrepreneurship Economic growth
<b>Macro economics</b>	
The economy as a whole	Money and inflation Interest rates Economic fluctuations Unemployment and inflation Fiscal and monetary policy
Government and economic institutions	Institutions Role of government and market failure Government failure Fiscal and monetary policy

Source: McCowage and Dwyer (2022)

Hansen et al. (2002) summarized the twenty standards of CEE into seven core economics topics needed for an individual need to understand to be regarded as economic literate. Based on this, Stevenson and Wolfers (2020) take it a step further and assert that there are only four core economic principles that may be used to make almost any economic decision, from simple household decisions to complex public policy decisions (see Table 2).

**Table 2** Summarized CEE Standard

S/N	Seven core economics topics	Four fundamental economic principles
1	Scarcity	Cost-benefit
2	Cost-benefit	Opportunity cost
3	Incentives	Marginal principle
4	Comparative advantage	Interdependence
5	Increasing opportunity cost	
6	Equilibrium	
7	Efficiency	

Sources: Frank and Bernanke (2007); Stevenson and Wolfers (2020)

Stevenson and Wolfers (2020) chose four principles to educate students about real-world issues, while a more comprehensive reorganization content is needed to prepare them for advanced economic study or applying economics in other disciplines. The concept of economic literacy refers to the ability to understand and use basic economic concepts and principles, such as supply and demand, competition, and inflation, in one's daily life.

Reinhardt, et.al., (2021) claimed that an economically literate person must understand the basic economic concepts and use them in daily decision-making. Economic literacy enables individuals to investigate and evaluate a wide range of characteristics of the world in which we live by employing ideas gained through economic knowledge (Livermore & Major, 2021). It supports our ability to assess the success of our economy and draw inferences about opportunity costs for use in our own decision-making. Economic literacy is an excellent resource for analyzing and debating a wide range of social issues in the world we live.

Economic literacy is the capacity to comprehend, organize, and apply economic principles, whether in theory or in practice (Ismail, et.al., 2019). Even though it may be a relatively new concept in developing countries, economic literacy is undeniably significant. It necessitates an understanding of fundamental economic concepts and ideas, as well as the ability to apply them effectively in real-world settings. Economic literacy is essential for individuals and societies to make informed decisions and successfully navigate economic systems. People run the risk of slipping behind and making bad decisions if they don't have a solid understanding of economic principles (Rivlin, 1999).

The criterion-based definition of economic literacy aligns with (Rahmatullah, 2018) which claimed that Individuals' economic behavior is influenced by the economic information they have gained via formal schooling, though they provided observable and measurable criteria for assessing economic literacy. The criterion-based definition ignores economic knowledge gained from informal or non-formal education settings. The criterion-based definition makes it difficult to measure informal economic literacy possessed by individuals that haven't experienced schooling but have often take rational economic decisions in their business and social life. The criterion-based definition of economic literacy as knowledge based only has been criticized as being narrowed, one-sided and weak representation of the term economic literacy (Welandt and Abs, 2023).

Peterson (2020) contends that literacy extends beyond classroom knowledge, encompassing applicable skills. This perspective might label unschooled individuals as illiterate, but Peterson highlights the multifaceted nature of literacy. It involves interacting with and shaping the world, as well as being influenced by it. Peterson suggests that assessing literacy in specific areas like economics, health, or science should consider effective engagement and expected behaviors. Supporting this view, Walstad (1998) and Reinhardt et al. (2021) argue that economic literacy should not solely rely on content mastery but also effective application.

The CEE standard's core concepts are rooted in Western economic systems, which differs from the planned economies in Eastern Europe and former Soviet states. Notable variations exist in terms like competition, market, price, entrepreneurship, and allocation of goods (Cwynar, 2022; Happ et al., 2023). This pose challenge of using CEE standard as determinant of who is economic literate or not due to differences in countries and regional socioeconomic context. The CEE standard may be adequate in USA but it may not be totally adequate in other countries.

### 3. Behavioral-Based Definition

The behaviorist viewpoint on economic literacy suggests that closely aligning economic literacy with behaviors that enables individuals to critically engage with information concerning public policy, current events, and the factors impacting economic circumstance of the environs (Rogers, 2014; Soroko, 2022). This perspective believe economic literacy is all about how an individual exhibit economic attitude and behaviour in their daily activities. This viewpoint aligns with the assertion that achieving economic literacy necessitates the cultivation of independent critical thinking and the use of evidence for decision-making across various aspects of human engagement (McCowage and Dwyer, 2022).

Economic literacy is defined as the capacity to successfully manage financial resources by applying associated economic knowledge and abilities (Ribeiro, et. al. 2019). A high level of economic literacy will improve economic efficiency, resource allocation, and individual and societal well-being (Dilek, et. al, 2018). Individuals make very bad financial and non-financial planning due to a lack of

financial and economic knowledge, and as a result, they profit less from economic prospects (Ribeiro, et. al. 2019).

Yıldırım and Öztürk, (2017) define economic literacy as "the ability to identify economic problems, alternative options, costs, and benefits; analyze the rewards at work in economic situations; assess the implications of economic fluctuations and policy changes; collect and organize statistical evidence; and measure costs against benefits." Economic literacy, according to the North Central Regional Educational Laboratory (NCREL), is the capacity to reassess the alternative options for analyzing economic issues and provide solutions, to interpret cost and profits, to examine the effect of changes in market conditions and public policies, to gather and organize economy-related data, and to align profits and costs (NCREL, 2006; Gerek and Kurt, 2008).

Budiwati et al. (2020) emphasize that economic knowledge is closely tied to rational investment, financial risk decision-making, fostering a savings culture, and effective spending management for household welfare. Low economic literacy impacts not only savings but overall welfare. Economic literacy empowers individuals to sensibly manage various aspects of their lives. It's considered an explanatory variable influencing other factors. Cultivating socio-economic reflection and awareness enables informed decisions in daily roles like customers, vendors, investors, and voters (Yıldırım and Öztürk, 2017).

Therefore, economic literacy involves utilizing economic knowledge and skills gained through formal schooling experiences, and experiential and societal-based learning to understand the economy and make informed decisions in different areas of life. The definitions indicate that a. economic literacy encompasses understanding economic principles b. economic knowledge can be acquired through formal school settings, and informal or non-formal education. c. irrespective of the source of economic knowledge, an economically literate person must understand the economy and exhibit sound decision-making ability.

#### 4. The Missing Link between Economic Literacy and Financial Literacy

According to Happ (2020), economic and financial knowledge are intertwined and form the foundation of financial and economic literacy. Together, they improve understanding of economic landscapes and options, underlining the importance of comprehending both for a complete understanding of financial survival. Over the last three decades, there has been a noticeable increase in academic interest in financial and economic literacy. The study of how people perceive, analyze, and use economic and financial information reflects society's recognition of the need to prepare individuals for complex economic challenges affecting the global economy (Sebastian & Happ, 2023). Despite the focus, Cude (2022) and Haupt (2022) stress that defining economic and financial literacy and their link remains a difficulty due to dynamic and complex nature of economic and financial literacy. These topics are still being clarified through research, which is tackling definitional issues. This ongoing project has implications for education, policy, and individual empowerment in economic and financial management.

Aside from conflicting definitions, there is also debate about the best way to arrange these concepts in relation to one another. Happ's (2020) posited that the integrated model opined that financial literacy is a component of economic literacy. The integrative model is consistent with previous scholarly position (Bosshardt and Walstad, 2014; Seeber and Retzmann, 2017). Muhamad (2020) posited that financial literacy is a subset of economic literacy and is commonly referred to as money literacy. Financial literacy is all about money, which includes saving, investing, and money management. Economic competency is also referred to as Economic literacy which entails to the capacity to apply economic principles to societal issues such as social, political, cultural, and environmental issues (Wuttke, et. al., 2016).

These conceptual frameworks coexist with others that divide financial and economic literacy (Koh, 2016). Financial literacy is perceived as an extension rather than an inherent component of economic literacy, as proposed by the integrated approach (Pang, 2010; Koh, 2016). The integrative approach, on the other hand, proposes a harmonizing method that combines interconnected ideas such as core economic and financial knowledge, as well as associated components of basic economic knowledge such as macroeconomics and microeconomics (Happ 2020). Also, based on the aforementioned, the following differences exist between economic literacy and economic numeracy:

Economic numeracy focuses on a mathematical-analytical approach and is proficient in core mathematical knowledge and skills, whereas economic literacy covers linguistic-argumentative understanding and a comprehension of essential economic concepts (Winther, 2010; Welandt and Abs, 2023).

## 5. Standardized Economic Literacy Measurement Scale

The development of economic literacy measurement instruments over time is a reflection of the shifting expectations placed on economic citizens (Scheffler, 2018). Variety of measures have been used to assess the level of economic literacy of various group in the society. It is interesting to assessed the actual content of measurement instruments when studying them to determine their major emphasis or to determine whether there is really a focus at all (Welandt and Abs, 2023).

This measurement includes the Walstad, Rebeck, & Butters (2013) Test of Economic Literacy (TEL) and the Walstad, Watts & Rebeck (2007) Test of Understanding in College Economics (TUCE), Fourie and Krugell (2015) Test of Understanding Economics in South Africa (TUESA), Chizmar and Halinski (1983) Basic Economic Testing (BET), and Soper's Test of Economic Knowledge (TEK) (1979). It should be noted that Test of Economic Literacy (TEL), Test of Understanding in College Economics (TUCE), Test of Understanding Economics in South Africa (TUESA), Basic Economic Testing (BET), and the Test of Economic Knowledge (TEK) are primarily designed to assess economic literacy among high school and undergraduate students, and that these assessments are solely focused on the participants' knowledge.

The Test of Economic Literacy is a standardized test for measuring the achievement of high (eleventh and twelfth grades) school students in economics (Walstad, Rebeck & Butters, 2013). It contains forty-five items each of form A and B that are collated from the twenty standard economic topics for high school graduate to master as stipulated by Council for Economics Education (2010). The Test items were classified by cognitive level based on Bloom's taxonomy of cognitive objectives (1956). The Blooms' taxonomy was classified as knowledge, comprehension, application, analysis, synthesis, and evaluation; however, it was reclassified as three-level which are; knowledge, comprehension, and application in the fourth edition. The forty-five items each in formats A and B are spread over the knowledge (6,7), comprehension (14, 12), and application (25, 25) in the following proportion.

Fourie and Krugell (2015) developed the Economic Literacy Test of Understanding Economics in South Africa (TUESA) to assess economic literacy among introductory economics students in South Africa, with two key sub-themes of microeconomics and macroeconomics understanding. The basic economic problem (scarcity, opportunity cost, and production variables), demand, supply, and elasticity, consumer theory, and theory of production are all covered in microeconomics. The exam includes macroeconomic questions like GDP, inflation, and unemployment, as well as monetary and fiscal policy and international economics.

The Test of Understanding College Economics (TUCE) is divided into two parts, each of which has multiple choice questions on macroeconomics and microeconomics. The major goal of this test is to assess economic literacy in university and college students and to compare the results (Walstad, Watts & Rebeck, 2007).

The Basic Economic Test (BET) is one of three nationally normed and standardized economics tests to assesses students' mastery of basic economic understanding in grades 5 to 6, and it has three components: understanding, knowledge, and application (Yasmin, et.al., 2014). The BET is an accomplishment test, not a speed test, and comes in two versions: A and B, each with 30 economics questions. Form A contains 8 knowledge items, 13 comprehension items, and 9 application items. Form B contains ten knowledge, twelve comprehension, and eight application items (William, et.al., 2010). The test covers a wide range of cognitive skills, although for this age group, the emphasis is on the lowest tiers of Bloom's Taxonomy.

The Test of Economic Knowledge (TEK) is a standardised test that uses multiple-choice questions to assess economic literacy in students in grades eighth and ninth grades (junior high/middle school) (Yasmin, et.al., 2014). The TEK version comprises 40 items in Forms A and B, each with the same economic content. Form A contains 6 knowledge elements, 21 comprehension items, and 13 application items. Form B has 7 knowledge items, 19 comprehension items, and 14 application items.

Percentages: 15-17.5% for knowledge items, 47.5-55% for comprehension items, and 32.5-35% for application items. These results represent a range of cognitive capacities, with a focus on the bottom tiers of Bloom's Taxonomy for the age group (Walstad, et.al., 2010).

## **METHODOLOGY**

The study uses PRISMA approach as review protocol in this study to reduce biases throughout the article selection and exclusion phase. The PRISMA 2020 standards provide updated recommendations for publishing systematic reviews, including the most recent breakthroughs in methodologies for discovering, selecting, evaluating, and synthesis of studies (Page, 2021; Puspitarini, 2023; Bamiro, et.al, 2023). Systematic reviews are gaining popularity in social and management sciences due to their rigorous and repeatable process that lowers bias, avoids missing relevant literature, and enables for complete examination of large amounts of data (Neves & Brito, 2020). The study adheres to a four-step process similar to prior systematic reviews (Miller et al., 2018), which includes a search strategy, inclusion and exclusion criteria, data validation and extraction, and review synthesis. The systematic review was guided by four research questions. (1) What does the concept of economic literacy mean? (2) What factors determine the variability of the level of economic literacy? (3) What are the psychometric properties of economic literacy measures? (4) How can we measure economic literacy appropriately?

### **1. Search Strategy**

The study conducted a comprehensive literature search on economic literacy concepts, constructs, and measurement across three databases: Scopus, Web of Science, and Google Scholar. Keywords like "economic literacy," "factors influencing economic literacy," "measurement of economic literacy," and "economic literacy assessment" were used to ensure a robust search (Skackauskiene, et.al., 2023). This approach aimed to avoid limitations associated with relying solely on one database (Utaminingsih, et.al., 2023). Initially, 126 relevant articles were identified and moved to the screening stage.

### **2. Screening Stage**

Duplicate publications (11) were discovered in databases such as Google Scholar, SCOPUS, and WOS, resulting in 114 papers. After rejecting research articles published prior to 2013, type of literacy, conference proceedings, duplicates, non-English articles, and out-of-scope articles, the final selection for the review consisted of 24 papers. Figure 1 below illustrates the distribution of articles per database, showing the initial number of identified articles and the final count of articles that met the inclusion criteria.

### **3. Eligibility Criteria**

To ensure precise results, specific criteria were set for including and excluding research papers. A thorough evaluation of keywords, content, titles, and abstracts was conducted to ensure selected papers met prerequisites and addressed research questions. Selected papers had to meet specifications: (1) Economic literacy, (2) Article document type, (3) Exclusively in English, (4) Peer-reviewed, and (5) Contributed to research questions. Excluded were editorials, book chapters, books, commentary essays, conference proceedings, monographs, letters to the editor, and other report formats. Peer-reviewed papers were chosen for validity and relevance (Neves & Brito, 2020). Initially, 126 papers were considered, with 24 remaining in the systematic review after eliminating 102. See figure 2 indicating PRISMA framework.

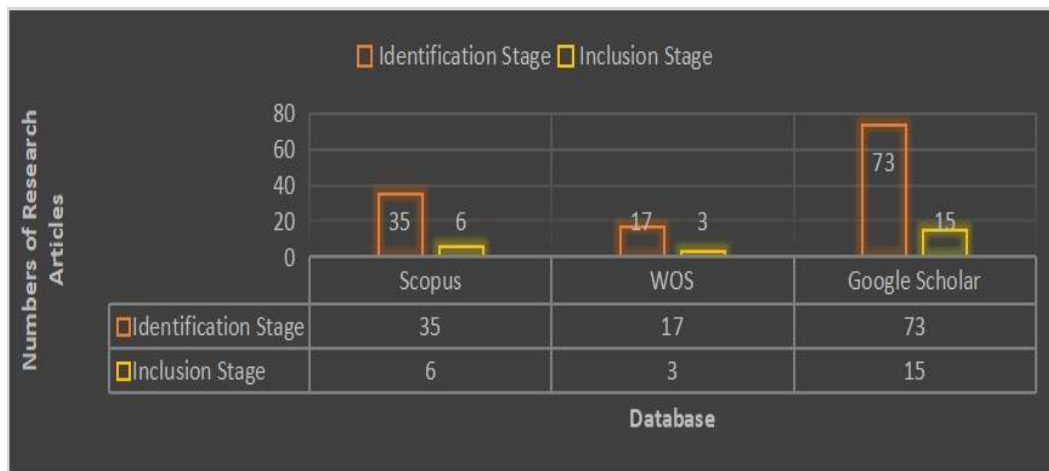


Figure 1 Analysis of Articles by Database

Table 3 The Eligibility & Exclusion Criteria

Criterion	Eligibility	Exclusion
Country	Global	
Source	Research papers	Editorials, chapter in book, books, commentary essays, conference paper, monographs and letters to the editor
Language	English Language	Other languages
Time Range	2013-2023	2013 and earlier
Subject	Economic literacy	Other literacy publications

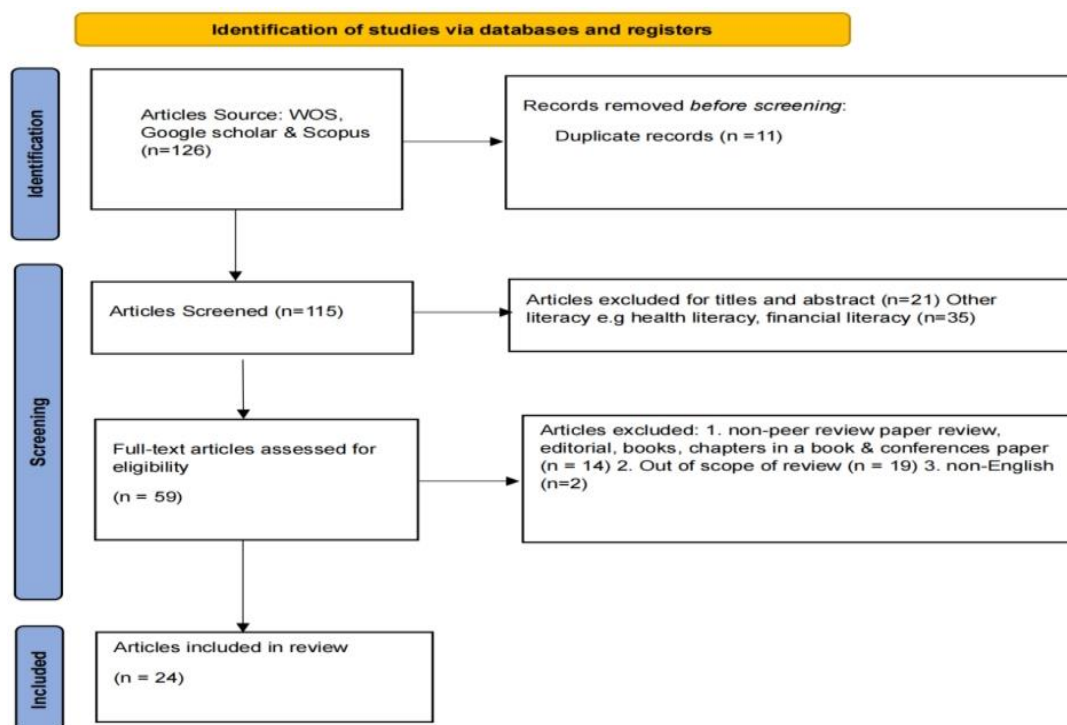


Figure 2 PRISMA diagram indicating identification, screening and eligibility criteria

#### 4. Quality Assessment

The MMAT evaluates the appraisal phase of systematic literature reviews that include mixed-methods, quantitative, and qualitative studies (Hong, et.al., 2018; Pluye, et.al., 2011). It simultaneously assesses the methodological quality of three types of research: mixed, qualitative, and quantitative (with sub-categories for randomised controlled trials, non-randomized studies, and descriptive analysis). The



MMAT criteria were used to judge the quality, with 25% attributed to articles of below-average quality, 50% assigned to those of average quality, 75% assigned to articles of above-average quality, and 100% assigned to pieces of excellent quality (Yusop, et.al., 2022). Expert review of the twenty-four articles used in the review shows that eighteen of the papers are rated high quality, four rated above average and one rated average. Since, 73% and 17% of the papers is rated high quality and above average respectively, the outcomes of the selection and inclusion the review papers are reliable. The below figure 3 demonstrate the quality assessment.

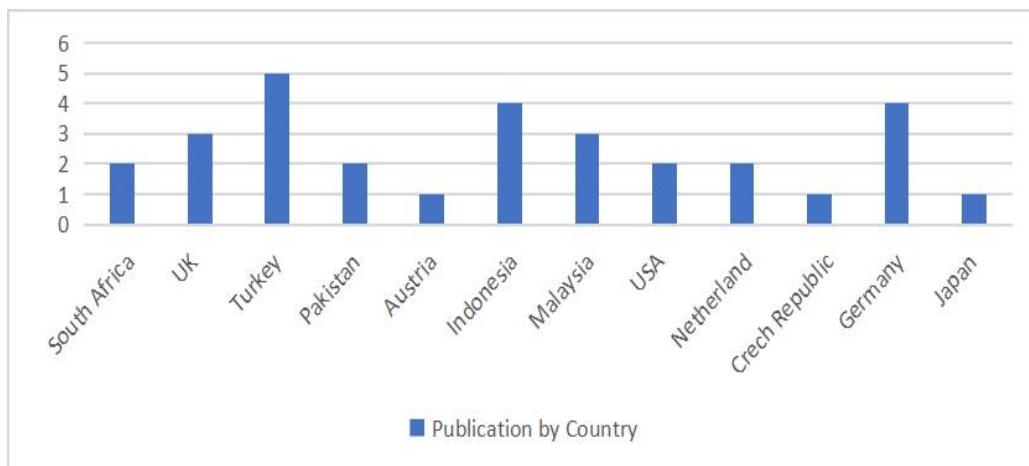
**Table 4** Data Extraction

S/N	Authors & Year	Method	Country	Journal
1	Dİlek, et.al., (2018).	Correlation Regression	Turkey	Afro Eurasian Studies
2	Yasmin, et.al., (2014)	Regression	Pakistan	Pakistan Journal of Commerce and Social Sciences
3	Stieger & Jekel, .(2019)	Qualitative	Austria	Journal of Social Science Education
4	Budiwatie, et.al., (2020)	Qualitative	Indonesia	International Journal of Innovation, Creativity and Change
5	Budiwati, et.al., (2020)	Cross-Tabulation	Indonesia	Jurnal Pendidikan Ilmu Sosial
6	Ismail, et.al., (2019)	ANOVA Correlation	Malaysia	Research in World Economy
7	Nizam, et.al., (2020)	Regression	Malaysia	Malaysian Journal of Society and Space
8	Yıldırım & Oztürk, (2017)	Sum of ranking scores	Turkey	Erciyes Journal of Education
9	Yayar & Karaca, (2017)	Factor Analysis, ANOVA, T-Test	Turkey	Pakistan Journal of Commerce and Social Sciences
10	Fourie & Krugell, (2015)	Chi-Square	South Africa	International Journal of Education Economics and Development
11	Cakmak, et.al., (2015)	Test ANOVA	Turkey, UK	The International Journal of Early Childhood Learning
12	Grol, et.al., (2017)	ANCOV	Netherland	Springer European Journal of Psychology of Education
13	Folke, et.al., (2021).	Factorial Analysis n= 346	Netherland, UK, Czech Republic & USA	European Journal of Psychology Assessment
14	Hashim, & Bakare, (2013)	T-Test	Malaysia	World Applied Sciences Journal
15	Tekbas, (2021)	ANOVA & T-Test	Turkey	Management and Economics Review
16	Hasan, et.al., (2022)	SEM	Indonesia	Jurnal Economia
17	Kimanzi, (2021)	Correlation	South Africa	International Journal of Innovation, Creativity and Change
18	Qayyum, & Muhammad, (2021)	Econometrics	Pakistan	Journal of Social Sciences and Humanities
19	Happ, et.al., (2021)	Mann–Whitney-U-test	Germany & Japan	SAGE Journal Citizenship, Social and Economic Education
20	Reinhardt, et.al., S.(2021)	Regression Analysis	Germany	Journal of International Students

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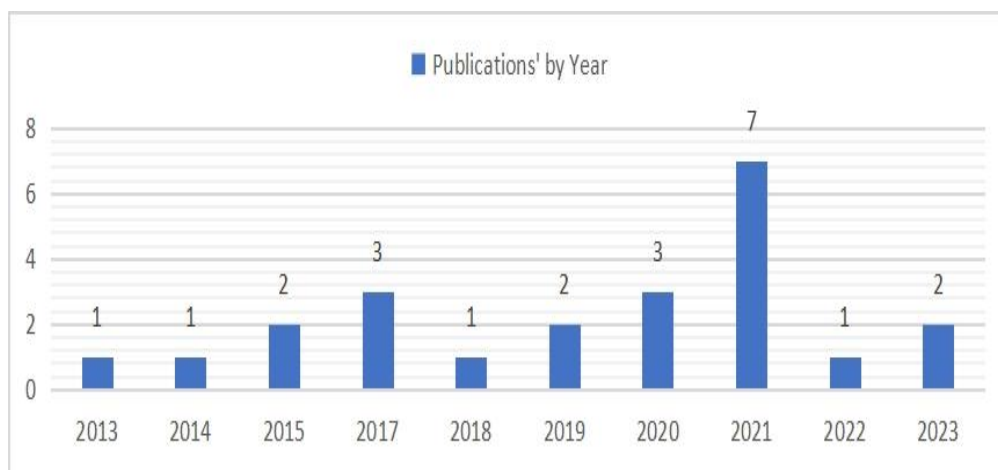
21	Lin & Bates, (2022)	CB-SEM	United Kingdom	Elsevier Journal of Intelligence
22	Pristiani, et.al., (2021)	Descriptive Statistic	Indonesia	Ilkogretim Online - Elementary Education Online
23	Happ, et.al.,(2023)	Measurement Invariance Analyses	Germany & USA	Journal of Risk and Financial Management
24	Sebastian & Happ, (2023)	Qualitative	Germany	Journal of Risk and Financial Management

Table 4 indicated data extracted from review studies. Figure 3 shows number of publication per country and it is evident that Turkey, Indonesia, Malaysia, United Kingdom and Germany have the most publication. Japan, Czech Republic, Austria has the least studies among the review studies.



**Figure 3** Publication by Country

Figure 4 portray the spread of the reviewed publication based on year. The highest publications were from 2021, 2020 and 2017 while the least publications are from 2023, 2022, 2014 and 2013 respectively.



**Figure 4** Publications by Year

Figure 5 analyzed the reviewed studies by research methodology employed in the paper. Out of twenty-four studies, twenty employ quantitative descriptive, one employ quantitative non-randomized research design while three studies are qualitative.

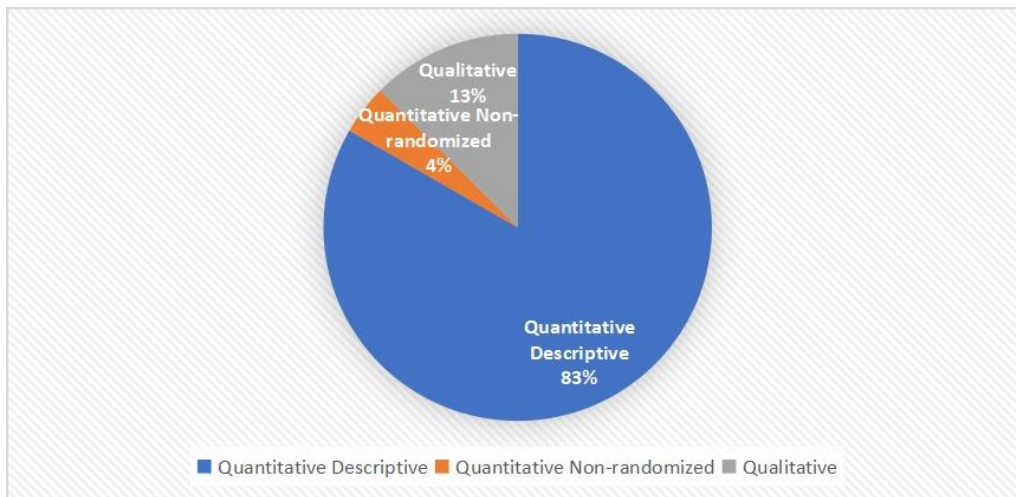


Figure 5 Publications by Methodology

## DISCUSSION OF FINDING

### 1. Factors determine the variability of the level of economic literacy

There are numerous factors that affect economic literacy (Gerek and Kurt, 2011). The review of studies indicated that the variability of economic literacy can be attributed to social factors, demographic factors, personality characteristic and cognitive factors. Figure 6 below indicate factors affect the level of economic literacy.

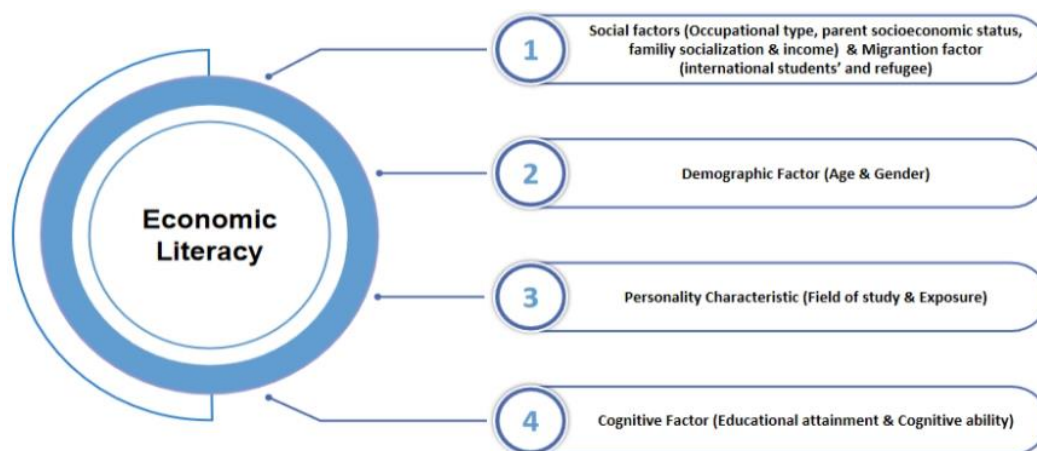


Figure 6 Factors affecting level of economic literacy

Delik (2018) argued that economic literacy was also affected by factors such as belief in the benefits of economic literacy and interest in economics. Yasmin and Kouser (2014) discovered that student education and expenditure, father education, gender, and age all have statistically significant effects on economic literacy. According to Yasmin et al. (2014), respondents' level of economic literacy showed positive and statistically significant correlations with age, spending habits, gender, father's education, and student's education. However, the parent's socioeconomic status was found to have a statistically significant but negative correlation. Additionally, Yayar and Karaca (2017) proposed that the levels of economic literacy are influenced by gender, age, occupation, and income.

Cakmak, et.al., (2015) studies revealed that demographic factors such as age and gender have minimal influence on one's level of economic literacy. An intriguing finding was that social science students who took economics classes, despite being expected to perform better, achieved statistically significant lower scores. On the other hand, students majoring in mathematics education exhibited

higher levels of economic literacy compared to the other participants. This finding was supported by (Nizam, et.al., 2020) who argued field of specialization and socioeconomic background impact on the level of economic literacy.

Tekbas, (2021) claimed that the results analyzed indicated that the population of Turkey has a reasonable degree of economic literacy. Yet, when the influence of demographic parameters on economic literacy was investigated, it was found that there was little difference in economic literacy according to age, gender, income level, or marital status. It was noted that there were considerable variations in terms of occupational groupings and educational attainment. Also, Qayyum and Muhammad, (2021) claimed that differences in economic literacy levels are mostly impacted by demographic characteristics, such as income, educational attainment, age, family history, and occupation types.

In a study by Reinhardt et al. (2021), the economic literacy of two groups of students—international students and refugees—was compared. The results showed that refugee pupils performed better than students from other countries on tests of economic literacy. Because they are older and have more academic experience, refugee students may have an edge over other students because, according to certain studies, economic skills tend to get better with age (Happ et al., 2018). Additionally, the survey found that female pupils underperformed male students, a finding that held true for both groups—those with and without refugee backgrounds.

Happ et al. (2023) claimed gender and first language impact the level of economic literacy. In the economic literacy test, it was shown that male students did better than their female counterparts in both the US and Germany. Students who did not speak English as their first language also performed worse on the economic literacy test than those whose first language was English. Notably, these linguistic and gender disparities were more pronounced in Germany than in the US.

In the study conducted by (Lin and Bates, 2022), it was discovered that a strong positive correlation exists between higher levels of economic knowledge and high cognitive ability. Interestingly, cognitive ability was found to significantly influence economic understanding, independent of and to a greater extent than educational attainment or economics courses. The research also highlights that higher cognitive ability contributes to a deeper comprehension of economic principles and a more effective application of economic knowledge, both of which play crucial roles in enhancing long-term financial security.

According to (Sebastian & Happ, 2023) carried out extensive quantitative research in Germany, reveals that migrants have lower economic literacy ratings than non-migrants. This study investigates the impact of family financial socialization on young adults' economic awareness. Interviews with eight post-Soviet migrants in Germany reveal that parents have a considerable influence on their children's understanding of economic ideas. The report suggests targeted programs and teacher training to close these understanding gap.

## 2. Psychometric Properties of Economic Literacy Measurement

In developing economic literacy instrument, (Welandt and Abs, 2023) claimed that four factors are pertinent to considered, which are methodological approach of the subject matter of economic literacy, difficulty level of the instruments, assessment formats and technical implementation and determining the reliability and validity of the instrument based on content coverage and real-life application. The methodological approach is based on the criterion-based or behavioural based approach. The assessment format could be survey format in form of verbal and mathematical representation mode using multiple choices, single choice or short answer questions. The technical implementation can be computer based or paper-based. Analysis of the reliability and validity of the instrument is meant to determine the suitability of the instrument based on content and the ability to predict higher-order thinking skills such as economic rationality, economic decision making and socioeconomic reflection.

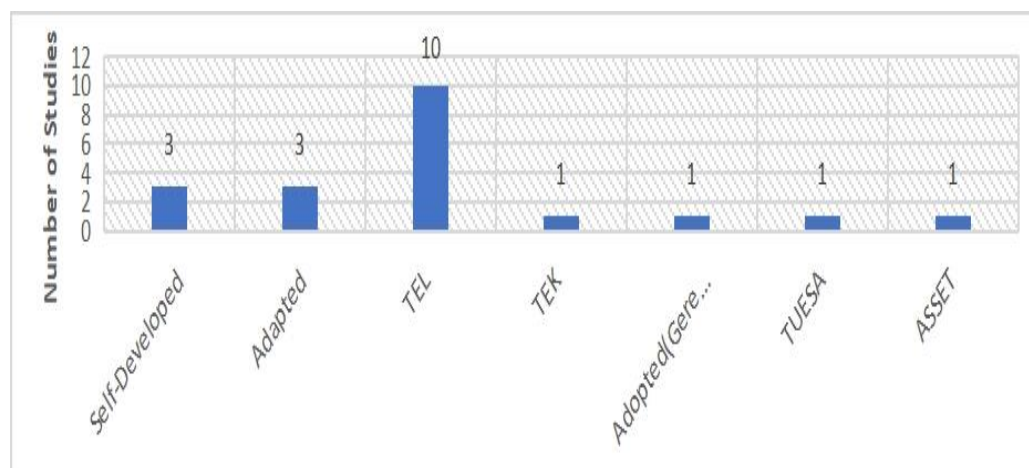
**Table 5** Psychometric Properties of Economic Literacy Measurement

S/N	Authors & Year	Measurement	Properties	Classification	Unit of Analysis
1	Dilek, et.al., (2018).	Self-Developed	Microeconomics, macroeconomics, and real or institutional economics	Criterion-Based Approach	General populace (Age 18-66+) Sample Size (481)
2	Yasmin, et.al., (2014)	Test of Economic Literacy (TEL)	Microeconomics and macroeconomics	Criterion-Based Approach	University Student Sample size (200)
3	Ismail, et.al., (2019)	TEL	Microeconomics and macroeconomics	Criterion-Based Approach	University Student Sample size (600)
4	Nizam, et.al., (2020)	TEL	Microeconomics and macroeconomics	Criterion-Based Approach	University, Secondary & Vocational Student Sample size (400)
5	Yayar & Karaca, (2017)	Adapted (Gerek and Kurt's (2011) Scale)	Economic Knowledge, Rationality, Individual Economic Planning and Social Economic Reflections	Behavioral Approach	Public Officer Sample Size (397)
6	Fourie & Krugell, (2015)	Test of Understanding Economics in South Africa (TUESA)	Microeconomics & Macroeconomics	Criterion-Based Approach	University Student Sample Size (2717)
7	Cakmak, et.al., (2015)	(TEL)	Microeconomics & Macroeconomics	Criterion-Based Approach	University Student Sample Size (888)
8	Grol, et.al., (2017)	Self-Developed	Microeconomics	Criterion-Based Approach	High School Student Sample Size (134)
9	Folke, et.al., (2020).	Assessment of Economics and Financial Literacy (ASSET)	Compound interest, economic and financial decision	Criterion-Based Approach	UK & US resident age 18-24.
10	Hashim, & Bakare, (2013)	TEL	Microeconomics & Macroeconomics	Criterion-Based Approach	Undergraduate (200)
11	Tekbas, (2021)	Adopted (Gerek and Kurt, 2011) Scale	Economics Knowledge, Economic Rationality, Social Economic Reflections and Individual Economic Planning	Behavioral Approach	Turkey resident (Age 18-65) Sample Size (389)
12	Hasan, et.al., (2022)	TEL	Microeconomics & Macroeconomics	Criterion-Based Approach	University Student Sample Size (362)
13	Kimanzi, (2021)	Self-Developed	Microeconomics & Macroeconomics	Criterion-Based Approach	University Student Sample Size (134)
14	Qayyum & Muhammad, (2021)	Adapted (TEL, OECD)	Policy awareness, theoretical understanding, institutional awareness and Self-Aptitude	Behavioral Approach	General Public Sample Size (696)

*continued*

15	Happ, et.al., (2021)	TEL	Microeconomics & Macroeconomics	Criterion-Based Approach	University Student Sample Size (901-Germany, 571-Japan)
16	Reinhardt, et.al., (2021)	TEL	Microeconomics & Macroeconomics	Criterion-Based Approach	University Student N=327
17	Lin & Bates, (2022)	The Test of Economic Knowledge	Microeconomics & Macroeconomics	Criterion-Based Approach	General Public/UK resident Sample Size (656)
18	Pristiani, et.al., (2021)	Adapted (TEL)	Microeconomics, Macroeconomics, Attitude & Skill component	Behavioral Approach	High School Student Sample Size (254)
19	Happ, et.al.,(2023)	TEL	Microeconomics & Macroeconomics	Criterion-Based Approach	High School Student Sample Size (United State-3517) Germany-983)
20	Budiwati, et.al., (2020)	TEL	Microeconomics & Macroeconomics	Criterion-Based Approach	Economics Teacher Sample Size (80)

Figure 8 analyses the economic literacy scale utilized in reviewed studies. The diagram highlights the prevalence of the TEL scale as the most commonly employed measurement for assessing economic literacy. This finding is supported (Welandt and Abs, 2023) that claimed that Test of Economic Literacy (TEL) is the most used measure in both national and international research. Three studies devised their own scales, while another three studies adapted existing ones. Out of these adaptations, two utilized the TEL and OECD financial literacy instrument. Additionally, one of the adapted studies employed the economic literacy scale developed by Gerek and Kurt in 2011. Other studies use Test of Economic Knowledge (TEK), the Economic Literacy Scale by Gerek and Kurt (2011), the Test of Understanding Economics in South Africa (TUESA), and the Assessment of Economics and Financial Literacy (ASSET) as measurement.

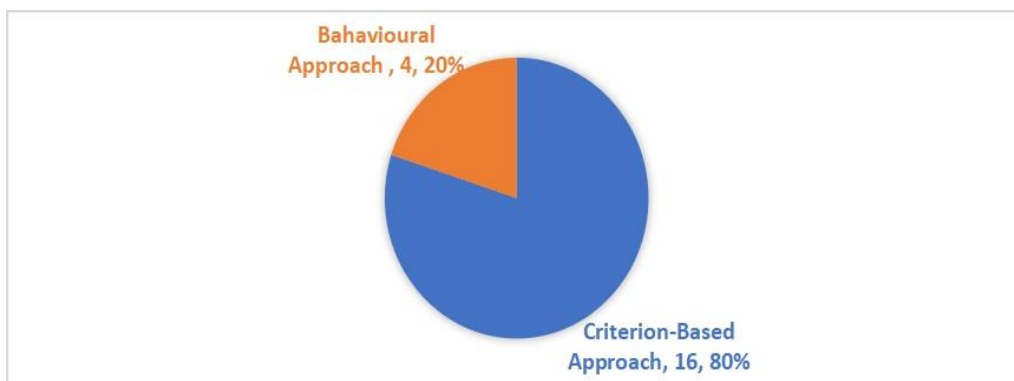


**Figure 8** Economic Literacy Instrument

Figure 9 illustrates the psychometric attributes of the Economic Literacy Scale. Most of the studies under review employed economic literacy scales developed through the criterion-based approach. These criterion-based economic literacy scales primarily focus on assessing economic knowledge, encompassing microeconomics and macroeconomics domains. TUESA, TEL, TEK, ASSET and some self-developed scales were used to assess the level of economic knowledge. The

ASSET scale includes components related to compound interest and economic and financial decision-making, covering aspects like risk diversification, inflation, simple interest rates, and interest compounding (Folke et al., 2020). However, the psychometric evaluation of the ASSET scale suggests that it may not accurately measure economic literacy through either approach. Despite its title, the ASSET scale's alignment with economics literacy appears misleading, which could impact future studies. The Traditional Economic Literacy (TEL) assessment has been criticized for its knowledge-centric approach, potentially neglecting the wider scope of economic literacy involving diverse economic situations and policy matters (Welsandt & Abs, 2023). Scholars argue for greater attention to policy choices and overarching economic contexts (Ackermann, 2019). Additionally, current measurement methods have faced criticism for their one-side interpretation of economic literacy.

When employing the criterion-based approach to measure economic literacy, future researchers should validate the TEL, TEK, and TUESA scale within the country context due to difference in economics curriculum and socioeconomic circumstances. An instance of this is seen in Happ et al.'s (2023) study, where they adapted the TEL scale (Walstad et al., 2013) and validated its use in Germany (Förster et al., 2017). Conversely, Hashim and Bakare (2013) utilized the TEL scale in the Malaysian context, but no explicit report on its adaptation and validation in Malaysia was provided, potentially affecting the study's outcomes. Sebastian and Happ (2023) argued that solely relying on a criterion-based approach to test economic knowledge might be deceptive. In their research, they employed the think-aloud method alongside the TEL survey, where participants articulated their responses. This approach revealed divergences in understanding through reasoning and explanations. Instances of correct answers with varying rationales exposed potential misconceptions, including cases where participants guessed correctly but explained differently.



**Figure 9** Methodological Approaches of Economic Literacy Instrument

Furthermore, the behavioural approach to developing economic literacy scales focuses on assessing the behavioural facets of economic literacy, including rational decision-making, economic attitudes, and skills. Reinhardt et al. (2019) proposed that economic literacy originated beyond academic settings, emphasizing its influence on individuals and societies. It emphasizes citizens' capacity to analyze public economic policies, highlighting the societal benefits gained when people possess economic knowledge, enabling them to comprehend and evaluate significant economic occurrences (Walstad, 1998; Reinhardt et al., 2019).

Economic literacy scales developed under the behavioural approach include Gerek and Kurt's (2011) scale, as well as the scales by Pristiani et al. (2021) and Qayyum and Muhammad (2021). Gerek and Kurt's (2011) scale encompasses dimensions of economic knowledge, rationality, individual economic planning, and social economic reflections. Pristiani et al.'s (2021) scale dimensions encompass Microeconomics, Macroeconomics, and Attitude & Skill components. The Qayyum and Muhammad (2021) Scale incorporates dimensions such as policy awareness, theoretical understanding, institutional awareness, and self-aptitude.

The quality of a measurement tool, whether it is considered effective or not, depends on the measurement approaches and application of the research (Welsandt & Abs, 2023). The intended audience and the study objectives must be precisely defined before designing a measurement tool. It is advantageous to start the process of creating new assessment items by reviewing the domain's present

measuring tools and their particular areas of content emphasis. If the aim is to determine economic knowledge or awareness, the criterion-based approach is appropriate. On the other hand, if the objective pertains to assessing economic attitudes or behaviors, then the behavioural approach is more suitable.

## **CONCLUSION**

The research findings indicate that the assessment of economic literacy's effectiveness hinges on both criterion and behavioral theoretical perspectives. The psychometric qualities of economic literacy assessment are influenced by factors such as theoretical perspectives, the social context within which economics curriculum is taught, and the unit of analysis employed. Moreover, it was observed that criterion-based measurements primarily adopt a knowledge-centric approach, which may not be suitable for gauging economic literacy accurately. Poor operationalization of the concept can pose challenges for generalizations the research' outcomes.

## **THEORETICAL AND MANAGERIAL IMPLICATION**

The study has dual implications, providing theoretical guidance by offering precise definitions and measurement guidelines for economic literacy, preventing confusion with financial literacy. It also lays the groundwork for future research, suggesting avenues for exploring economic literacy across diverse units and advocating the development of appropriate psychometric scales. On the managerial front, the study emphasized the need to validate scales across countries. This practical insight enables policymakers to design effective interventions and policies for enhancing economic literacy in diverse populations, making the study valuable for both theoretical refinement and practical policy making.

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Data will be made available on request.

## **CONFLICTS OF INTEREST**

The authors declare no conflict of interest.



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