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Development of a Psychological Measurement: Synectic Thinking Style Scale for Indonesian Students

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Abstract

Indonesia is a "space of imagination" rich in metaphorical and analogical traditions rich in symbols, allusions, and narratives, such as folktales, *pantun*, proverbs, *wayang* puppetry, and various forms of traditional Indonesian art. However, this space of imagination has not yet flowed into classrooms, thus stimulating students' thinking styles. Furthermore, valid, reliable, and theory-based instruments are still very limited. Measuring synectic thinking styles that strive to create a creative, innovative, and globally competitive generation will only be policy rhetoric. This article aims to develop and validate a synectic thinking style measurement instrument designed to assess students' engagement in metaphorical and creative thinking processes. This instrument is based on the synectic thinking style construct with two main theoretical dimensions by Gordon, making the strange familiar – which is understanding something unfamiliar through an existing knowledge framework – and making the familiar strange which is seeing something familiar from a new perspective. Data were collected online through a convenience sampling technique from 1,252 respondents, and after cleaning outliers, 607 responses were retained for analysis. Validity tests using Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) showed a stable factor structure and met the goodness of fit criteria. The Rasch Model analysis supported high reliability and fulfilled the assumptions of local independence. Although several items were found to have similar content or sound, and the need for refinement of the distribution of item difficulty levels, this instrument was deemed suitable for use as an initial measurement of synectic thinking style as a result of a particular learning model. Further research is recommended for the development of adaptive and cross-context versions.

Keywords: creativity measurement, CFA, EFA, educational assessment, instrument development, psychometric validation, Rasch model, *synectic thinking style*

Abstrak

Indonesia merupakan "ruang imajinasi" yang kaya akan tradisi metaforis dan analogis yang kaya simbol, penuh kiasan, dan narasi, seperti berupa cerita rakyat, pantun, pepatah, wayang, dan berbagai bentuk seni tradisional, namun ruang imajinasi itu belum mengalir di ruang-ruang kelas sehingga memicu gaya berfikir pelajar. Lebih dari itu masih sangat terbatas instrumen yang valid, reliabel, dan berbasis teori, mengukur gaya berfikir sinektik yang berupaya menciptakan generasi kreatif, inovatif, dan berdaya saing global hanya akan bersifat retorika kebijakan. Artikel ini bertujuan untuk mengembangkan dan memvalidasi instrumen pengukuran gaya berfikir sinektik yang dirancang untuk menilai keterlibatan siswa dalam proses berpikir metaforis dan kreatif. Instrumen ini disusun berdasarkan kontruk synectic thinking style dengan dua dimensi teoretis utama oleh Gordon, yaitu making the strange familiar (memahami hal asing melalui kerangka pengetahuan yang sudah ada) dan making the familiar strange (melihat hal yang sudah dikenal dengan perspektif baru). Data dikumpulkan secara daring melalui teknik *convenience sampling dari 1252 responden, dan setelah dilakukan pembersihan data outlier, sebanyak 607 respons dipertahankan untuk dianalisis. Uji validitas menggunakan Exploratory Factor Analysis (EFA) dan Confirmatory Factor Analysis (CFA) menunjukkan struktur faktor yang stabil dan memenuhi kriteria goodness of fit. Analisis Model Rasch mendukung reliabilitas tinggi serta terpenuhinya asumsi dan independensi lokal. Meskipun ditemukan beberapa item memiliki kesamaan isi atau bunyi, dan kebutuhan penyempurnaan sebaran tingkat kesulitan item, instrumen ini dinyatakan layak digunakan sebagai alat ukur awal synectic thinking style sebagai hasil model pembelajaran tertentu. Penelitian lanjutan direkomendasikan untuk pengembangan versi adaptif dan lintas konteks.*

Kata kunci: asesmen pendidikan, CFA, EFA, kreativitas, model Rasch, pengembangan instrumen, *synectic thinking style*, validitas psikometrik

Introduction

Empirical evidence shows that all parties still need to work hard to improve the creativity scores of Indonesian students. Many strategic policies have been launched, including principal exchange programs, teacher exchange programs, and a redesign of the principal supervision system throughout Indonesia (Pusporini et al., 2020). All of this is intended to address these challenges that PISA 2022 data shows that Indonesian students' creative thinking skills rank among the lowest in the world. Indonesia's average score is only 19 out of 60 points, far below the OECD average of 33 points. Only 31% of Indonesian students reach basic proficiency (Level 3), while the OECD average is 78%. In fact, only 5% of students are among the top performers (Levels 5-6), compared to the OECD average of 27%. Indonesia is among the 14 countries with the lowest performance in creative thinking. This data confirms that Indonesian education remains weak in developing divergent and innovative thinking skills, two core aspects directly measured by synectic thinking styles.

The independent learning curriculum (*kurikulum merdeka belajar*), implemented for a decade (2014-2024), and then deep learning since 2025, places creativity as a crucial dimension of the student profile. Synectic thinking in learning is essentially an interactive activity between a person and various learning resources within the learning environment through the five senses and experiences, which can potentially change a person's behavior to reflect a more creative thinking style (Lachman, 1997; Washburne, 1936). The aim of learning is to form a synectic thinking style to enable the process of acquiring knowledge, skills and forming attitudes in dealing with problems that arise during the learning process (Jargom, 2020). The quality of learning to form a synectic thinking style is greatly influenced by the motivation, content and creativity of educators (Sebastianelli et al. 2015), because educators play a role in creating learning conditions that encourage students to achieve learning targets. These targets are the result of teachers' creative processes in designing learning so that students are trained in their synectic thinking style when engaged in meaningful and creative problem-solving situations. This is in accordance with research results showing that encouragement from teachers and motivation from within students both have an important influence on student creativity, although the influence is not direct (Yuan et al., 2019).

The process and various learning models in Indonesia, even in the world, often still face a number of problems if the aim is to form students' synectic thinking style, and often even hinder optimal student learning in terms of their further cognitive development (Alentina et al., 2013). The implementation of learning has not been running optimally, which is shown in the teacher's learning process which is too directive (Dolmans et al., 2005). The implementation of learning has not been running optimally, which is shown in the teacher's learning process which is too directive, which cuts off the potential for student independence at a very early stage (Hmelo-Silver, 2004) caused by not encouraging project-based learning, divergent thinking, and a student-centered approach. Teacher dominance in the learning process also reinforces this passive tendency in students. This situation hinders student development because the learning model limits their ability to build imagination and express ideas. Furthermore, evaluation is suboptimal because teachers are unfamiliar with using portfolios to monitor and improve student progress. This situation indicates that learning still falls short in accommodating the needs of active, creative, and student-centered learning. Therefore, high-quality learning is needed, emphasizing deep understanding and supported by metacognitive skills such as self-regulation and reflection on the learning process (Mattick & Knight, 2007).

As individuals at the forefront and a core component of education, teachers have tremendous potential to transform and improve the quality of education. Teachers are not only required to possess skills and expertise, but also to possess resilience, self-efficacy, optimism, and hope to impact students (Nashtya & Baidun, 2017). The results obtained by students clearly reflect the level of educational development that has occurred so far (Habibillah et al., 2023). Teachers' teaching skills (Fitriani et al., 2022; Yanti et al., 2025) and their performance (Masdianah et al., 2023; Mujiningsih & Syahid, 2024; Wahyuni & Syahid, 2025) has a significant impact on the quality obtained by students. Therefore, if teachers have the ability to manage the class to present effective and efficient teaching methods and models, such as for the sake of and to form a synectic thinking style, so that the student learning process will be able to experience better progress.

One effective learning model is one that fosters synectic thinking in students. Research by Rutiningsih (2018) confirms that students who develop synectic thinking using a specific learning model are more effective than those who develop conventional learning models, as evidenced by a significantly higher average gain index score of 21.12 compared to 18.34. Learning models that foster synectic thinking are often considered a specific antidote to the problem of overly directive teaching styles. Overly directive teachers can lead to the demise of learning independence, low critical thinking skills, decreased intrinsic motivation, transactional interpersonal relationships, and the inhibition of creativity and innovation. While some learning models, such as Problem-Based Learning (PBL) and Discovery Learning, are student-centered or focused on finding solutions, the synectic thinking developed within a learning environment possesses unique mechanisms that can fundamentally reconstruct communication patterns and thinking paradigms in the classroom.

A synectic thinking style resulting from a particular learning model will be achieved if the learning direction is designed to strengthen students' cognitive structures through metaphorical activities to enhance creativity. Synectic thinking style is an individual's cognitive style that reflects a person's consistent tendency to process information and solve problems using metaphorical-analogical learning approaches and models. This construct is rooted in Gordon's (1961) synectic theory. In education, the synectic thinking style is designed and formed within a learning model that emphasizes an approach to creative problem-solving by connecting seemingly unrelated concepts (Gordon, 1961). When synectic thinking styles are designed or formed within a learning model, research results show that synectic thinking styles influence creative thinking, metacognitive skills (Suratno et al., 2019), and improve students' communication skills in their creativity (Kaur & Kaur, 2024).

At the time of writing, there is no psychological measurement tool specifically and systematically measuring synectic thinking styles in Indonesia, and even globally, it is still very limited. This is especially true for assessing synectic thinking styles within a learning model to measure student creativity in Indonesia. In Indonesia, a similar measurement tool has been circulating, namely the Torrance Tests of Creative Thinking (TTCT) by Torrence (1966, 1972) adapted by Munandar (1977). However, this adaptation is still oriented towards general creativity and is less sensitive to the mechanisms of making the strange familiar and making the familiar strange. Although the TTCT has become the most popular and widely used instrument worldwide for measuring creative thinking (Kim, 2006, 2011; Torrance, 1966, 1998, 2008; Acar et al., 2024), this instrument is general in nature and focuses on divergent thinking broadly, such as fluency, originality, elaboration, and flexibility. The TTCT does not specifically measure the metaphorical-analogical process that is at the heart of synectic thinking, as Gordon (1961) described it as inspiring. Therefore, it is necessary to develop a more specific and theory-based instrument, such as the synectic thinking style, that can assess the effectiveness of a particular learning model in more detail, especially on aspects of creativity, thereby being able to describe students' creativity levels more accurately. The synectic thinking style measurement tool produced through a particular learning model must be reliable, valid, have good item quality, and be equipped with norms to facilitate score interpretation. Practically, this instrument is expected to be used as a tool to identify students' creativity levels.

Methods

In the initial data collection phase between July and October 2025, 1,252 respondents participated, consisting of 602 males (48.1%) and 650 females (51.9%). The age range of respondents was between 12 and 20 years (M = 16.21 and SD = .95). The study participants came from various archipelago regions in Indonesia. The majority of respondents came from Java Island (88.4%), followed by Sumatra (9.1%), Sulawesi (1.2%), Maluku (.4%), and a small number from Kalimantan (.2%), Bali (.2%), and West Nusa Tenggara (.2%). Data collection in this study used a convenience sampling technique.

To date, no systematically documented development has been found for measuring synectic thinking styles resulting from a specific learning model. Therefore, researchers felt the need to develop an instrument capable of measuring synectic learning constructs in a more targeted manner. The development of this synectic thinking style instrument was carried out through stages of construct conceptualization by referring to the basic theory introduced by Gordon (1961) and the latest study presented by Agilandeshwari and Subramani (2024). Based on this theoretical foundation, 28 items were compiled representing two main dimensions of synectic learning. This questionnaire uses a Likert scale with four response options: "strongly disagree," "disagree," "agree," and "strongly agree." The two main dimensions that served as a reference in developing the items of this instrument were making the strange familiar and making the familiar strange.

Data analysis in this study was conducted through three stages, namely EFA and CFA, which were then continued with analysis using the Rasch Model approach to assess item characteristics in more depth. All EFA and CFA procedures in this study were analyzed using JASP 0.95.1.0 statistical modeling software with the Weighted Least Squares Mean and Variance Adjusted (WLSMV) estimation method specifically designed for ordinal or categorical data and using a Likert scale instrument (Li, 2016; Gi, 2023). Furthermore, the use of WLSMV is recommended by Psychological Test Adoption and Development for CFA-based testing (Gi, 2023), and the use of WLSMV is appropriate when used on samples as study subjects of more than 200 people (Roebianto, 2014).

The next stage, the author conducted an analysis using the Rasch Model with the Rating Scale Model (RSM) scoring developed by Andrich in 1978 and the Partial Credit Model developed by Master in 1982 (Isgiyanto, 2013). RSM & PCM are polytomous models in Item Response Theory (IRT) or Rasch modeling that aim to analyze questionnaires/tests with graded scores. In this case, RSM assumes that the rating scale structure is the same for all items, while PCM allows that each item has a unique and different rating scale structure. Then, the data analysis in this study was carried out using the Rasch model approach, specifically RSM. RSM is a mathematical extension of Georg Rasch's one-parameter logistic model (1-PL). This measurement model is very suitable for use with polytomous data sourced from Likert scale instruments in this study. RSM is able to estimate the probability of a participant (n) in selecting a certain response category (x) on an instrument item (i) by considering the individual's ability level and the item's difficulty level (Kim & Kyllonen, 2006). The use of Rasch modeling provides several advantages in the measurement process because it is able to calibrate three main components simultaneously, namely the measurement scale, the respondent (person), and the characteristics of the item (Sumintono & Widhiarso, 2015).

In addition, the Rasch Model is also known to be effective in handling missing data, providing more precise estimates, and producing standard errors that help improve the accuracy of measurement results (Sumintono & Widhiarso, 2015). The entire Rasch analysis process in this study was conducted using WINSTEPS software using the Joint Maximum Likelihood Estimation (JMLE) method, which allows for efficient and reliable estimation of item and person parameters in Rasch modeling. Furthermore, this program produces various outputs in the form of very comprehensive tables, but only a few outputs that are considered relevant to the focus of the study are then selected for analysis and reporting. The main outputs presented include: (1) unidimensionality checks to ensure that the instrument measures one core construct; (2) local independence tests using the Q3 index to assess the presence or absence of dependencies between items; (3) item measure estimates that indicate the relative difficulty level of each item; (4) summary statistics for respondents and items including reliability indices and separation values; (5) mapping the distribution of respondent abilities and item difficulty levels using Wright Map.

Results and Discussion

Results

A total of 1,252 respondents participated in this study, obtained through Google Forms. Prior to analysis, the authors conducted a preliminary check to determine if there were any outliers in the data. The check revealed several observations identified as outliers. Therefore, these observations were removed. A total of 645 observations were removed, leaving the 607 observations that met the criteria for further analysis.

The Kaiser-Meyer-Olkin value in Table 1 above is .983, exceeding the recommended value of .60 (Permana & Guci, 2024). A Kaiser-Meyer-Olkin (KMO) value of .983 indicates that the data is highly suitable for factor analysis. This value is considered very high, indicating that the relationships between items are considered strong and sufficient to form a stable factor.

Table 1. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	Bartlets's test
.938	$\chi^2_{(378)}$ =14,355.897, P-value=.000

Furthermore, the Bartlett test results show a value of $\chi^2_{(378)}$ =14,355.897 with a p-value = .000. This means that the Bartlett test is significant, so the correlation between items in the data does not form an identity matrix. In other words, there is a strong enough relationship between variables that the data is suitable for factor analysis. The Kaiser-Meyer-Olkin test and the Bartlett test indicate that the synectic thinking style data in this study is suitable for analysis using factor analysis. The next step is to view the results of the factor reduction through a scree plot graph (Figure 1 below). The point of change in the slope of the line (inflection point) is seen after the second point, which indicates that the number of factors formed is one factor. The determination of the number of factors is based on the correlation pattern between items. Thus, the EFA process can be concluded as running well because it successfully reduced a number of items into more specific factors.

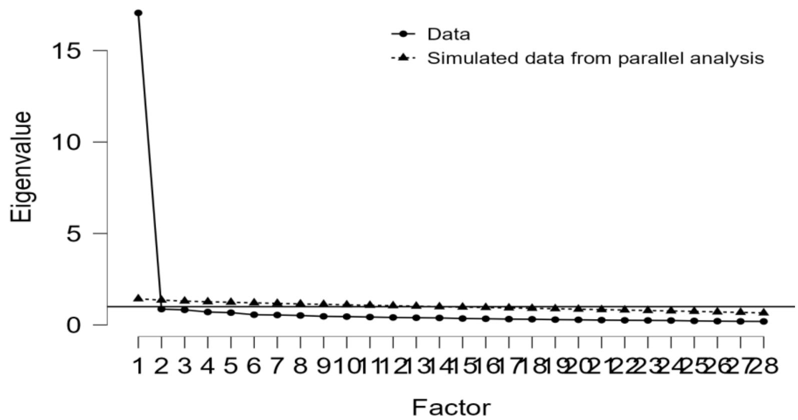

Figure 1. *Scree Plot*

Furthermore, the resulting factor loading indicates how much influence each item has on synectic thinking style. A good factor loading value is generally above .40 (Septian et al., 2024; Stevens, 1992). If an item has a value below the limit of < .40, it means that the item is less influential and therefore is not displayed in the table. The analysis results show that all items have factor loading values of .975 to .989, which means that all items are worthy of being retained for further analysis and this instrument has good accuracy in its measurement function in explaining synectic thinking style.

After conducting the EFA analysis, the next step is to confirm whether all items measure synectic thinking style (Umar & Nisa, 2020). The use of the CFA model must meet several goodness of fit criteria, namely the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), and Standardized Root Mean Square Residual (SRMR). Based on the criteria proposed by Hu and Bentler (1999) and Wang and Wang (2019), the standard model considered to have a good fit is CFI > .95, TLI > .95, RMSEA < .05, and SRMR < .08. The initial test results showed that the model did not meet the fit criteria with a Degree of Freedom value = 350, CFI = .984, TLI = .983, RMSEA = .072 (CI [.068, .076]), and SRMR = .038. Because the model did not fit, the researcher modified the model 21 times (Figure 2). After modification, the model met the goodness of fit criteria with a Degree of Freedom value = 326, CFI = .993, TLI = .992, SRMR = .029, and RMSEA = .050 (CI [.046 - .054]).

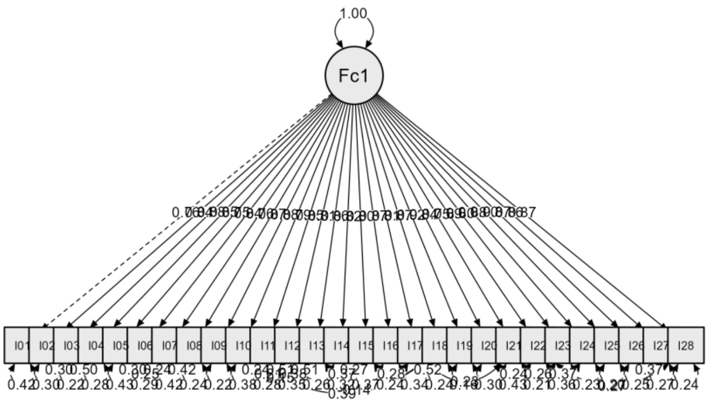

Figure 2. Unidimensional Model of Synectic Thinking Style

Furthermore, as seen in **Table 2.** below, the CFA results indicate that the proposed theoretical structure or model is consistent with the data obtained in the field. The next step is to check each item. This is done by examining the Z-value (or t-value) of the factor loading coefficient. An item is considered valid if it has a t-value > 1.96 and is positively loaded (Umar & Nisa, 2020). Based on the table above, all items have t-values greater than 1.96 and all show positive loadings. Therefore, it can be concluded that all factor loading coefficients on these items are valid.

Table 2. Reliability

Coefficient ω	Coefficient α
.970	.976

The results of the synectic thinking style test show that this instrument has a very good internal consistency value, with a Coefficient Omega (ω) value of .970 and a Coefficient Alpha (α) of .976. These results are far above the threshold of .70, this instrument is stated to have very high reliability for measuring the construct being studied.

Table 3. Factor loading coefficient of synectic thinking style Scale-28 Items

Item	Estimate	S.E.	Z-Value	P-Value	Description
Item01	.761	.006	131.1	<.001	Valid
Item02	.838	.006	150.0	<.001	Valid
Item03	.880	.005	165.2	<.001	Valid

Item	Estimate	S.E.	Z-Value	P-Value	Description
Item04	.851	.005	161.4	<.001	Valid
Item05	.755	.007	114.8	<.001	Valid
Item06	.845	.005	154.3	<.001	Valid
Item07	.760	.006	118.8	<.001	Valid
Item08	.874	.005	172.2	<.001	Valid
Item09	.881	.005	176.4	<.001	Valid
Item10	.785	006	129.6	<.001	Valid
Item11	.846	.006	150.8	<.001	Valid
Item12	.806	.006	135.5	<.001	Valid
Item13	.860	.006	138.6	<.001	Valid
Item19	.825	.005	150.4	<.001	Valid
Item20	.795	.006	130.7	<.001	Valid
Item22	.874	.005	176.8	<.001	Valid
Item24	.815	.005	148.8	<.001	Valid
Item28	.874	.005	165.9	<.001	Valid
Item14	.918	.004	212.5	<.001	Valid
Item15	.836	.005	156.7	<.001	Valid
Item16	.754	.006	117.2	<.001	Valid
Item17	.889	.005	180.4	<.001	Valid
Item18	.802	.006	140.5	<.001	Valid
Item21	.875	.005	175.9	<.001	Valid
Item23	.895	.005	171.5	<.001	Valid
Item25	.868	.005	181.2	<.001	Valid
Item26	.857	.005	165.3	<.001	Valid
Item27	.871	.005	179.3	<.001	Valid

Unidimensionality

Unidimensionality testing is a crucial step to ensure that all items in an instrument truly represent the construct being measured (Aryadoust et al., 2020). One widely used approach is principal component analysis of residuals (PCAR) (Chou & Wang, 2010; Smith, 2002). The PCAR procedure is performed after a Rasch Model analysis to examine residual patterns, which are the differences between actual responses and model-predicted responses. In Factor Analysis, a one-factor model is obtained, indicating that the set of items being studied can actually be grouped into a single factor, or what is called unidimensionality. Unidimensionality is an assumption in psychological, educational, or social science measurement that states that a set of items in an instrument is single or measures a single construct, dimension, or latent factor. Furthermore, an instrument is considered to have one factor or unidimensionality if the proportion of raw variance explained by the raw variance explained by measures should exceed 20%. In general, interpretation of value categories is grouped into three categories: 1). 20%-40% is categorized as sufficient; 2). 40%-60% is categorized as good; 3). > 60% is categorized as very good. On the other hand, the unexplained variance value in the 1st to 5th contrast has an ideal value of below 15% to ensure good model quality (Sumintono & Widhiarso, 2014). Based on the eigenvalue of 41.5, it indicates the large contribution of variance explained by the measure or construct in the analysis. Meanwhile, the raw variance explained by measure value of 59.7% means that the instrument or model is able to explain 59.7% of the overall data variance. In other words, more than half of the information contained in the data is successfully explained by the measured construct, so it can be concluded that the instrument has a strong and adequate ability to explain variance. Furthermore, the unexplained variance value in the 1st contrast was obtained at 2.2 (rounded). This indicates an initial indication of a secondary dimension (sub-dimension) in the research instrument, but its strength is relatively weak.

Local Independence

Local independence is a local assumption in the Rasch model that requires that each set of items must have no inter-item dependencies or meaningful correlations. This assumption is used if the unidimensionality assumption is proven to be met, this assumption stipulates that the residual correlation between other pairs of items is never > .30 (Aryadoust et al., 2020; Fan & Bond, 2019; Yen, 1984). In the results of this test, no residual correlation was found that exceeded the specified value above > .30. Based on the test results, the highest residual correlation value was .28 for the pair of items 11 and 12, and the lowest residual correlation value was .18 for the pair of items 22 and 28. Therefore, it can be concluded that the local independence assumption is met.

Item Measure

In advance of conducting further analysis using Winstep, the researcher transformed the data into a standard scale by setting the unit mean value at 50 and the unit scale at 5 to facilitate the interpretation of the measurement results. A unit scale of 5 means that each logit is multiplied by 5 (shifting one decimal place). Meanwhile, a unit mean of 50 means that the mean is shifted to the right by 50 to eliminate negative values. The final results are 0, 10, 20, 30, 40, 50, etc. The results of the item measure analysis obtained a range of the lowest measure value of 46.54 and the highest of 53.12. Measure in the Rasch Model is a linear estimate value (in logit units) that describes the respondent's ability level (person measure) or the level of question difficulty (item measure) (Linacre, 2019). Measure transforms mental ordinal score data into linear interval data that allows for fair and consistent comparisons between attributes.

This transformation is carried out to overcome the use of raw scores and improve the quality assurance of rating scale-based instruments. In this case, the Rasch Model allows or produces linear measurements based on ordinal data, the resulting logit (log-odds) units are often difficult to use practically because their value range includes negative and positive numbers or the use of complex decimals, making it difficult to understand or interpret the measurement results. Therefore, it is necessary to transform the logit scale into a more applicable and practical value so that it is easy to use in subsequent instrument use (Ekstrand et al., 2022).

In Table 4, all synectic thinking style items have goodness-of-fit statistics and the acceptable MNSQ value is .5 < MNSQ < 1.5, the acceptable ZTSD value is -2.0 < ZTSD < 2.0, and the Pt. Measure Corr value is .04 (Sumintono & Widhiarso, 2015). Table 5 below does not find any mismatched items, and this can mean that all synectic thinking style items fit the Rasch Model. The estimated item difficulty level is between .70 - 1.24 on the logit scale. Based on the item discrimination index, all synectic thinking style items have a high discrimination value in the positive direction and below the determination > .30 (Suryadi et al., 2020). This indicates that all these items have a good function to distinguish people with a high level of synectic thinking style versus a low synectic thinking style.

Reliability Item and Respons

Wright and Masters (1982) developed the concept of reliability in the Rasch model, which, although inspired by classical theories, such as Cronbach's alpha, has a different approach to measurement. In the Rasch model, Person Separation Reliability (PSR) is used to estimate the reliability of differentiating respondent abilities, while Item Separation Reliability (ISR) is used to measure the extent to which items can be differentiated based on their level of difficulty. These two values indicate how well the instrument is able to measure the intended variable. According to Wright and Stone (1999), ISR describes the accuracy of the items in providing information to test takers. An instrument is considered good if its separation reliability value exceeds .80 (Bond & Fox, 2015). For the synectic thinking style instrument, the PSR value is .97 and the ISR is .91. Thus, it can be concluded that the synectic thinking style instrument has excellent reliability and the results of its data analysis are acceptable.

Table 4. Statistics of the Fit of Rasch Items for Synectic Thinking Style

Item	Measure	Model S.E.	Infit	Outfit	PTMEA
Item 15	53.12	.50	1.04	.94	.74
Item 12	52.31	.48	1.05	.95	.77
Item 10	52.27	.49	1.08	.97	.74
Item 21	52.24	.48	1.26	1.24	.71
Item 13	52.06	.51	.91	.79	.79
Item 18	51.92	.49	.84	.74	.80
Item 17	51.58	.48	1.03	.90	.77
Item 1	51.44	.50	1.24	1.20	.71
Item 27	51.39	.52	.91	.74	.78
Item 26	50.97	.49	.88	.74	.80
Item 25	50.68	.51	.85	.74	.80
Item 23	50.23	.48	1.13	1.03	.75
Item 5	50.05	.50	1.24	1.19	.70
Item 4	49.94	.50	1.05	.92	.76
Item 11	49.85	.49	.92	.81	.79
Item 16	49.77	.49	.89	.76	.80
Item 24	49.24	.49	.91	.81	.81
Item 20	49.22	.48	1.05	.97	.78
Item 6	49.12	.50	.97	.83	.78
Item 3	49.00	.48	.88	.82	.82
Item 2	48.78	.49	1.02	.95	.77
Item 7	48.64	.51	1.14	1.14	.70
Item 8	48.39	.50	.86	.73	.79
Item 4	48.12	.49	.96	.91	.79
Item 9	47.85	.49	.93	.89	.80
Item 22	47.65	.48	.83	.74	.83
Item 19	47.63	.48	.77	.70	.85
Item 28	46.54	.49	.92	.86	.86

Wright Map

One of the advantages of the Rasch Model analysis with WinStep is the availability of the Wright Map (person-item map). This map attempts to map or visualize the distribution of subject ability levels and the level of difficulty of instrument items on an equivalent measurement scale (logit). The results of the analysis in Figure 1, compare the level of ability of respondents (left/persons) with the level of difficulty of the items (right/items) on the same logit scale. The majority of respondents are in the 50 to 90 logit range. This indicates that most of the respondents have a very high level of ability on the items tested by the researcher. Furthermore, the left section shows that the items (item 01-item 28) are concentrated in a narrow logit range, namely between 45 and 55. There are no items above level 60. Furthermore, there is a gap in the area or value of 60 logit and above. This means that the synectic thinking style items do not sufficiently reach or measure people or respondents with high abilities (the group at the top of the map). This concludes that the synectic thinking style instrument is off-target. Off-target occurs when the difficulty level of the instrument or test items developed is not aligned with or reaches the abilities of respondents with low abilities, or is too easy for respondents or test takers. Based on Figure 3 below, this synectic thinking style scale is most optimal for measuring individuals with moderate abilities. This is evident from the distribution of items, which tend to be concentrated around the middle area of the ability continuum. In this section, the number of items is quite large and not evenly distributed, allowing the instrument to distinguish individual abilities more accurately.

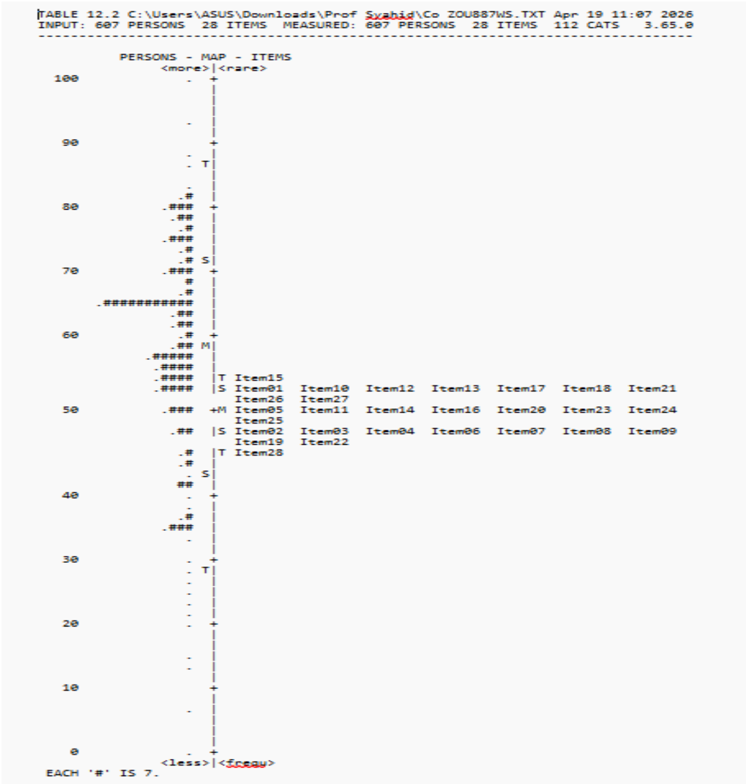

Figure 3. Wright Maps

Furthermore, at the lower and upper extremes of synectic thinking ability, the number of items available is relatively small. At the very low ability range (logit < –5), there are almost no items in that range. Similarly, at the very high ability range (logit > +), only a few items can measure this group. This condition indicates that the instrument is less able to provide optimal information for individuals who are very weak or very strong in synectic thinking style. This limitation can reduce measurement precision at both ends of the ability range due to the lack of items capable of mapping individual variation in greater detail. Therefore, instrument developers are advised to add some easier items to address the low-ability region, and add more difficult items to reach individuals with very high abilities. This addition will ensure a more even distribution of items across the ability range, making the measurement tool more sensitive, representative, and accurate in reflecting the variation in synectic thinking style abilities among students in Indonesia.

Discussion

This study aims to develop and evaluate a synectic thinking style instrument for students in Indonesia, integrating modern and classical validation approaches through EFA, CFA, and the Rasch Model. The results indicate that the developed instrument has a stable one-factor structure. Psychometrically, the CFA results indicate that the final model meets the goodness of fit criteria after modification, indicating that the instrument structure aligns with the empirical data. Furthermore, the Rasch analysis provides additional evidence regarding the quality of the items and responses. The reliability values of the PSR (.97) and ISR (.91) indicate that the instrument is able to consistently differentiate respondents' ability levels while assessing differences in item difficulty (Bond & Fox, 2015). The instrument also meets the assumptions of unidimensionality and local independence, meaning that the scale statistically measures the same construct and there is no redundancy between items. Furthermore, the number of samples, test length, and target audience influence unidimensionality. This is in line with research by Wardana (2022), which confirms that dimensionality testing is influenced by test length and sample size.

However, the Wright map shows that item distribution is more concentrated in the medium ability range, while the representation of items at very low or very high abilities is still limited. This phenomenon is likely influenced not only by the item development process but also by the characteristics of student responses during the questionnaire completion phase. In the field, indications were found that some respondents showed a tendency to answer quickly, were less reflective, and did not fully consider the content of the statements. This is supported by statistical fit patterns and response distributions that indicate the presence of response fatigue. This condition likely occurred due to: (a) the relatively large number of items, (b) the questionnaire was completed online without supervision, and (c) the majority of respondents reported completing the questionnaire in between other activities, making the process appear rushed. Psychological factors of respondents, such as short attention spans, a tendency to get bored easily, and unstable thinking depth in adolescents, as found in cognitive development research, may also contribute to suboptimal response patterns. In other words, in addition to methodological factors, the developmental characteristics of respondents also influence the quality of the data obtained.

Practically, this instrument offers an important contribution to the evaluation of learning that supports creativity based on synectic thinking styles, while also providing a diagnostic tool that educators can use to map students' readiness and characteristics in the creative thinking process. This instrument also has the potential to be used to monitor the effectiveness of creativity-based pedagogical interventions or creative problem-solving. However, before widespread implementation, refinements are needed by adding items with a wider range of difficulty and retesting in the context of supervised or digitally adaptive completion to reduce response bias.

Further studies are recommended to test measurement invariance across different cultural and demographic groups, as well as to develop a short scale version specifically for classroom use, and a Rasch-based computer adaptive testing (CAT) version to maintain optimal student response focus. Longitudinal research is also needed to test the instrument's sensitivity in capturing changes in creativity as a direct result of implementing synectic thinking styles.

Overall, this instrument can be considered a strong first step in providing a valid, reliable, and theory-based measurement tool for evaluating synectic thinking styles in students, although further refinement is needed to achieve measurement stability across broader contexts and populations.

Conclusion

This study successfully developed and validated a synectic thinking style instrument for Indonesian students based on theoretical foundation, with two core dimensions: making the strange familiar and making the familiar strange. Through EFA, CFA, and Rasch Model analyses, the instrument demonstrated a stable factor structure, strong construct validity, and excellent reliability. The analysis results also confirmed the fulfillment of the assumptions of unidimensionality and local independence, thus making this instrument a suitable measurement tool for identifying students' involvement in synectic thinking styles, both for research and educational practice.

However, findings related to the distribution of items on the Wright map and the tendency of some respondents to answer hastily indicate response fatigue, possibly due to the large number of items, online completion, and the relatively short attention span of adolescent respondents. Therefore, further development is needed, such as the development of a more concise version of the instrument or computer-based adaptive testing to make measurement more efficient and responses more reflective. Overall, this instrument makes an important contribution in providing a standardized evaluation tool to support learning practices that hone students' creative abilities and further research on the effectiveness of learning to produce synectic thinking styles in various educational and learning contexts.

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Appendix A.

Synectic Thinking Style Scale by Syahid et al. (2026)

Dimensions	Indicator	Item
Memahami hal asing melalui kerangka pegetahuan yang sudah ada	Berpikir analogis	Pengetahuan saya menjadi instrumen kognitif untuk memahami fenomena yang sebelumnya tidak familiar
		Pengetahuan saya membantu memahami tanda lalu lintas/notasi rumus
		Pengetahuan saya memahami makna dan fungsi begitu melihat suatu benda/simbol/tanda dan lainnya.
		Pengetahuan saya mudah mendemonstrasikan video tutorial dan memperagakannya
	Berpikir metaforis	Pengetahuan saya mudah memahami bahasa isyarat
		Pengetahuan saya mudah menangkap pesan lisan padahal baru pertama kali saya dengar.

Dimensions	Indicator	Item
		Pengetahuan saya mudah membandingkan dua hal yang berbeda berdasarkan persamaan/perbedaan sebagai dasar menyampaikan pesan imajinatif
		Pengetahuan saya dengan cepat menghubungkan satu hal pada situasi tertentu dengan situasi yang lain
		Pengetahuan saya kesulitan membaca makna dan maksud dari simbol-simbol peraturan/peringatan/petunjuk/situasi/tata tertib *
		Pengetahuan saya dengan mudah menjelaskan konsep/teori/rumus matematika/hukum fisika dengan sederhana
Melihat hal sudah dikenal dengan sudut pandang yang baru	Pola pikir dapat melihat masalah dari berbagai sudut pandang	Saya dengan cepat menganalisa masalah pelik/kompleks dari berbagai sudut pandang baru
		Saya dengan cepat memecahkan rumus matematika dengan berbagai cara penyelesaian yang baru
		Saya kesulitan menghadapi tantangan baru untuk meraih untuk meraih cita-cita di masa depan *
		Saya dengan mudah menangkap pengalaman orang lain sebagai inspirasi yang baru
		Saya kesulitan menghadapi masalah dengan cara terbaru*
		Saya dapat mengambil semua inovasi dan temuan terbaru sebagai inspirasi bagi kehidupan saya
	Menghasilkan berbagai solusi kreatif	Saya termasuk produktif menghasilkan ide-ide kreatif,

Dimensions	Indicator	Item
		meskipun dalam tekanan
		Saya termasuk orang yang kreatif
		Semakin saya melakukan aktivitas kreatif maka kapasitas saya akan berkembang
		Kreativitas saya semakin berkembang di tengah-tengah mereka yang ahli
		Saya tetap berpikir kreatif di lingkungan yang kurang mendukung
		Pada saat saya belajar (baca buku/melihat praktik/video tutorial) hal itu sangat berharga untuk mengasah kreatif saya dalam mencari solusi
		Pada saat senggang sekalipun, saya tetap kreatif
		Saya mengambil banyak ide/pelajaran dari pengalaman orang lain dalam menghadapi masalah baru yang pelik dan komplek
		Kreativitas saya sangat membantu dalam bersosialisasi
		Pada saat saya memandang masalah dari sudut pandang yang berbeda-beda, kerap muncul pendekatan baru tanpa disadari
		Saya dengan mudah memberikan lebih dari satu alternatif solusi untuk setiap masalah yang saya hadapi
		Saya cenderung menghindari masalah yang sulit karena merasa tidak akan berkembang*