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The 7C Skills Framework: A Measurement Tool to Enhance Global Competence in Multicultural Learning Based on Engagement Theory

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Abstract. The need to understand global competence in higher education in Indonesia currently relies on the 7C skills measuring instrument, which originates from Western cultural contexts and may lead to potential biases. This study aims to develop a 7C skills measuring instrument grounded in engagement theory through theoretical studies, expert validation, empirical testing, and construct validity. Adopting an exploratory sequential mixed-methods design, the research was conducted in two phases: the qualitative phase followed by the quantitative phase. The qualitative phase aimed to conceptualize the development of the 7C skills measuring instrument based on engagement theory through theoretical studies and expert evaluations. The findings from the qualitative phase revealed that the 7C skills framework consists of seven dimensions: critical thinking, collaboration, communication, creativity, connectivity, computational thinking, and cross-cultural understanding. The instrument was tested on 385 university students in Indonesia and analyzed for feasibility, factor structure, and construct validity. As a result, the instrument was reduced to 61 items, as certain items did not meet eligibility criteria. These findings demonstrate that the 7C skills measuring instrument, grounded in engagement theory, is valid and applicable for university students in Indonesia. Additionally, this study contributes to both the refinement of engagement theory as the foundation for constructing the 7C skills framework and the advancement of engagement theory by integrating perspectives from motivational theory and environmental fit. The practical implications include the development of a more precise and applicable 7C skills measurement tool for various educational contexts, fostering the enhancement of 21st-century skills.

Keywords: 7C skills; engagement theory; global competence; measurement tool; multicultural learning

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1. Introduction

In an era of increasing global competition, university students in Indonesia are expected to develop global competencies to compete internationally. However, a gap remains between the skills students possess and the demands of the global workforce, highlighting the need for a more adaptive and innovative educational strategy. In Indonesia, the transformation of education toward developing global competency still faces obstacles (Meilianti et al., 2021; Syafi'i et al., 2024), such as the lack of a 21st century skills-based curriculum (Nambiar et al., 2019; Rinekso, 2021), low level of student involvement in learning (Kristiana et al., 2023; Sudibjo & Riantini, 2023), and gaps in the use of digital technology (Fadhli et al., 2023). Universities also face challenges in increasing the engagement of students from diverse cultural backgrounds (Sulistyanto et al., 2023).

Currently, the rapid development of science and technology is facing very complex challenges and realities in scientific progress (Poonputta & Nuangchalerm, 2024). Researchers globally are faced with increasingly dynamic conditions of research measurement tools in line with changes in trends and culture in society in various countries (Zhong et al., 2024). Thus, improved validated research measurement tools can better identify and understand phenomena and provide a basis for developing new theory. To respond to this, the development of measuring instruments needs to be linked to efficiency and productivity in various fields (Rikala et al., 2024). One of the focuses is the development of tools to measure 21st-century skills. These tools are essential to accurately identify problems and produce precise data. Such data can then be used to provide recommendations for addressing issues related to global competence.

Empirical data obtained from a survey of 150 students at various universities in Indonesia show a worrying condition related to the low global competence possessed by students. The survey results revealed that as many as 65% of students stated that they had difficulty understanding global issues, 70% of students stated that they lacked experience in cross-cultural interactions, and only 20% of students stated that they had good English language skills, while the rest felt that they needed to improve these skills in order to compete at a global level. Active student involvement is essential to building global competencies (Yuyun, 2023). However, many students in Indonesia still face limitations in access to international-based learning. This can be caused by teaching methods that focus more on theory and memorization than practical application.

The development of 21st century skills measurement tools has also undergone adjustments and changes in accordance with the demands of technological progress(Gürsoy, 2021; Yilmaz, 2021). One of the widely recognized models for measuring 21st century skills is the 4C model, which includes Critical Thinking, Creativity, Collaboration and Communication skills (Kennedy & Sundberg, 2020; Rios et al., 2020). However, with the increasing complexity of technological advances, the 4C model alone is not sufficient to demonstrate the skills required by the next generation (Dishon & Gilead, 2021). Therefore, various parties have tried to develop and expand the 4C model into 6C. The 21st century skills

measurement model uses the 6C model by complementing the 21st century skills 4C model by adding Connectivity and Computational Thinking (Chu et al., 2021).

The development of 21st century skills measurement tools has been carried out from the 4C model to 6C as an effort to be able to measure such skills accurately in order to provide solutions enabling educators to equip the next generation with relevant skills (Shafie et al., 2019). With the right and comprehensive measuring tools, educators can identify and map students' abilities into 4C and the skills needed in the 6C model. However, based on the studies that have been conducted, it is necessary to add elements in 21st century skills expanding from the 6C model to 7C, namely by adding Cross-Cultural Understanding. This is necessary because we see Indonesian values that are currently starting to be aggregated by the development of globalization.

The 7C skill measurement tool needs to be studied based on engagement theory the dimensions of which include agentic engagement, behavioral engagement, emotional engagement and cognitive engagement (Gokmenoglu & Dasci Sonmez, 2024). The study of engagement theory is essential as a foundation for developing a 7C skills measurement tool, enabling students to recognize their constructive contributions to the instructions or tasks they receive during learning, particularly in a multicultural context (Islam & Khan, 2024). Efforts are made to encourage students to pay attention to learning activities and be diligent in completing assignments (Zajda, 2024), obeying the applicable norms and rules to avoid problems (Bognár et al., 2024). They are also prompted to feel positive emotions in teaching and learning activities, approaching them with interest and enthusiasm rather than annoyance, anxiety and boredom, in addition to the use of self-regulation and modern and in-depth learning techniques in the learning activities carried out by students (Nikou, 2024).

In the development of measuring instruments from the 4C model to 6C, the author then added a further component, namely Cross-Cultural Understanding. This is expected to provide a solution to the development of the next generation holistically (Granziera et al., 2022). By incorporating Critical Thinking, Collaboration, Communication, Creativity, Connectivity, Computational Thinking, and Cross-Cultural Understanding into the 21st-century skills measurement tool, we can assess students' overall development and gain insights into their abilities across various relevant aspects.

This study investigates the research question: How is the 7C skills construct formulated based on the engagement theory perspective in multicultural learning, as informed by theoretical studies, expert evaluations, empirical tests, and construct validity analysis? Furthermore, the study aims to analyze the 7C skills construct within this framework, drawing on the same sources of validation.

2. Literature Review

This literature review examines the 7C skills within the context of multicultural learning through the lens of engagement theory. Specifically, it explores the relationship between engagement and 21st-century skills, as well as their impact

on learning in a multicultural higher education environment. By synthesizing various theories and previous studies, this review highlights the role of engagement in developing students' comprehensive competencies.

2.1 Engagement in Multicultural Learning

Engagement is a fundamental aspect in education, especially in the context of higher education (Rachmad, 2022). Engagement has been linked to positive outcomes such as improved academic achievement (Reder et al., 2020; Tani et al., 2021) and reduced anxiety in the learning process (Guo et al., 2023; Paton et al., 2024). Although many educational constructs link various factors to positive educational outcomes, engagement is intuitively understood by practitioners as something that shapes students and engagement is seen as responsive to practices in higher education (Kong, 2021; Nepal & Rogerson, 2020). In a multicultural environment, engagement serves as a bridge that allows students from different cultural backgrounds to actively participate in the learning process.

However, research shows that engagement can decline during the transition from high school to college (Hidayat et al., 2024; Stein et al., 2024). Factors that influence engagement in multicultural learning include the academic environment, social support, and pedagogical strategies used by lecturers (Neufeld & Rigby, 2024; Nguyen & Ha, 2023). In addition, the engagement framework expands on the concept of the importance of meaningful engagement leading to content and implementation (Abacioglu et al., 2023). Therefore, a theory-based approach is needed that can explain the engagement mechanism in improving student learning outcomes.

Lack of engagement in higher education has been a concern for researchers for decades due to students' global interests and attitudes toward student knowledge in a multicultural learning environment (Abacioglu et al., 2023; Lo Presti et al., 2024; Martin et al., 2023). This decline often coincides with the transition from high school to college (Chi et al., 2024; Lyons et al., 2023). However, researchers suggest that decreased engagement is not an inevitable outcome of the high school to college transition (Thomas & Baral, 2023). Students have good development potential to engage cognitively by reasoning abstractly, considering multiple perspectives, and weighing multiple strategies simultaneously (Acosta-Gonzaga, 2023; Lazarides et al., 2023).

2.2 Relationship between Engagement and 7C Skills

Self-determination theory (SDT) and stage-environment fit (SEF) are two main theories used to explain student engagement in higher education. SDT emphasizes that students will be more motivated when they feel they have competence, autonomy, and social relatedness (Evans et al., 2024; Hornstra et al., 2023; Ryan & Deci, 2024). while SEF shows that the suitability between the educational environment and students' development needs will increase engagement (Cipriano et al., 2024; Schweder et al.). Because early adolescents are unique in their increasing developmental needs for autonomy and relatedness, these two theories provide a lens through which to evaluate engagement research at this age level.

The 7C skills, consisting of Critical Thinking, Collaboration, Communication, Creativity, Connectivity, Computational Thinking, and Cross-Cultural understanding, play an important role in engagement-based learning. Several studies have shown that these skills contribute to building an inclusive and adaptive learning environment to cultural differences. (Corbisiero-Drakos et al., 2021; Khoiri et al., 2021). The 21st century skills framework is presented in Figure 1.

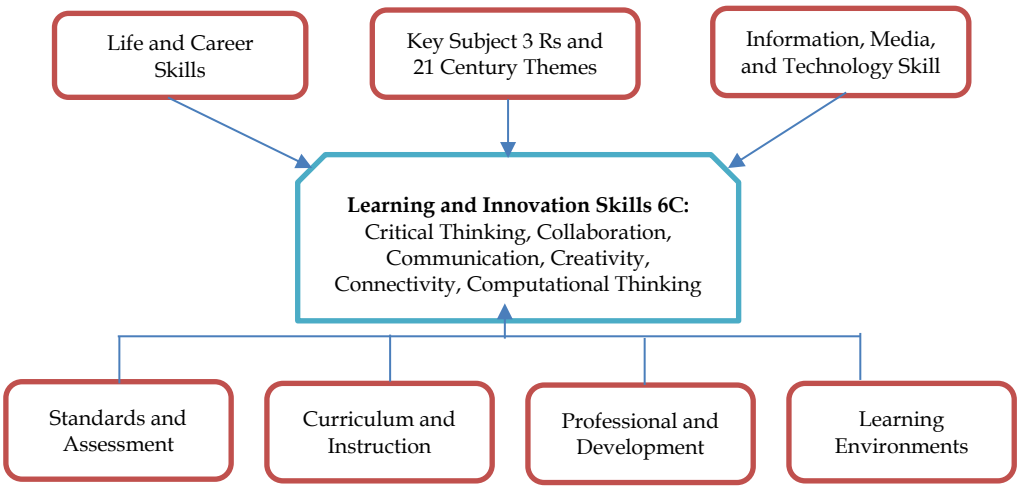

Figure 1: 21st century 6C skills framework (Chu et al., 2021)

Several studies have examined the relationship between engagement, 7C skills, and multicultural education. High engagement is positively correlated with increased critical thinking and communication skills (Mutohhari et al., 2021). Engagement in project-based learning enhances creativity and collaboration in a multicultural environment (Valtonen et al., 2021). The use of technology in learning strengthens students' computational literacy and global connectedness (Abacioglu et al., 2023; Islam & Khan, 2024).

Engagement plays an important role in developing 7C skills in students in a multicultural environment (Abacioglu et al., 2023; Kain et al., 2024). However, there is still a research gap regarding how each aspect of engagement can be optimized to effectively enhance these skills (Abacioglu et al., 2023; Islam & Khan, 2024). This study aims to develop a framework that integrates engagement theory with 7C skills in the context of multicultural learning. A mixed-methods approach, combining quantitative and qualitative analyses, will be employed to examine the relationship between engagement and 7C skills. The validity of the 7C skills construct, grounded in engagement theory, will be tested through surveys, expert interviews, and empirical data analysis. By adopting this approach, the study seeks to provide deeper insights into optimizing engagement in multicultural learning environments.

3. Research Methods

3.1 Research Design

This study employs a mixed-methods approach, combining qualitative and quantitative methods, to gain a comprehensive understanding of 7C skills within the framework of engagement theory in a multicultural learning context. The research adopts an explanatory sequential design (Figure 2), where quantitative data are collected and analyzed first, followed by qualitative data to provide deeper insights into the quantitative findings. The qualitative phase is conducted in stages, beginning with the conceptualization of 7C skills based on engagement theory, which serves as the foundation for developing a measurement instrument. This initial qualitative phase is followed by the quantitative stage, which refines and validates the findings from the qualitative analysis.

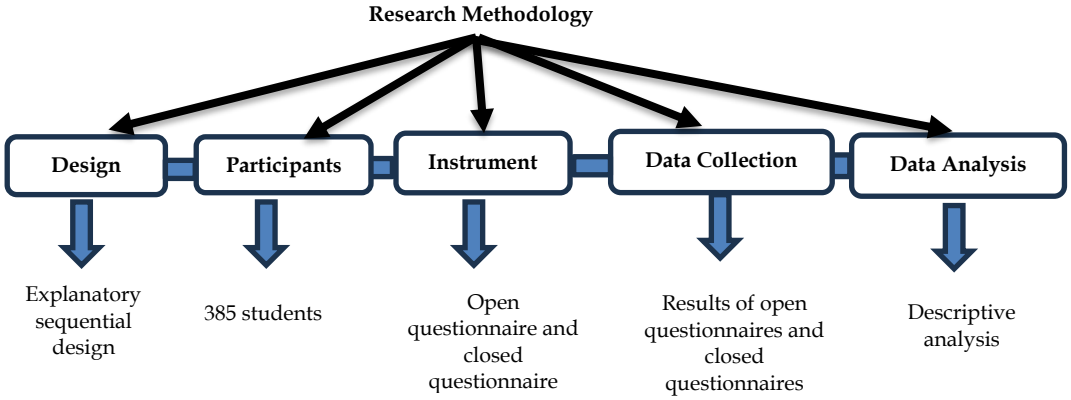

Figure 2: Research design used in explanatory sequential design

Qualitative research aims to explore data as a foundation for creating a blueprint for developing a 7C skill measurement tool from the perspective of engagement theory. Expert review is conducted as a systematic process of collecting data and information relevant to the development of a 7C skills measurement tool based on engagement theory. On the other hand, the quantitative method for developing the 7C skill measurement tool from the engagement theory perspective begins with preparing the instrument items, followed by analyzing the validity and reliability of the tool.

3.2 Research Participants

The population in this study were the 10,373 students at Indonesian universities spread across 18 study programs at universities in Indonesia. Slovin formula was used by setting a percentage of leeway of 5%, to obtain a sample of 385 students.

3.3 Research Instruments

Figure 3 presents a flowchart of the 7C skills measurement tool development.

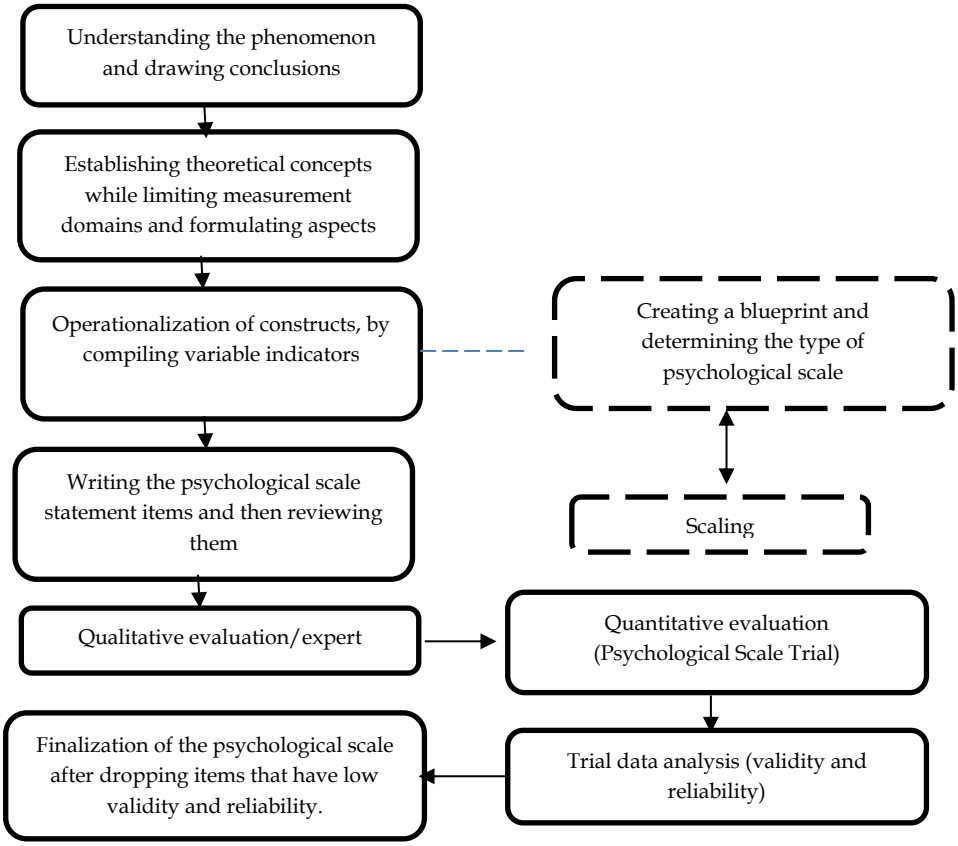

Figure 3: Flowchart of 7C skills measurement tool development

3.4 Data Collection Procedure

Data collection techniques in this study used: 1) an open questionnaire given to students at universities in Indonesia. For data collection, a quantitative survey approach was used. Data collected by the author through coded tools produced statistical data for analysis. 2) A closed questionnaire with items on the variables described was used for data collection from students at universities in Indonesia. The data collection instrument used a standardized instrument that has often been used by researchers in the field of variable studies similar to this study.

3.5 Data Analysis

The data analysis used is exploratory factor analysis and confirmatory factor analysis (Hochrainer-Stigler, 2020). Next, to analyze the relationship between items, the structural equation modeling (SEM) method is used with the help of SPSS and AMOS to collect and analyze data.

4. Results

4.1 Qualitative Results

The results of qualitative research in this study are based on the results of theoretical studies and expert tests. An expert or specialist, as referred to in this study, is someone with expertise relevant to the research being conducted. The first expert's assessment indicated that all aspects of the evaluation demonstrated high to very high validation. An s-CVI value of 0.97 was obtained, signifying very high validity (very good). The validator provided several suggestions regarding

the 7C skills measuring instrument from the engagement theory perspective, specifically noting that *"some statement items needed to be aligned with the predetermined indicators. These suggestions were then incorporated into revisions to enhance the validity of the 7C skills measuring instrument based on the engagement theory perspective."*

Then, the second expert provided an assessment with very high validation, obtaining an s-CVI value of 0.99, indicating excellent validity. The validator's feedback on the 7C skills measuring instrument, based on the engagement theory perspective, stated: *"The instrument has been well-prepared; however, some language errors are still present. It is highly recommended that researchers ensure each complete sentence in the instrument ends with a period."* Meanwhile, the third expert validator provided a highly positive validation assessment, obtaining an s-CVI value of 0.98, which indicates very high validity (excellent). The expert's comments stated: *"Overall, the proposed measuring instrument items are well-constructed, complete, and comprehensive. Each item appropriately represents an indicator of its respective aspect. There are minor revisions needed for sentences that remain ambiguous. Once revised, the instrument will be feasible and ready for testing."*

The fourth expert assessment provided validation ratings in the "good" and "very high" categories, achieving an s-CVI score of 0.91, indicating very high (excellent) validity. The expert provided feedback stating that: *"overall, the proposed measurement items are well-constructed, but some sentences remain ambiguous."* Based on theoretical review and expert validation, the 7C skills measurement instrument, grounded in the engagement theory perspective, is deemed suitable for trial implementation.

4.2 Quantitative Results

The instrument was tested for validity is a 7C skills questionnaire, developed from the perspective of engagement theory. This questionnaire includes statements with alternative answers ranging from positive to negative perspectives. It will be administered to respondents for testing. The 7C skills measuring tool, based on engagement theory, has a scale ranging from 1 to 7, with provisions for both favorable and unfavorable statements. The answer criteria range from a positive perspective, such as "strongly agree", to a negative perspective, such as "strongly disagree".

The instrument or measuring tool begins with questions to collect demographic and geographic data from the respondents. The next section gathers information regarding the 7C skills based on the perspective of engagement theory. The developed instrument consists of 77 statement items. All statements are first theoretically studied, which is an extension of the 7C skills. The novelty of the 7C skills measurement tool, based on the perspective of engagement theory, lies in its integration of the 7C skills from 21st-century skills: Critical Thinking, Collaboration, Communication, Creativity, Connectivity, Computational Thinking, and Cross-Cultural Understanding. The tool then examines the 7C skills through the lens of engagement theory, which includes agentic engagement, behavioral engagement, emotional engagement, and cognitive engagement.

This study involved 77 items of 7C skills instruments, starting with a CVI test and then an open trial was conducted on 385 students spread across Indonesia. Testing the validity of the development of the 7C skills measuring instrument using the CVI approach can be done by calculating two types of values, namely the content of individual items (i-CVI) and the content validity of the overall scale (s-CVI). The data were obtained from assessments by experts, which are presented in Table 1.

Table 1: Expert validation result data

No	Assessment aspects	Relevant proportions				*Mean* i-CVI
		V1	V2	V3	V4	
1	Clarity	1.00	1.00	0.93	0.93	0.97
2	Accuracy of content	1.00	1.00	1.00	0.8	0.95
3	Relevance	1.00	1.00	1.00	1	1.00
4	Validity of content	0.80	1.00	1.00	1	0.95
5	No bias	1.00	1.00	1.00	0.8	0.95
6	Language accuracy	1.00	0.93	0.93	0.93	0.95
		s-CVI				0.96

Source: Data analysis, 2024

The results of this content validity test are in line with previous research that has been conducted to test the validation of research instruments using the CVI approach and produces valid values according to the threshold, namely 0.83, while based on the data analysis above, a value of 0.96 > 0.83 was obtained with the criteria of being feasible or relevant or having very high validity (Bashooir & Supahar, 2018; Heryanto et al., 2019; Nursalam et al., 2017; Safitri, 2018; Santoso et al., 2016; Sugiharni, 2018). Based on the exploratory factor analysis test, it is known that the indicator estimate value for the newly formed dimensions in the 7C Skills variable can be presented in Table 2.

Table 2: Standardized regression weights variable 7C skills

			Estimate
Ct.1	<---	Critical Thinking	.784
Ct.2	<---	Critical Thinking	.756
Ct.3	<---	Critical Thinking	.829
Ct.4	<---	Critical Thinking	.800
Ct.5	<---	Critical Thinking	.468
Ct.6	<---	Critical Thinking	.723
Ct.7	<---	Critical Thinking	.761
Ct.8	<---	Critical Thinking	.500
Ct.9	<---	Critical Thinking	.770

			Estimate
Ct.10	<---	Critical Thinking	.614
Ct.11	<---	Critical Thinking	.805
Ct.12	<---	Critical Thinking	.743
Ct.13	<---	Critical Thinking	.464
Cm.1	<---	Communication	.700
Cm.2	<---	Communication	.704
Cm.3	<---	Communication	.654
Cm.4	<---	Communication	.385
Cm.5	<---	Communication	.655
Cm.6	<---	Communication	.593
Cm.7	<---	Communication	.444
Cm.8	<---	Communication	.664
Cm.9	<---	Communication	.715
Cm.10	<---	Communication	.296
Cm.11	<---	Communication	.609
Cm.12	<---	Communication	.660
Cl.12	<---	Collaboration	.640
Cl.11	<---	Collaboration	.740
Cl.10	<---	Collaboration	.724
Cl.9	<---	Collaboration	.705
Cl.8	<---	Collaboration	.657
Cl.7	<---	Collaboration	.707
Cl.6	<---	Collaboration	.278
Cl.5	<---	Collaboration	.685
Cl.4	<---	Collaboration	.657
Cl.3	<---	Collaboration	.276
Cl.2	<---	Collaboration	.703
Cl.1	<---	Collaboration	.630
Cr.1	<---	Creativity	.717
Cr.2	<---	Creativity	.509
Cr.3	<---	Creativity	.401
Cr.4	<---	Creativity	.568
Cr.5	<---	Creativity	.535
Cr.6	<---	Creativity	.683
Cr.7	<---	Creativity	.703
Cr.8	<---	Creativity	.789

			Estimate
Cr.9	<---	Creativity	.615
Co.9	<---	Connectivity	.649
Co.8	<---	Connectivity	.607
Co.7	<---	Connectivity	.522
Co.6	<---	Connectivity	.481
Co.5	<---	Connectivity	.684
Co.4	<---	Connectivity	.631
Co.3	<---	Connectivity	.540
Co.2	<---	Connectivity	.550
Co.1	<---	Connectivity	.616
Cp.1	<---	Computational Thinking	.487
Cp.2	<---	Computational Thinking	.749
Cp.3	<---	Computational Thinking	.810
Cp.4	<---	Computational Thinking	.828
Cp.5	<---	Computational Thinking	.555
Cp.6	<---	Computational Thinking	.751
Cp.7	<---	Computational Thinking	.765
Cp.8	<---	Computational Thinking	.502
Cp.9	<---	Computational Thinking	.733
Cp.10	<---	Computational Thinking	.792
Cp.11	<---	Computational Thinking	.769
Cc.11	<---	Cross-Cultural	.824
Cc.10	<---	Cross-Cultural	.773
Cc.9	<---	Cross-Cultural	.772
Cc.8	<---	Cross-Cultural	.777
Cc.7	<---	Cross-Cultural	.692
Cc.6	<---	Cross -Cultural	.485
Cc.5	<---	Cross-Cultural	.789
Cc.4	<---	Cross-Cultural	.764
Cc.3	<---	Cross-Cultural	.746
Cc.2	<---	Cross-Cultural	.767
Cc.1	<---	Cross-Cultural	.802

Source: AMOS SEM Output, 2024

The test results as presented by the researcher in the table above show there are several items that do not reach a value of > 0.5, including Ct.5 with a value of 0.468 <0.5, Cm.4 with a value of 0.385 <0.5, Cm.7 with a value of 0.444 <0.5, Cm.10 with

a value of 0.296 <0.5, Cl.6 with a value of 0.278 <0.5, Cl.3 with a value of 0.276 <0.5, Cr.3 with a value of 0.401 <0.5, Co.6 with a value of 0.481 <0.5, and Cp.1 with a value of 0.487 <0.5. The suitability model on each new dimension provides a statistically significant value. The model structure is presented in Figure 4.

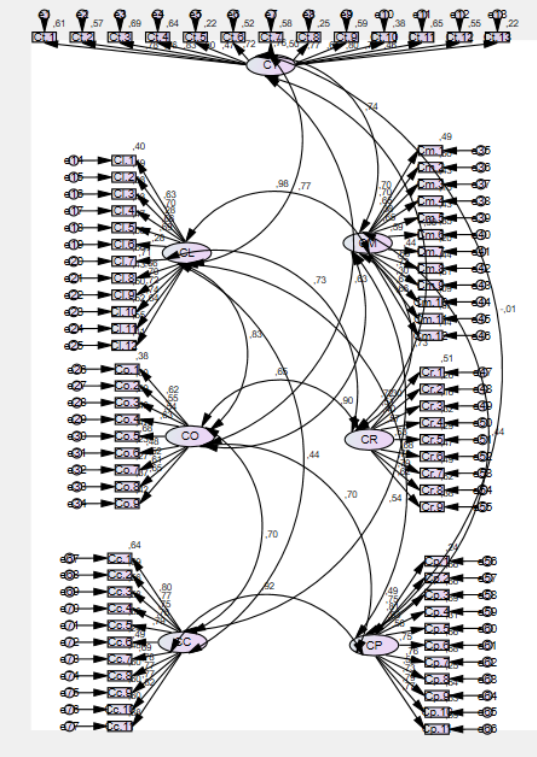

Figure 4: Results of data analysis connecting between dimensions of 7C skills

Exploratory factor analysis was conducted using Chi-square/df estimators, root mean square error of approximation (RMSEA), GFI, AGFI, CFI, and TLI were used as adjustment indices. There was good agreement when Chi-square/df < 5, GFI and AGFI 0.95, CFI and TLI 0.95 and RMSEA 0.08. The results are described in Table 3.

Table 3: Overall goodness of fit 7C skills

No	Goodness of fit indices	Parameter		Result	Information
		Good fit	Marginal fit		
1.	*CMIN/DF*	≤ 5.00	-	5.668	*Good Fit*
2.	*RMSEA*	≤ 0.08	-	0.063	*Good Fit*
3.	*GFI*	≥ 0.90	>0.05 - ≥ 0.90	0.697	*Accepted Fit*
4.	*AGFI*	≥ 0.90	>0.05 - ≥ 0.90	0.604	*Accepted Fit*
5.	*TLI*	≥ 0.95	>0.05 - ≥ 0.90	0.686	*Accepted Fit*
6.	*CFI*	≥ 0.95	>0.05 - ≥ 0.90	0.697	*Accepted Fit*

Source: Data analysis, 2024

As a result, the overall CMIN/DF and RMSEA values are in the good category, while the GFI, AGFI, TLI and CFI values are in the accepted fit category. However, based on various considerations, the fit model can be used for interpretation because it is still within the permitted threshold. There are many mode fit requirements, but research using SEM AMOS must meet four requirements, one of which is obtained from the CMIN Table (CMIN/DF and/or P= probability); baseline comparisons; and root means square error approximation (RMSEA). In testing this entrepreneurial character variable, the researcher obtained six model fit requirements, so that the calculation has produced items that meet the requirements for interpreting the data.

5. Discussion

Based on the analysis using standardized regression weights, all remaining items exhibit strong loading factors and can be used to interpret the data effectively. The Chi-square (X^2) statistical test, one of the mechanisms used to assess the validity of the confirmatory factor analysis model, shows that the CMIN/Chi-square (X^2) value is 3.074, which is less than 5, placing it within the "Good Fit" category. This indicates that the CMIN/Chi-square (X^2) value is appropriate for evaluating the model fit in confirmatory factor analysis. The RMSEA measures the discrepancy between the observed covariance matrix per degree of freedom and the predicted covariance matrix. RMSEA is a key indicator of model fit in confirmatory factor analysis. As a rule of thumb, a model is considered a good fit if RMSEA is less than 0.08. If the RMSEA value is 0.08 or lower, the model is deemed acceptable; otherwise, if it exceeds 0.08, the model is considered unfit. The AMOS version 23 output indicates that the RMSEA value is 0.073, which is below the 0.080 threshold, placing it within the "Good Fit" category. Based on this, the RMSEA value is suitable for evaluating the model fit in confirmatory factor analysis.

Engagement theory has a scope regarding how individuals are actively involved in the learning process through relating, creating, and donating. In an academic context, engagement analyzes the extent to which students are cognitively, emotionally, and behaviorally involved in the learning process. However, in this study, engagement theory will be used as the basis for developing 7C skills, so this engagement theory needs to be expanded. Therefore, the role of SDT, SEF theory, and expectancy-value theory becomes the perfection of engagement theory in constructing an academic buoyancy measuring instrument containing 7C skills (Critical Thinking, Collaboration, Communication, Creativity, Connectivity, Computational Thinking, Cross-Cultural Understanding). The 7C skills construct based on engagement theory is presented in Figure 5.

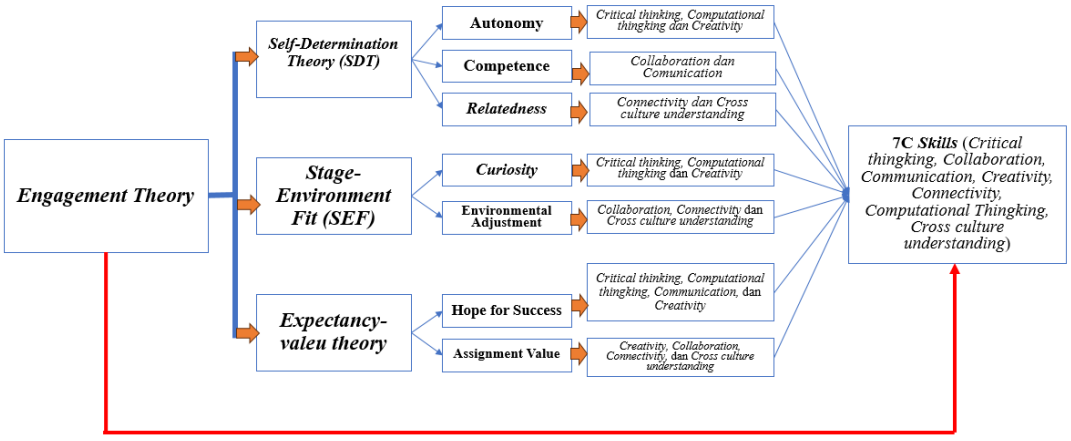

Figure 5: 7C skills construct based on engagement theory

The role of SDT lies in emphasizing the importance of autonomy, competence, and relatedness to foster someone's intrinsic motivation. SDT in the context of engagement theory is used to construct a measuring instrument for 7C skills, namely (1) this is related to the knowledge of students who feel they have control over learning and the ability of students to be more resilient in facing academic challenges. It shows that autonomous student behavior will tend to think critically, analytically and creatively in solving various problems. Furthermore, (2) students feel capable of completing academic tasks and feel capable of going through various challenges and obstacles. This shows that someone who has competence will feel confident to collaborate and communicate well in teamwork and share ideas. (3) Students in maintaining good relationships with peers and lecturers will build motivation and foster 7C skills in Connectivity and Cross-Cultural understanding.

Furthermore, SEF focuses on the importance of the fit between student development and the academic environment. A good learning environment that is in accordance with the developmental stage of students will support engagement and foster 7C skills. An environment that is in accordance with student needs will have an impact on student cognitive development through curiosity and the ability to analyze and think critically. In addition, the learning environment strongly supports the learning process. A learning environment that can provide the right challenges for students will make students more involved and have the ability to go through these challenges well. A good learning environment will make students feel like they are part of a supportive academic community.

Then, expectancy-value theory focuses on students' motivation to be more involved in academic tasks. There are at least two factors in expectancy-value theory, namely the expectation to succeed (expectancy) and the value of the task (value). Expectancy-value theory in the context of engagement theory is used to construct a measuring instrument for 7C skills, namely students who have the expectation to succeed tend to persist when facing small failures. Students who have the expectation to succeed tend to have the motivation to improve cognitively through involvement in discussions and problem solving. When

students feel that the academic tasks they are working on are valuable (for example, the task is relevant to their career or personal interests), then students will be more likely to be involved and persist in facing various challenges.

The main limitation of this study is the lack of research examining the cross-cultural applicability of 7C skills among university students in Indonesia. Future studies are recommended to explore the cross-cultural invariance of the scale in both individualistic and collectivist societies across various countries. Additionally, this study is limited to the psychometric analysis of 7C skills based on engagement theory. Future research should consider employing an experimental quantitative research design, specifically a cross-sectional approach.

6. Conclusion

The present study examined the validity of the 7C skills construct based on the engagement theory perspective using SEM with the assistance of the analysis of moment structure (AMOS) software. Through confirmatory factor analysis, the model was validated, demonstrating a strong fit. The CMIN/DF and RMSEA values fell within the "good" category, while GFI, AGFI, TLI, and CFI values were classified as "acceptable fit". As a result, 68 out of the 77 instrument items met the criteria for data interpretation, confirming the robustness of the measurement model.

These findings underscore the significance of engagement theory as a foundational framework for developing 7C skills, which include Critical Thinking, Collaboration, Communication, Creativity, Connectivity, Computational Thinking, and Cross-Cultural Understanding. The study suggests that integrating additional theoretical perspectives—such as SDT, SEF theory, and expectancy-value theory—could further enhance engagement theory. This integration would contribute to the development of a more comprehensive measurement tool for assessing 7C skills in various educational and professional contexts. Moving forward, this study highlights the need for further empirical research to refine and expand the applicability of the engagement theory framework. Researchers and practitioners should consider how these theoretical advancements can be implemented in curriculum design and skill development programs to better prepare individuals for the demands of the modern world. By doing so, the measurement and enhancement of 7C skills can be continuously improved, ensuring their relevance and effectiveness in fostering meaningful engagement and lifelong learning.

7. References

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