Factor analysis of life skills constructs in geographical learning

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Abstract. This study aims to identify key predictors of life skills in geography learning, essential for students' independent quality of life in the 21st century. Using a quantitative descriptive method, 351 Grade XII social science students from SMAN 3, 6, 7, 8, and 10 Tasikmalaya were selected via random sampling. Data collection involved questionnaires based on geography learning characteristics, life skills, and relevant regulations. Analysis with SPSS 24 for Bivariate Pearson correlation revealed significant relationships between variables, such as Geographic Knowledge with Geographic Information Identification (r=0.726), Problem Solving (r=0.741), and Decision Making (r=0.735). Further, factor analysis using AMOS 22 confirmed model fit across three Goodness-of-Fit measures: Absolute Fit (χ^2=5.649, p=0.059, CMIN/DF=2.825, GFI=0.992, RMSEA=0.072), Incremental Fit (AGFI=0.959, TLI=0.989, NFI=0.994), and Parsimonious Fit (PNFI=0.331, PGFI=0.198). Findings indicate that geography knowledge is a strong predictor of essential life skills like decision-making and problem-solving. This research underscores the value of applied geography knowledge to foster students' life skills, equipping them to utilize knowledge as opportunities in modern society.

1 Introduction

Life skills are essential tools that enable individuals to lead independent, high-quality lives. Gazda, Horne, and Ginter [1] define life skills as "all the skills and knowledge a person experiences, necessary for effective living." Similarly, Mannix [2] describes life skills as “a group of skills an individual needs to acquire for an independent life.” Hodge, Danish, and Martin [3] expand this, defining life skills as "skills that enable individuals to succeed in different environments, such as school, home, and neighborhoods." In essence, life skills are the knowledge and competencies that equip individuals to effectively address the challenges of their environments, contributing to their personal independence.

While there are various definitions, life skills studies consistently highlight certain indicators across the literature. For example, the World Health Organization (WHO)

emphasizes indicators such as decision-making, problem-solving, and interpersonal communication, while others, such as Meche and Goudas, add elements like physical fitness and resilience [4, 5, 6]. Table 1 summarizes these recurring indicators across studies, showcasing how different researchers have contributed to defining life skills comprehensively.

Table 1. Life Skill Indicators

No	Opinion	Indicators
1	WHO (1999)	1) Decision making and problem solving, 2) Creative thinking and critical thinking, 3) communication and interpersonal skills, 4) self-awareness and empathy dan 5) coping with emotions and stress.
2	Meche (2003)	1) Interpersonal communication/human relations, 2) problem solving-decision making, 3) Identity development/purpose in life dan 4) physical fitness
3	Goudas, et al (2006)	1) perform under pressure, 2) solve problems, 3) deadlines and or challenges, 4) set goals, 5) communicate, 6) handle both success and failure, 6) work with a team and within a system dan 7) receive feedback and benefit
4	Hodge, et al (2012)	1) Behavioral (communicating effectively with peers and adults), 2) Cognitive (making effective decisions), 3) interpersonal (being assertive) dan 4) intrapersonal (setting goals)
5	Currie, et al (2012)	1) interpersonal communication / human relations, 2) problem-solving / decision-making, 3) Physical fitness / health maintenance dan 4) identity development / purpose in life
6	Duerden & Witt (2015)	1) Leadership, 2) Communication, 3) Self-Esteem, 4) Responsible Citizenship, 5) Problem Solving, 6) Decision making, 7) Self-Responsibility, 8) Teamwork, 9) Community Volunteering , 10) Healthy Lifestyle Choices
7	Akfirat & Kezer (2016)	1) Communication, 2) Self-recognition, 3) Self-confidence, 4) Being able to say "No", 5) Problem Solving Skills
8	Hoskins & Liu (2019)	1) critical thinking, 2) creativity, 3) problem solving, 4) communication, 5) self awareness, 6) resilience, 7) negotiation, 8) descision making, 9) emphaty, 10) participation

[7-9]

Among the many indicators, problem-solving and decision-making emerge as core elements across nearly every framework. Choueiri and Mhanna argue that “problem-solving and decision-making are highly desirable assets” in today’s increasingly complex world, noting their importance in both personal and professional contexts [10]. Problem-solving involves transforming an undesired situation into a desired one, which includes identification, planning, and monitoring stages [11, 12]. The OECD defines problem-solving as “goal-directed thinking in situations without routine solutions” [13]. Similarly, decision-making involves choosing the best action among alternatives, a process guided by identifying options, evaluating consequences, and making informed choices [12, 14, 15]. Together, these skills form the backbone of effective life skills, equipping individuals to manage challenges and make purposeful decisions.

Meche highlights that problem-solving and decision-making are closely intertwined, with effective decisions often supporting efficient problem-solving [5]. In this regard, life skills create a foundation for independence and personal efficacy, where rational decision-making becomes a valuable tool for overcoming daily challenges [15]. The development of life skills is not limited to a particular discipline; rather, it can be integrated across various fields of

study. Geography, in particular, has unique potential in this regard. Geography as a subject not only fosters knowledge about physical landscapes and cultures but also builds skills that help students understand their environment and society. Sugandi notes that geography supports lifelong learning, and Parjito states that geography skills go beyond standard curriculum demands [16, 17]. Implementing practical geography education can engage students with real-world applications, connecting them to the physical, social, and cultural characteristics of their regions [18, 19].

Many studies show successful integration of life skills in education through various subjects. For example, Seah et al. focus on math education, Sitti et al. apply connectivism theory in learning, and Wurdinger and Qureshi use project-based learning to foster life skills [20-22]. Although these studies incorporate life skills into learning, the indicators used are often general. This research aims to address that gap by focusing specifically on geography education and examining how geography-specific life skills align with relevant learning outcomes and competency standards.

Despite the breadth of studies on life skills, limited research has focused on tailoring life skills indicators specifically to geography education. The gap in the literature lies in the lack of studies that examine geography's unique contributions to life skills development, particularly in problem-solving and decision-making within regional and cultural contexts. This research offers a novel approach by exploring how geography education can uniquely foster life skills that are directly relevant to understanding and utilizing local potential.

The objective of this study is to test the construct of life skills within geography education at the high school level. By identifying and analyzing geography-specific life skills, this research aims to provide a framework that integrates life skills into geography learning, ultimately contributing to students' ability to navigate and solve real-world problems in their immediate environments. This research seeks to clarify how geography education can be a powerful tool in shaping independent, skillful individuals prepared to contribute to their communities and society.

2 Method

The research employed a quantitative descriptive method, selected for its capacity to systematically quantify relationships among variables and interpret them within the context of geography education and life skills indicators. The choice of a descriptive quantitative approach was motivated by the need to objectively measure the prevalence and interrelations of life skills across a broad sample of students, providing a data-driven foundation for assessing life skills competencies within the geography curriculum.

The study was conducted in 2022 with a sample of 351 twelfth-grade social studies students (class XII-IPS) from five high schools in Tasikmalaya: SMAN 3, SMAN 6, SMAN 7, SMAN 8, and SMAN 10. A random sampling technique was used to ensure a representative sample across schools, promoting generalizability of the findings. The data collection instrument, a questionnaire, was meticulously developed based on three core aspects: (1) the specific characteristics of geographic learning, which emphasize spatial understanding and regional analysis, (2) essential life skills, particularly problem-solving and decision-making, which align with competencies promoted in geography education, and (3) current educational regulations, ensuring alignment with national curriculum standards.

Data analysis was conducted in two stages using SPSS 24 and Amos 22 software. First, the Bivariate Pearson correlation test in SPSS was employed to examine the relationships between the proposed variables, allowing an initial assessment of how different life skills indicators correlate within geography learning contexts. Subsequently, Exploratory Factor Analysis (EFA) was performed using Amos 22 to validate the construct of life skills within this context. The EFA was supported by three goodness-of-fit measurements to assess model

validity: (1) absolute fit measures, which indicate how well the proposed model matches the observed data; (2) incremental fit measures, which compare the proposed model to a baseline model to confirm its relative accuracy; and (3) parsimonious fit measures, which consider model complexity, aiming for simplicity without compromising explanatory power.

The research process followed a structured sequence: first, a literature review was conducted to establish a theoretical foundation on life skills in geography education. This review informed the questionnaire development, which aimed to capture nuanced life skills relevant to geography. After data collection, the data were processed in SPSS to examine preliminary correlations, then analyzed in Amos 22 to confirm the factor structure and fit of the life skills construct. This methodological approach was designed to ensure rigorous, data-backed insights into the integration of life skills within geography education, providing a reliable framework for educators and policymakers to foster these essential competencies in students.

3 Findings and Discussion

3.1 Proposed Construct Variables

As previously explained, the main indicators of life skills generally include problem-solving and decision-making. In this section, we will explore how the learning outcomes of geography align with these general life skills and introduce the proposed predictor variables as life skills constructs in geography education. This discussion starts with the applicable laws and regulations outlined in Permendikbudristek No. 33 Tahun 2022 regarding geography learning outcomes. According to these regulations, there is a clear compatibility between problem-solving and decision-making with the desired outcomes of geography education at the high school level. This implies that geography education encourages students to develop unique ways of thinking to solve problems. While the subject matter across various disciplines may be similar, each field contributes its own perspective, tools, and methods of analysis. This allows students to view and approach life problems from diverse angles, helping them make informed decisions. In this context, the concept of multicriteria decision-making (MCDM), commonly used in developed countries, is relevant. MCDM is the ability to find alternative options in solving a problem based on criteria that are evaluated to be compared with one another, Jankowski [23].

In geography education, problem-solving and decision-making are distinctive because they are based on spatial, environmental, and analytical perspectives. Jankowski further explains that much of the development in this area has occurred by integrating MCDM with geographic information systems (GIS) and making MCDM a core component of spatial decision-support systems (SDSS) [23]. This suggests that one of the unique contributions of geography education is to equip students with the ability to process, interpret, and utilize geographical information to make decisions and solve problems effectively. Setiawan also emphasizes that geography education should be practical, encouraging students to engage with real-world scenarios by using varied media, such as maps, charts, and tables, to better understand the physical, social, and cultural conditions of their region [18]. This approach allows geography education to develop life skills by helping students interpret geographic data and analyze it for decision-making, a skill set that is central to the discipline.

Geography education's role in problem-solving and decision-making extends beyond theoretical knowledge into practical applications. Jankowski lists several areas where geographical problem-solving and decision-making are applied, including eco-regional management, transportation, sustainable water management and natural hazard management [23]. This aligns with Maryani's argument that geoliteracy is vital for understanding the

growing globalization, interconnectedness, and interdependence between places in various domains such as economics, politics, and culture [24]. While geography education in countries like New Zealand emphasizes decision-making competitions at the secondary school level, the situation in Indonesia remains different, with a focus on quizzes that test students' knowledge of facts rather than their ability to analyze and solve problems. As LeHeron, Flaws, and Logie note, these competitions aim to "introduce students to the informed decision-making process that will be invaluable in their future community and vocational activities"[25]. Thus, geography education's unique contribution lies in developing problem-solving and decision-making skills through spatial, environmental, and regional analysis.

Based on this review of the literature, four predictor variables for life skills in geography education are proposed. First, problem-solving and decision-making abilities are central to life skills and should be considered key predictors. Second, the ability to identify geographic information using GIS tools, maps, tables, and graphs is another important predictor, reflecting the unique nature of geography education. Third, geographic knowledge itself, which encompasses both theoretical and applied aspects of geography, is another predictor variable that plays a role in shaping life skills in geography education [26-27].

As presented in Table 2 and Table 3, the author outlines the alignment between the geography learning achievements at the high school level, as defined in Permendikbudristek No. 33 Tahun 2022, and the proposed life skills predictor variables in geography education, based on a review of the relevant literature.

Table 2. Suitability CP Phase E with Life Skills Indicators

No	Learning Outcomes	Life Skill Indicators
1	Understand the basic concepts of geography, maps/remote sensing/GIS, geographical research and geospheric phenomena	Geographical Knowledge
2	Identify/process information about physical and social regional diversity	Identify Geographic information
3	Analyze areas based on basic knowledge of geography, physical and social characteristics of the area.	Identify Geographic information
4	Describe the problems that arise in the geosphere phenomena that occur and provide the best solution ideas to deal with them.	Problem Solving
5	Communicating/publishing research results in various media	Decision Making

(Adapted from: Permendikbudristek No. 33 Tahun 2022, [7], [23], [25], [28])

Table 3. Suitability CP Phase F with Life Skills Indicators

No	Learning Outcomes	Life Skill Indicators

1	Developing questions about the characteristics of areas with certain activities due to physical and social changes	Identify Geographic information
2	Processing regional characteristic information	Identify Geographic information
3	Analyze certain activities due to physical and social changes by utilizing the use of maps.	Problem Solving
4	Predicting changes in natural and social conditions in the form of strategic position advantages, natural resources or regional disasters in Indonesia by utilizing maps and GIS technology.	Problem Solving
5	Predicting ideas for solutions to regional development, strategic positions, resources, and disasters in Indonesia	Decision Making
6	Analyze village and city development in the context of regional development and inter-regional cooperation, able to analyze spatial and numerical data obtained from various methods.	Problem Solving
7	Evaluating the facts of inter-regional cooperation	Decision Making

(Adapted from: Permendikbudristek No. 33 Tahun 2022, [7], [23], [25], [28])

Based on the Table 2 and Table 3, it is evident that geography education plays a significant role in enhancing life skills, particularly through its distinctive characteristics, such as the utilization of GIS and the integration of spatial, environmental, and regional perspectives. This aligns with Haggett's framework, which transitions from the structure of orthodox geography to integrated geography [26-27].

3.2 Test of Proposed Construct Variables

3.2.1 Validity and Reliability

Validity testing uses Pearson product moment and reliability testing uses Cronbach's alpha. In the process there were several improvements to the instrument for testing construct variables, below the author presents the final improvement value of the validity and reliability test of the instrument.

Table 4. Test of Validity

NO	PRODUCT MOMENT	VALIDITY	NO	PRODUCT MOMENT	VALIDITY
1	0,267	Valid	23	0,349	Valid
2	0,256	Valid	24	0,248	Valid
3	0,267	Valid	25	0,263	Valid
4	0,304	Valid	26	0,301	Valid
5	0,229	Valid	27	0,321	Valid
6	0,301	Valid	28	0,258	Valid
7	0,387	Valid	29	0,260	Valid
8	0,216	Valid	30	0,244	Valid
9	0,250	Valid	31	0,244	Valid
10	0,365	Valid	32	0,269	Valid
11	0,296	Valid	33	0,290	Valid
12	0,300	Valid	34	0,258	Valid
13	0,255	Valid	35	0,209	Valid
14	0,286	Valid	36	0,286	Valid
15	0,275	Valid	37	0,279	Valid
16	0,217	Valid	38	0,238	Valid
17	0,244	Valid	39	0,236	Valid
18	0,272	Valid	40	0,265	Valid
19	0,244	Valid	41	0,290	Valid
20	0,250	Valid	42	0,255	Valid
21	0,327	Valid	43	0,277	Valid
22	0,276	Valid			

Table 5. Test of Reliability

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.704	.704	43

The results of the Cronbach's Alpha value in the reliability table above are 0.704 and more than 0.60, so it can be concluded that the life skills instrument in geography learning is reliable.

3.2.2 Normality

The number of samples used in this research was 351 students. When the sample size is large (more than 100) the central limit theory applies, so it can be assumed that the data is normally distributed. According to Healey: "The sampling distribution of sample means will become normal in shape as sample size increases for any variable, even when the variable is not normally distributed across the population [29]. When N is large, the mean of the sampling distribution will equal the population mean, and its standard deviation"

Furthermore, Healey explain "A good rule of thumb is that if sample size (N) is 100 or more, the Central Limit Theorem applies, and you can assume that the sampling distribution of sample statistics is normal in shape" [29]. Because the data was assumed to be normally distributed, the Pearson Correlation test was carried out in SPSS 24 and the Goodness of Fit test in Amos 22.

3.2.3 Correlation Test Result of Proposed Construct Variables

The factors proposed as forming life skills in geography learning were then tested for correlation between indicators using Bivariate Pearson Correlation test analysis. The basis for decision making in bivariate Pearson correlation analysis can be seen by comparing the Pearson Correlation value or r count with r table. If the calculated r count > than r table, then there is a correlation between the variables being linked. Meanwhile, if the calculated r count < r table then there is no correlation between the variables being linked. Decision making can also be done by looking at the Sig (2-tailed) value. If the Sig (2-tailed) value < 0.05 then there is a correlation between the variables being linked, conversely if the Sig (2-tailed) value > 0.05 then there is no correlation between the variables being linked. The following are a correlation table between Geography Life Skills indicators.

Table 6. Correlation Test of Life Skills Indicators in Geography Learning

		PG	ID	PS	DM
PG	Pearson Correlation	1	.726**	.741**	.735**
	Sig. (2-tailed)		.000	.000	.000
	N	351	351	351	351
IDTOTAL	Pearson Correlation	.726**	1	.733**	.707**
	Sig. (2-tailed)	.000		.000	.000
	N	351	351	351	351
PSTOTAL	Pearson Correlation	.741**	.733**	1	.789**
	Sig. (2-tailed)	.000	.000		.000
	N	351	351	351	351
DMTOTAL	Pearson Correlation	.735**	.707**	.789**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	351	351	351	351

The results of the correlation test between Geographic Knowledge and Geographic Information Identification obtained r count=0.726. The results of the correlation test between Geography Knowledge and Problem Solving obtained r count=0.741. The results of the correlation test between Geography Knowledge and Decision Making obtained r count=0.735. The results of the correlation test between Geographic Information Identification and Problem Solving obtained r count=0.733. The results of the correlation test between Identification of Geographic Information and Decision Making obtained r count=0.707. The results of the correlation test between Problem Solving and Decision Making obtained r count=0.789. All calculated r count > r table=0.105. Thus, all components proposed as construct variables have a significant correlation.

3.2.4 Goodness of Fit Test Result of Proposed Construct Variables

Model feasibility assessment measures the suitability between observed or actual inputs and the predictions of a proposed model. There are three types of Goodness-of-Fit measures, namely (1) absolute fit measures, (2) incremental fit measures and (3) parsimonious fit measures. The following is a table of Goodness of Fit values resulting from AMOS 22 output.

Table 7. Goodness of Fit Model Life Skills Test in Geography Learning

No	Goodness of Fit	Criteria	Results	Explanation
Absolut Fit Measure				
1	Chi-Square Statistic (X^2)	Expected Small	5,649	Relatively Small
2	CMIN	Expected Small	5,649	Relatively Small
3	CMIN/DF	≤ 5	2,825	Reasonable
4	Goodness of Fit Index (GFI)	0 - 1.0	0,992	Good fit
5	Root Mean Square Error of Approximation (RMSEA)	0.05 - 0.08	0,072	Acceptable
Incremental Fit Measures				
1	Adjusted Goodness of Fit Index (AGFI)	≥ 0.90	0,959	Good fit
2	Tucker-Lewis Index (TLI)	≥ 0.90	0,989	Good fit
3	Normed Fit Index (NFI)	≥ 0.90	0,994	Good fit
Parsimonious Fit Measures				
1	Parsimonious Normal Fit Index (PNFI)	0.60 – 0.90	0,331	Can't be compared
2	Parsimonious Goodness of Fit Index (PGFI)	0 – 1.0	0,198	Can be compared

According to Haryono & Wardoyo a small chi-square value will produce a probability value (p) hat is greater than the significance level (〈) and this indicates that the input covariance matrix between predictions and actual observations is not significantly different [25].

Based on the model fit test criteria in the table above, for the absolute fit measure, the Chi-Square (X^2) value = 5,649 is relatively small, seen from the degree of freedom value of 2 and the probability level (p) = 0,059 which is greater than the significance level (〈) = 0,05. Judging from the Chi-Square value (X^2) the model we have chosen is feasible. The CMIN/DF value = 2,825 < 5 which is a reasonable measure. The GFI value ranges from 0 (poor fit) to 1.0 (perfect fit), and a GFI value that exceeds 0.9 is the minimum measure for good fit. From the table, the GFI value = 0.992, indicating that the proposed model includes good fit. The RMSEA value = 0.072 is in the value interval between 0.05 - 0.08 and shows that the model is acceptable.

The incremental fit measures obtained from the test results are an AGFI value = 0.959, a TLI value = 0.989, and an NFI value = 0.994, all of which exceed the recommended minimum limit, namely equal to or more than 0.90. This indicates that the Goodness of Fit test results based on incremental fit measures have met the good fit criteria.

The criteria for parsimonious fit measures obtained from the test results is a PNFI value = 0.331, although it has not yet reached a value between 0.60 - 0.90 which shows that there is a significant difference between the model and other alternative models, but the PGFI value = 0.198 is already in the value interval of 0 - 1.0 so that the model can compared with a different number of coefficients.

The results of the model fit test criteria show that the life skills model in geography learning meets the model fit test criteria, because of the 10 criteria 9 of them meet the requirements.

3.2.5 Life Skills Equation Model in Geography Learning

The following figure is the output of the Life Skills model in Geography Learning using the AMOS version 22 application, the model structure can be seen in below.

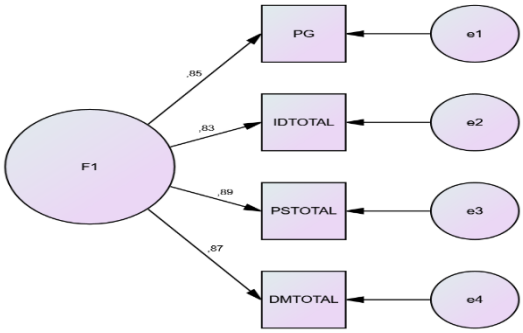

Fig. 1. Life Skills Equation Model in Geography Learning

From the model above it can be converted into the following equation :

$$KHG = \beta_1 \cdot PG + \beta_2 \cdot ID + \beta_3 \cdot PS + \beta_4 \cdot DM + \epsilon \quad (1)$$

notes:

KHG/F1 = Life Skills in Geography Learning
β_1 = Standard estimates value between KHG and ID
ID = Identify Geographic Information
β_2 = Standard estimates value between KHG and PS
PS = Problem Solving
β_3 = Standard estimates value between KHG and DM
DM = Decision Making
β_4 = Estimated standard value between HG and PG
PG = Geographical Knowledge
ϵ = Other factors that cannot be controlled

By substituting standard estimates values in the model image, the KHG equation can be changed to :

$$KHG = \beta_1 \cdot PG + \beta_2 \cdot ID + \beta_3 \cdot PS + \beta_4 \cdot DM + \epsilon$$

$$KHG = 85\% \cdot PG + 83\% \cdot ID + 89\% \cdot PS + 87\% \cdot DM$$

This equation is the relationship between Life Skills in Geography Learning and the indicators that form it, namely Geographical Knowledge, Geographic Information Identification, Problem Solving and Decision Making. This means that from the goodness of fit test results, the four indicators proposed for problem solving are the indicators with the greatest contribution to life skills in geography learning at 89%, followed by decision making at 87%, then geographical knowledge at 85% and identification of geographic information at 83%.

4 Conclusion

The conclusion of this research is drawn from the test results, which indicate that all the variables proposed to form life skills in geography learning exhibit significant correlations. Furthermore, the results of the goodness-of-fit test reveal positive outcomes, with the proposed model meeting 9 out of 10 test criteria, demonstrating its robustness and validity.

This indicates that the modeling of variables forming life skills in geography learning is a reliable approach for measuring the level of life skills in geography education at the secondary school level**.**

In the future, it is anticipated that the results of the life skills level test in geography learning will serve as a key consideration in the development of geography education. This would provide greater stimuli for students, especially in improving their life skills. The most effective solution to ensure the success of national education standards lies in fulfilling aspects of graduate competency standards through an educational approach that fosters student independence. This approach aligns with the broader educational goals of cultivating critical thinking and decision-making skills among students.

As emphasized by Bustin, a holistic understanding of geographical knowledge enables young individuals to think about the world in innovative ways [30]. This kind of knowledge contributes to the development of their ability to make informed choices, guiding how they live and think in the modern world. By focusing on the integration of life skills in geography education, we can equip students with the capabilities to engage meaningfully with the complex challenges of contemporary society.

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