

## Exploratory Factor Analysis (EFA) for Lifelong Learning Competencies of Students with Disabilities in University

Fitri Dwi Arini<sup>1\*</sup>, Permata Permata<sup>2</sup>

<sup>1</sup>Universitas Negeri Padang, Indonesia

<sup>2</sup>Universitas Sebelas Maret, Indonesia

\*Corresponding author e-mail: [fitridwiarini@fip.unp.ac.id](mailto:fitridwiarini@fip.unp.ac.id)

### Abstract

This study utilized Exploratory Factor Analysis (EFA) to identify the core factors that constitute lifelong learning competencies among students with disabilities in a university context. This study aimed to evaluate the content validity and perform Exploratory Factor Analysis (EFA) on a 14-item scale designed to assess lifelong learning competencies in students with disabilities. The items were developed based on five key factors: Goal setting, application of knowledge and skills, self-direction and self-evaluation, locating information, and adaptable learning strategies. Analyzing the responses of 46 students with disabilities, the study validated the content of the 14 items on the Lifelong Learning Competencies scale. However, the EFA process indicated that only these 10 items could be consolidated into theoretical factors, resulting in four key dimensions: curiosity, openness to learning, access to information and information literacy, and self-direction and self-evaluation. These factors encapsulate critical elements of lifelong learning competencies, including self-regulation, critical thinking, and adaptability. This research contributes to the advancement of inclusive educational practices, ensuring that students with disabilities are equipped to thrive in lifelong learning and achieve academic and professional success.

**Keywords:** lifelong learning competencies, students with disabilities, factor analysis, EFA.

**How to cite:** Arini, F. D. & Permata, P. (2024). Exploratory Factor Analysis (EFA) for Lifelong Learning Competencies of Students with Disabilities in University. *International Journal of Pedagogy and Learning Community (IJPLC)*, 1(2), 42-48. <https://doi.org/10.24036/3f7kr953>



Licensees may copy, distribute, display and perform the work and make derivative works and remixes based on it only if they give the author or licensor the credits (attribution) in the manner specified by these. Licensees may copy, distribute, display, and perform the work and make derivative works and remixes based on it only for non-commercial purposes.

### INTRODUCTION

The emphasis on enhancing the quality of education and personal development for both lecturers and students has become a central goal in universities across Indonesia (Gast et al., 2022; Umbase, 2023). In line with the growing global emphasis on lifelong learning, universities are increasingly focusing on strategies to strengthen educational practices, particularly by fostering competencies that ensure long-term personal and academic growth. Lifelong learning competencies, such as critical thinking, self-directed learning, adaptability, and problem-solving, are essential for preparing students to thrive in an ever-evolving global environment (AlAli & Wardat, 2024; Bidokht & Assareh, 2011). These competencies not only equip students for professional success

but also enable them to contribute meaningfully to society. However, ensuring inclusive access to lifelong learning for all students, especially those with disabilities, remains a significant challenge.

Students with disabilities face unique challenges in achieving lifelong learning competencies, often encountering physical, cognitive, and environmental barriers that limit their participation in educational activities. While there have been improvements in inclusive education practices, students with disabilities still struggle to access adequate learning resources and academic support, which are crucial for developing lifelong learning skills (Karakoc, 2021; Zhang et al., 2022). This disparity underscores the necessity of investigating the specific factors influencing lifelong learning competencies among students with disabilities in higher education.

In many universities, including those in Indonesia, students with disabilities continue to face substantial gaps in educational opportunities (Amnesti et al., 2023). Despite initiatives to enhance inclusivity, the needs of students with disabilities are often overlooked in research and not sufficiently addressed in institutional policies and academic programs. While steps have been taken by the Indonesian government and universities to promote inclusivity, there remains limited research on the barriers to developing lifelong learning competencies for students with disabilities. These barriers include a lack of specialized support services, insufficient resources, and societal stigma, which are particularly evident in higher education settings where independent learning, engagement with advanced academic content, and participation in scientific research are expected (Akmal, 2017; Wibowo & Muin, 2018).

Lifelong learning is vital for all students, and it is crucial that students with disabilities are not only accommodated but empowered to thrive both academically and socially. Through lifelong learning, students with disabilities can develop essential skills that enable them to contribute to academic research, engage in meaningful discussions, and participate in professional networks (Aykac et al., 2020; Handayani, 2017). However, to achieve this, universities must first identify and understand the factors that influence the development of lifelong learning competencies for this group. Identifying and addressing the barriers they face while leveraging opportunities to support their growth is essential for creating an inclusive learning environment.

This study aims to apply Exploratory Factor Analysis (EFA) to identify the key factors that influence lifelong learning competencies among students with disabilities in a general university context. EFA is an appropriate tool for uncovering underlying patterns and relationships between variables, particularly when the factors affecting lifelong learning competencies are not well understood. By analyzing these factors, this research seeks to highlight the most significant aspects of lifelong learning competencies, including self-direction, access to information, self-evaluation, and academic support (Yap & Tan, 2022). The findings from this study will provide universities with the insights needed to develop targeted strategies that promote lifelong learning competencies and meet the specific needs of students with disabilities.

The study will be guided by several theoretical frameworks, including Motivation Theory, Self-Confidence Theory, Interest Theory, and the Theory of Knowledge. Motivation Theory suggests that both external and intrinsic factors influence individuals' engagement with learning behaviors aimed at achieving academic and personal goals. Self-Confidence Theory emphasizes the internal ability to make decisions and navigate academic challenges, while Interest Theory highlights the role of personal engagement in learning activities. Lastly, the Theory of Knowledge underscores the importance of scientific thinking processes and critical analysis, which are crucial in the development of lifelong learning competencies. These theoretical perspectives will help explore how students with disabilities interact with academic content, manage their learning, and overcome challenges in university environments, thus offering a comprehensive understanding of the factors influencing lifelong learning.

In conclusion, this study aims to address a gap in the literature by applying EFA to examine the lifelong learning competencies of students with disabilities in higher education. By identifying the key factors that shape these competencies, the research will provide valuable insights into the specific challenges and opportunities faced by students with disabilities. The findings will

contribute to the development of more inclusive and effective educational strategies, ensuring that students with disabilities are provided with the necessary support, tools, and opportunities to succeed academically and professionally. This research will not only improve the educational experience for students with disabilities but also assist universities in Indonesia and globally in their efforts to enhance inclusive education and lifelong learning.

## **METHODS**

### **Research Design**

This study utilized a quantitative approach with a cross-sectional survey design to explore factors affecting the development of early reading skills in students with various disabilities. A quantitative approach is ideal for gathering and analyzing data numerically, enabling the identification of patterns and relationships within the data (Creswell & Creswell, 2018). Data were collected via an online self-administered survey, which is a cost-effective method that allows for fast data processing and analysis without the need for extensive resources (Marcano Belisario et al., 2014). The online format also ensured that respondents could complete the survey at their convenience, while the system required them to respond to all items before submission, minimizing missing data and ensuring a complete dataset.

### **Participants**

The respondents in this study were 46 students with disabilities aged 17 to over 24 years, enrolled in six faculties at University in West Sumatra, Indonesia. The students were chosen through a purposive sampling technique, which allowed easy access to participants willing to engage with the research (Etikan, 2016). The respondents were categorized based on their age and the nature of their disabilities. The age distribution included students from 17-18 years (26.1%), 19-20 years (32.6%), 21-22 years (32.6%), and those over 24 years (8.7%).

### **Data Collection and Analysis**

The study utilized a five-point Likert scale questionnaire adapted from Yap & Tan (2022) to assess lifelong learning competencies among university students, comprising 14 items. Data collection involved distributing the digital questionnaire to 46 active students with disabilities enrolled at universities in West Sumatra, Indonesia. The questionnaire was converted to a digital format using Google Forms for easier access and streamlined data collection. The forms were shared via WhatsApp, with in-person support sessions provided to encourage participation and facilitate responses. To analyze the data, Exploratory Factor Analysis (EFA) was employed, using the statistical tool JASP (Jeffreys's Amazing Statistics Program) version 0.18.3 to estimate each indicator within its respective factor.

## **FINDING AND DISCUSSIONS**

Factor analysis was conducted on 14 items related to lifelong learning competencies of students with disabilities in university settings, using Principal Component Analysis with Varimax rotation. The results, as presented in Table 1, show a Kaiser-Meyer-Olkin (KMO) test value of 0.729, which is considered good according to the recommendations by Tabachnick & Fidell (2013), who suggest a minimum value of 0.6. This KMO value indicates that the data does not exhibit serious multicollinearity issues, making it suitable for factor analysis. Additionally, Bartlett's Test of Sphericity is significant ( $p = 0.000$ ,  $p < 0.05$ ), confirming sufficient correlations among the items for factor formation. These results demonstrate that the dataset meets the necessary conditions for conducting Exploratory Factor Analysis (EFA), with all items showing appropriate usability and significant values for further analysis.

**Table 1.** KMO and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin	Measure of Sampling Adequacy	0.762
Bartlett's Test of Sphericity	Approx. Chi-Square	210.361
	df	45
	Sig.	<0.001

By using standar Eigenvalues, four factors represented variables. However, there were only three factors with Eigenvalues >1. Therefore, Factor 1, Factor 2, and Factor 3 could explain the variance of 36.9%, 15,7%, and 10,5%. Thus, the ability of these three factors to explain the variance was 63,1%/

**Table 2.** Total Variance Explained Output of JASP

Factors	Eigenvalues	SumSq. Loadings	Proportion var.	Cumulative
Factor 1	3.889	3.486	0.349	0.349
Factor 2	2.121	1.343	0.134	0.483
Factor 3	1.026	1.097	0.110	0.593
Factor 4	0.898	0.978	0.098	0.690

Based on the loading factor, the items formed four groups (factors). The first factor consisted of item 3, 4, 7, 8 and 13. At the same time, the second factor comprised items number 2, and 9. The third factor comprised item number 14, and the fourth factors comprised item number 11 and 12. Thus, four items could not be maintained because of smaller loading factor, which was less than 0.4.

**Table 3.** Output Loading Factor Items

Factors	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness
Item 8	0.913				0.156
Item 4	0.902				0.158
Item 3	0.837				0.266
Item 7	0.730				0.331
Item 13	0.723				0.439
Item 9		0.961			0.005
Item 2		0.435			0.762
Item 14			0.961		0.005
Item 12				0.797	0.304
Item 11				0.409	0.670

*Note.* Applied rotation method is varimax.

Based on Table 3, the scale items can be grouped as presented on Table 4.

**Table 4.** Grouping of Items based on Factors

Factors	Items
Factor 1	<ul style="list-style-type: none"> <li>• Saya merasa mampu belajar secara mandiri.</li> <li>• Saya menikmati proses belajar karena memberikan pengalaman baru.</li> <li>• Saya mengaitkan pembelajaran di kampus dengan penerapannya dalam kehidupan.</li> <li>• Saat mempelajari materi baru, saya menghubungkannya dengan apa</li> </ul>

	<p>yang sudah saya ketahui</p> <ul style="list-style-type: none"> <li>• Saya dapat menghadapi hal-hal yang tidak terduga dan menyelesaikan masalah secara bertahap.</li> </ul>
Factor 2	<ul style="list-style-type: none"> <li>• Saya jarang mengevaluasi cara belajar saya sendiri dan cara untuk meningkatkannya.</li> <li>• Saya merasa orang lain lebih kompeten dalam mengevaluasi keberhasilan belajar saya sebagai mahasiswa.</li> </ul>
Factor 3	Saya merasa nyaman ketika harus beradaptasi dalam situasi yang tidak pasti.
Factor 4	<ul style="list-style-type: none"> <li>• Saya sering kesulitan menemukan informasi saat saya membutuhkannya.</li> <li>• Saya lebih suka masalah yang hanya memiliki solusi tunggal.</li> </ul>

The next EFA stage is to name the four factors in Table 3. The items grouped in Factor 1 are items 3, 4, 7, 8 and 13. Items 3 and 4 taken from the qualitative theoretical construct of the Curiosity, items 7 and 8 taken from the application of knowledge and skills, whilst item 13 from the adaptable learning strategies. The items grouped in Factor 2 were items number 2 and 9, were taken from Curiosity and Self-Direction and Self-Evaluation. The items in Factor 3 were item number 14 from the construct of adaptable learning strategies. Factor 4 comprised item number 11 and 12 taken from the Adaptable Learning Strategies.

The grouping of the items into four factors can be understood through theoretical perspectives on self-directed learning, adaptability, and curiosity. Factor 1, which includes items related to independent learning, enjoyment of learning, and application of knowledge, reflects self-directed learning and adaptability. Self-directed learning is a critical component of effective education, as students who can learn independently are more likely to engage in deeper and more meaningful learning (Radović et al., 2024; Saleem et al., 2024). The concept of curiosity, which is also evident in this factor, promotes an active exploration of new knowledge and connects it to prior experiences (Wade & Kidd, 2019; Ibrahim et al., 2024). Additionally, adaptability is central to how learners' approach new and unexpected challenges, which is consistent with cognitive flexibility theory (Wade & Kidd, 2019; Nengsih et al., 2022), where learners must adjust their strategies to meet dynamic learning demands.

Factor 2, which comprises items related to self-evaluation and reliance on external feedback, signals an area where learners may lack sufficient self-regulation. Self-regulated learning, which includes the ability to monitor and assess one's own learning processes, is crucial for academic success (Salamah et al., 2022; Ye et al., 2024). The tendency to rely on others for evaluation rather than self-assessment suggests that learners may benefit from increased opportunities to develop self-reflection skills. This notion aligns with studies on self-directed learning, which emphasize the importance of cultivating learners' abilities to assess their own learning strategies and progress (Ibrahim et al., 2021; Chakraborty, 2024). Thus, this factor points to the need for fostering more autonomy in the evaluation process to promote more independent learning.

Factor 3, focusing on adaptability in uncertain situations, reflects the learners' comfort with navigating complex and unpredictable learning environments. Adaptable learning strategies, as highlighted in recent literature, are critical for learners to thrive in ever-changing contexts (Tannoubi et al., 2023; Li et al., 2024). This factor underscores the importance of fostering adaptability in learners to help them manage challenges, an essential skill for lifelong learning. Finally, Factor 4, which addresses difficulties in problem-solving and information retrieval, points to the need for enhancing problem-solving strategies and resourcefulness. Learners who struggle to find information and prefer single-solution problems may benefit from a more developed approach to critical thinking and information seeking (Szabo et al., 2020). These challenges are common in educational contexts where learners must be equipped to handle complex problems and seek diverse sources of information. Overall, these four factors collectively reflect the

different aspects of self-regulated learning, adaptability, and problem-solving that contribute to effective learning experiences.

## CONCLUSION

The testing of the Lifelong Learning Competencies among students with disabilities in university context was empirically proven statistically using EFA. From 10 out of 14 items fulfilled the factor loading values more than 0.6. The key factors identified—curiosity, openness to learning, access to information and information literacy, and self-direction and self-evaluation—demonstrate the multifaceted nature of learning skills that support academic and professional growth. The findings suggest that while the Lifelong Learning Competencies scale is valid in content, the theoretical factors need to be considered when designing programs and support systems for students with disabilities. By targeting these competencies, universities can create more inclusive and supportive learning environments that enhance self-regulation, adaptability, and problem-solving abilities. Future research should continue to explore how these factors interact in diverse educational settings, further strengthening the development of lifelong learning capabilities for students with disabilities.

## REFERENCES

- Akmal, A. (2017). Public Policy and ICTs for Higher Education of Disabled Students in Indonesia. *KnE Social Sciences*, 2(4), 51. <https://doi.org/10.18502/kss.v2i4.867>
- AlAli, R., & Wardat, Y. (2024). Innovative Teaching: Building Engagement, Critical Thinking, and Lifelong Learning Skills. *International Journal of Religion*, 5(10), 2152–2163. <https://doi.org/10.61707/fdpxd919>
- Amnesti, S. K. W., Jundiani, Zulaichah, S., Noh, M. S. M., & Fitriyah, L. (2023). Higher Education with Disabilities Policy: Ensuring Equality Inclusive Education in Indonesia, Singapore and United States. *Journal of Human Rights, Culture and Legal System*, 3(3), 412–440. <https://doi.org/10.53955/jhcls.v3i3.135>
- Aykac, M., Aslandag, B., & Kogce, D. (2020). The Examination of Prospective Mathematics Teachers' Perceptions of Lifelong Learning Competencies. *Journal of Computer and Education Research*, 8(16), 705–719. <https://doi.org/10.18009/jcer.751476>
- Bidokht, M. H., & Assareh, A. (2011). Life-long learners through problem-based and self directed learning. *Procedia Computer Science*, 3, 1446–1453. <https://doi.org/10.1016/j.procs.2011.01.028>
- Chakraborty, S. (2024). Empowering and Engaging Adult Learners: Strategies to Facilitate Self-directed Learning in Adult Education. *International Journal For Multidisciplinary Research*, 6(3), 1–26. <https://doi.org/10.36948/ijfmr.2024.v06i03.22216>
- Creswell, J. W., & Creswell, J. D. (2018). Research Design: Qualitative, Quantitative and Mixed Methods Approaches. In *SAGE Publications* (5th Editio). SAGE Publications. <https://doi.org/10.4324/9781315707181-60>
- Gast, I., Neelen, M., Delnoij, L., Menten, M., Mihai, A., & Grohnert, T. (2022). Supporting the well-being of new university teachers through teacher professional development. *Frontiers in Psychology*, 13(July), 1–19. <https://doi.org/10.3389/fpsyg.2022.866000>
- Handayani, M. R. (2017). Audiobook islami untuk penyandang disabilitas SLB kategori A. *At-Taqaddum*, 8(2), 109–128. <https://doi.org/10.21580/at.v8i2.1167>
- Ibrahim, R., Hock, K. E., Handrianto, C., Rahman, M. A., & Dagdag, J. (2021). Perceptions of parents and teachers on students with learning disabilities (SLD) in Malaysia. *International Journal of Education, Information Technology, and Others*, 4(2), 287–298.
- Ibrahim, R., Shanmugavel, R., & Omar, R. (2024). Competences of Preschool Parents and Teachers in the Early Detection of Preschool Children at Risk of Dyslexia. *International Journal of Pedagogy and Learning Community (IJPLC)*, 1(1), 38–48.
- Karakoc, B. (2021). Views of Academic Staff in Universities on Lifelong Learning and Adult

- Education. *Asian Journal of Education and Training*, 7(3), 195–203. <https://doi.org/10.20448/journal.522.2021.73.195.203>
- Li, L., Meng, W., Wang, L., Jiang, Y., Kong, Q., & Shi, Z. (2024). Mental Health Factors and Learning Adaptability Among Nursing Students During the COVID-19 Pandemic: A Structural Equation Modelling Study. *Teaching and Learning in Nursing*, 000, 1–8. <https://doi.org/10.1016/j.teln.2024.11.017>
- Marcano Belisario, J. S., Huckvale, K., Saje, A., Porcnik, A., Morrison, C. P., & Car, J. (2014). Comparison of self administered survey questionnaire responses collected using mobile apps versus other methods. *Cochrane Database of Systematic Reviews*, 2014(4). <https://doi.org/10.1002/14651858.MR000042>
- Nengsih, Y. K., Handrianto, C., Nurzalia, M., Waty, E. R. K., & Shomedran, S. (2022). Media and resources development of android based interactive digital textbook in nonformal education. *Journal of Nonformal Education*, 8(2), 185-191.
- Radović, S., Seidel, N., Menze, D., & Kasakowskij, R. (2024). Investigating the effects of different levels of students' regulation support on learning process and outcome: In search of the optimal level of support for self-regulated learning. *Computers and Education*, 215(July 2023). <https://doi.org/10.1016/j.compedu.2024.105041>
- Salamah, U., Rumadan, I., Handrianto, C., & Alfurqan. (2022). The role of mediation agencies in divorce cases as an effort to provide protection against women and children. *Muwazah*, 14(1), 45–56.
- Saleem, S., Burns, S., & Perlman, M. (2024). Cultivating young minds: Exploring the relationship between child socio-emotional competence, early childhood education and care quality, creativity and self-directed learning. *Learning and Individual Differences*, 111(July 2023), 102440. <https://doi.org/10.1016/j.lindif.2024.102440>
- Szabo, Z. K., Körtesi, P., Guncaga, J., Szabo, D., & Neag, R. (2020). Examples of problem-solving strategies in mathematics education supporting the sustainability of 21st-century skills. *Sustainability (Switzerland)*, 12(23), 1–28. <https://doi.org/10.3390/su122310113>
- Tabachnick, B. G., & Fidell, L. S. (2013). Using Multivariate Statistics. In *Pearson* (6th Editio). Pearson. <https://doi.org/10.1037/022267>
- Tannoubi, A., Quansah, F., Magouri, I., Chalghaf, N., Bonsaksen, T., Srem-Sai, M., ... & Bragazzi, N. L. (2023). Modelling the associations between academic engagement, study process and grit on academic achievement of physical education and sport university students. *BMC psychology*, 11(1), 418.
- Umbase, R. S. (2023). Management of quality assurance and development of the quality culture of higher education in Indonesia. *Multidisciplinary Reviews*, 6(4). <https://doi.org/10.31893/multirev.2023032>
- Wade, S., & Kidd, C. (2019). The role of prior knowledge and curiosity in learning. *Psychonomic Bulletin and Review*, 26(4), 1377–1387. <https://doi.org/10.3758/s13423-019-01598-6>
- Wibowo, S. B., & Muin, J. A. (2018). Inclusive Education in Indonesia: Equality Education Access for Disabilities. *KnE Social Sciences*, 3(5), 484. <https://doi.org/10.18502/kss.v3i5.2351>
- Yap, J. S., & Tan, J. (2022). Lifelong learning competencies among chemical engineering students at Monash University Malaysia during the COVID-19 pandemic. *Education for Chemical Engineers*, 38(September 2021), 60–69. <https://doi.org/10.1016/j.ece.2021.10.004>
- Ye, J. H., Cui, Y., Wang, L., & Ye, J. N. (2024). The Relationships between the Short Video Addiction, Self-Regulated Learning, and Learning Well-Being of Chinese Undergraduate Students. *International Journal of Mental Health Promotion*, 26(10), 805–815. <https://doi.org/10.32604/ijmh.2024.055814>
- Zhang, W., Chin, T., Li, F., Lin, C. L., Shan, Y. N., & Ventimiglia, F. (2022). The Impact of Career Competence on Career Sustainability Among Chinese Expatriate Managers Amid Digital Transformation in Vietnam: The Role of Lifelong Learning. *Frontiers in Psychology*, 13(March), 1–8. <https://doi.org/10.3389/fpsyg.2022.791636>