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Profiling Islamic Undergraduate Student Engagement in Indonesia: A Multidimensional Latent Profile Analysis

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Abstract

Introduction. This study employed multidimensional item response theory (MIRT) to examine the complexities of undergraduate student engagement. Utilizing a within-item multidimensional graded response model, the research scaled and profiled student engagement across cognitive, behavioral, and social dimensions, employing latent profile analysis to unveil distinct engagement patterns among Islamic university undergraduates.

Method. Aligning with a cross-sectional design, the study involved 657 Islamic university students (65% female) spread across Indonesia, selected through convenience sampling. A 19-item measuring Multidimensional Student Engagement Scale was applied, yielding internal consistencies: $\alpha = .913$ for all items, .895 for the Cognitive Subscale, .811 for the Behavioral Subscale, and .754 for the Social Subscale. These coefficients indicate the scale's high internal reliability level, reinforcing its consistency in assessing student engagement dimensions.

Results. The latent profile analysis revealed four typical engagement profiles among the participants. The first, encompassing 133 students, exhibited low engagement across all three dimensions: cognitive, behavioral, and social. The second profile, with 47 students, showed a contrasting pattern with high engagement in cognitive and behavioral dimensions but low in the social aspect. The majority, with 462 students, fell into the third profile, demonstrating an average level of engagement across all dimensions. The fourth, comprising 15 students, was characterized by high engagement in all three dimensions, representing a fully engaged cohort.

Discussion and Conclusion. The identification of four distinct engagement profiles by LPA underscored the necessity for personalized educational strategies. According to this, tailoring interventions to specific engagement profiles can enhance student experiences and outcomes. For instance, leveraging digital platforms for Class 1 and 2 students while promoting leadership and community roles for Class 4 students represents a strategic approach aligned with contemporary educational research.

Keywords: engagement; latent profile analysis; multidimensional graded response model; undergraduate students.

Resumen

Introducción. Este estudio empleó la teoría multidimensional de respuesta al ítem (MIRT) para examinar las complejidades del compromiso de los estudiantes universitarios. Utilizando un modelo de respuesta graduada multidimensional dentro de un ítem, la investigación escaló y perfiló el compromiso de los estudiantes a través de dimensiones cognitivas, conductuales y sociales, empleando un análisis de perfil latente para desvelar distintos patrones de compromiso entre los estudiantes universitarios islámicos.

Método. De acuerdo con un diseño transversal, en el estudio participaron 657 estudiantes universitarios islámicos (65% mujeres) de toda Indonesia, seleccionados por muestreo de conveniencia. Se aplicó una escala de compromiso estudiantil multidimensional de 19 ítems, que arrojó con-sistencias internas: α = .913 para todos los ítems, .895 para la subescala cognitiva, .811 para la subescala conductual y .754 para la subescala social. Estos coeficientes indican el alto nivel de fiabilidad interna de la escala, lo que refuerza su consistencia en la evaluación de las dimensiones del compromiso de los estudiantes.

Resultados. El análisis del perfil latente reveló cuatro perfiles típicos de compromiso entre los participantes. El primero, con 133 estudiantes, mostró un bajo nivel de compromiso en las tres dimensiones: cognitiva, conductual y social. El segundo perfil, con 47 estudiantes, mostraba un patrón contrastado con un alto compromiso en las dimensiones cognitiva y conductual, pero bajo en el aspecto social. La mayoría, con 462 estudiantes, pertenecía al tercer perfil, con un nivel medio de compromiso en todas las dimensiones. El cuarto, compuesto por 15 estudiantes, se caracterizaba por un alto nivel de compromiso en las tres dimensiones, lo que representaba una cohorte totalmente comprometida.

Discusión y **Conclusion**. La identificación de cuatro perfiles distintos de compromiso mediante LPA subraya la necesidad de estrategias educativas personalizadas. De acuerdo con esto, adaptar las intervenciones a perfiles de compromiso específicos puede mejorar las experiencias y los resultados de los estudiantes. Por ejemplo, aprovechar las plataformas digitales para los estudiantes de las clases 1 y 2 y promover el liderazgo y las funciones comunitarias para los estudiantes de la clase 4 representa un enfoque estratégico en consonancia con la investigación educativa contemporánea.

Palabras clave: compromiso; análisis de perfil latente; modelo multidimensional de respuesta graduada; estudiantes universitarios.

Introduction

Student engagement has garnered significant attention in educational research as a major contributor to student performance and success in the tertiary education (Büchele, 2020; Kahn, 2014; Wekullo, 2019). The concept condenses various dimensions, including cognitive, behavioral, and social aspects, each crucial role in shaping students' learning process and outcome. Though there is an ongoing debate among researchers regarding the precise definition and understanding of student engagement (Kahn, 2014), it is clear that empirical evidence has demonstrated that students fully engaged in their learning process tend to complete their higher education with increased vigor and dedication (Carmona-Halty et al., 2019; Schaufeli et al., 2002; Tight, 2020).

In recent years, the focus has shifted towards exploring and implementing strategies to enhance student engagement at the undergraduate level, ranging from institutional support mechanisms to innovative teaching and learning methods. Researchers have examined the impact of various interventions for strengthening student engagement, including management support (Wilson et al., 2020) in USA, social media integration in learning (Yin et al., 2014) in China, curriculum and module development (Brown et al., 2014) in UK, diverse teaching methodologies (Balan & Metcalfe, 2012) in Australia, and the influence of community and family support systems (Timms et al., 2018). The effectiveness of these interventions is significantly enhanced when they are tailored to specific student engagement profiles, which requires a deeper, more precise understanding of these profiles.

Globally, studies employing this person-centered approach have revealed various engagement profiles. For instance, research in Germany identified five distinct profiles (Schnitzler et al., 2020), while Italian studies uncovered three categories (Portoghese et al., 2018). Four profiles were noted in the US and Canada (Fosnacht et al., 2018), and Finnish research categorized undergraduate students into four groups (Ketonen et al., 2016). In Colombia, distinct patterns were observed in secondary education (Maynard et al., 2012). These studies highlight the diversity of student engagement profiles across different educational contexts and underscore the need for a nuanced understanding of these patterns.

Besides those mentioned earlier, as Tight (2020) notes, much of the literature on student engagement focuses on Western contexts, with limited research emerging from Asian countries,

particularly Indonesia. This gap in the literature is particularly pronounced in the context of Islamic universities in Indonesia. These institutions are not only centers of academic learning but also play a crucial role in cultural and religious education. These universities' unique cultural and religious ethos presents challenges and opportunities for understanding student engagement. It is, therefore, crucial to investigate how student engagement manifests in these specific settings to provide insights that can inform educational practices and policies tailored to this context.

Furthermore, Student engagement as a multidimensional construct essential for understanding and improving academic outcomes, particularly in the diverse educational sector of Southeast Asia. Immanuella et al. (2023) identify cognitive, emotional, behavioral, and agentic dimensions as key components of student engagement, highlighting their interrelated roles in shaping students' learning experiences. In Southeast Asia, these dimensions are influenced by external factors such as institutional support, teaching practices, and cultural contexts, shaping internal predictors such as motivation and self-efficacy. The review emphasizes that engagement in this region is not uniform but varies according to demographic factors such as age, generational differences, and type of university, underscoring the need for context-specific approaches to promoting engagement. By situating engagement within this multidimensional framework, their work demonstrates how cultural and systemic factors shape how students connect with their academic environments. My research narrows this focus to students at an Islamic university in Indonesia and explores their unique engagement patterns across cognitive, behavioral, and social dimensions. This localized study aims to deepen the understanding of engagement in a specific Southeast Asian context, providing insights to tailor interventions that improve educational outcomes while addressing the complex factors that influence student engagement in the region.

Existing research on student engagement has employed more variable-centered and less person-centered approaches. Variable-centered research typically focuses on general factors affecting groups of students, which may not adequately capture the complex, complex engagement patterns present within diverse student populations. Aligning with Howard and Hoffman (2017) notes, a person-centered approach, such as latent profile analysis, offers a more detailed understanding of students' engagement patterns. This approach is especially pertinent in Islamic Universities in Indonesia, where a unique interaction of cultural, religious, and personal factors may influence student engagement.

The demographic and social characteristics of Islamic university students in Indonesia reflect the country's position as the most populous Muslim-majority nation. These students often come from diverse socio-economic and cultural backgrounds, representing both urban and rural areas. Many first-generation university students face unique challenges, such as financial constraints, limited access to academic resources, and the need to balance religious commitments with academic responsibilities (Azra, 2012). In addition, Indonesian Islamic universities are uniquely positioned to integrate faith-based values with modern education, providing a distinctive setting for exploring student engagement. However, these students often face barriers such as inadequate digital infrastructure, limited academic English proficiency, and limited access to global academic networks. They require targeted support to develop leadership skills, foster community engagement, and increase cognitive and social engagement. These specific needs underscore the importance of tailoring engagement strategies to this population, providing a strong rationale for focusing on Islamic university students in this study.

The urgency to identify student engagement patterns in Indonesia stems from the need to understand how Indonesian students engage with their tertiary education. This understanding is critical for several reasons. Firstly, it can provide international insights into student engagement in a context that has been largely overlooked in academic literature. Secondly, identifying different engagement patterns among Indonesian students can assist policymakers in devising strategic steps to enhance student engagement, both on-campus and off-campus. Such strategies include developing targeted support systems, creating engaging learning environments, and implementing policies that foster a more inclusive and supportive educational atmosphere.

Given these benefits and the lack of research on university student engagement in Indonesia, the present study investigates student engagement profiles in this specific context. This research seeks to contribute to the broader academic discourse on student engagement by providing a comprehensive overview of Indonesian university student's engagement with their studies. The study will employ a person-centered approach, allowing for a detailed and deep understanding of the unique engagement patterns of Indonesian students. This approach is expected to yield academically valuable and practically relevant insights for educators, policymakers, and students.

Further, the present study employs a within-item structure of multidimensional item response theory (MIRT) before latent profile analysis to identify and profile distinct engagement patterns among undergraduate students in Islamic universities in Indonesia. This methodological approach overcomes the limitations of traditional engagement scaling techniques, which often rely on sum scores that fail to capture the interval nature of engagement attributes, aligning with what McNeish (2022) prefers to scale scores despite sum scores. By focusing on the typology of student engagement profiles, this study seeks to map patterns across engagement dimensions, such as cognitive, behavioral, and social aspects. This comprehensive approach is expected to reveal a range of engagement profiles, from those exhibiting high levels of engagement across all dimensions to those showing varying engagement patterns.

Student Engagement

Student engagement has been extensively explored and developed in empirical research. This construct has evolved from two primary perspectives: employee- and student-based engagement. Pioneering this application in the academic context, Schaufeli et al. (2002) introduced the concept of student engagement, drawing parallels between the occupational engagement of workers and the academic engagement of students. They identified three core dimensions of student engagement: absorption, dedication, and vigor, analogous to the occupational involvement of workers in their tasks. This conceptualization has been supported by subsequent research (for example, Carmona-Halty et al., 2019; Luthans et al., 2016; Tight, 2020; Wefald & Downey, 2009).

Further expanding this construct, Soane et al. (2012) and Schmidt et al. (2017) identified three distinct dimensions of student engagement: intellectual, affective, and social vs affective, behavioral, and cognitive, respectively. The trajectory of this construct's development can be traced back to the work of Kuh (2009), who defined student engagement as the quality of effort and involvement in productive learning activities, emphasizing four indicators: academic challenge, learning with peers, experiences with faculty, and campus environment. This was further refined by Finn and Zimmer (2012) also Kuh (2009), who categorized student engagement into four dimensions: academic, cognitive, social, and affective. Zhoc et al. (2019) detailed the social dimension as encompassing interactions with peers and teachers. Additional perspectives from Assunção et al. (2020), Bond et al. (2020), Marôco et al. (2016), and Sinval et al. (2021) further emphasized the tripartite nature of student engagement: cognitive, emotional (affective), and behavioral. Meanwhile, as elucidated by Ben-Eliyahu et al. (2018), Haug

et al. (2018), and Yin and Wang (2016), students may engage in higher education with varying degrees and types of engagement. This variation suggests that a student may be engaged in one aspect (e.g., behavioral) but not in others (e.g., cognitive and social), leading to a complex pattern of engagement that warrants empirical investigation. From these diverse perspectives, it becomes evident that student engagement is inherently a multidimensional construct.

Defining engagement in this study, we draw upon the definitions provided by Ben-Eliyahu et al. (2018), who describe it as the intensity of productive involvement in an activity, and Bond et al. (2020), who view it as the energy and effort employed within a learning community. We propose a definition of student engagement as "positive student encouragement, intention, and evaluation in lectures," grounded in three supporting arguments. Firstly, engaged students exhibit enthusiasm, energy, attentiveness, persistence, and confidence in their tasks (*cognitive*). Secondly, their engagement is characterized by positive activation and intentions (*behavioral*) towards tasks and personal self. Lastly, engagement is marked by feelings of connection to the peer, tutor, teacher, and environment (*social*).

Considering the cultural context of Indonesia, where social life plays a significant role, our definition incorporates cognitive, behavioral, and social dimensions, providing a comprehensive understanding of student engagement in this specific cultural setting. Cognitive Engagement is the extent to which students are mentally invested in their learning activities, characterized by deep focus and willingness to engage in rational reasoning and experience during task completion. This form of engagement is evident when students are so absorbed in their assignments that they lose track of time, focusing solely on completing their tasks excellently. As per Ben-Eliyahu et al. (2018), behavioral engagement emphasizes students' physical and active participation in their learning environment. This includes actively asking questions, participating in discussions, and seeking information about materials and assignments, regardless of physical presence in the classroom. Such students often go beyond their responsibilities, demonstrating a strong intrinsic motivation and willingness to exert extra effort for task success. Drawing from Saks (2019), social engagement focuses on student engagement's interpersonal and organizational aspects. This dimension is observed when students foster positive relationships with peers, staff, and lecturers, feeling integrated into their campus community. They actively share, consult, and provide input on academic matters, showing concern for campus-related issues and contributing towards them.

In practical terms, engagement in the context of this research refers to the extent to which students are actively involved in their college experience, encompassing both academic learning and extracurricular activities. It is a multidimensional construct that includes cognitive engagement (students' mental investment in learning), behavioral engagement (participation in academic and co-curricular activities), and social engagement (interaction with peers and faculty). Academic engagement goes beyond mere participation and reflects a student's motivation, effort, and emotional connection to his or her educational environment.

Finally, this paper addresses the gaps in understanding the engagement profile among university students. Although recent research utilizes scales and measures of levels of engagement, detailed information on specific engagement patterns still needs to be explored. Identifying and understanding these engagement profiles is critical to developing targeted interventions to increase student engagement and improve learning outcomes. This knowledge gap emphasizes the importance of more in-depth research to shed light on the complexities of student engagement in higher education.

Method

Participants

The study was conducted with complete adherence to ethical standards. Approval was obtained from the Faculty Review Board (FRB) before data collection. Participants were informed about the study's objectives, assured of the confidentiality of their responses, and reminded of their voluntary participation, with the option to withdraw at any time without consequences.

Participants consisted of 657 undergraduate students from 13 public Islamic universities under the Ministry of Religious Affairs (MORA), located in the Indonesian cities of Aceh, Bandung, Banjarmasin, Makassar, Malang, Medan, Palembang, Pekanbaru, Palangkaraya, Pamekasan, Purwokerto, Salatiga, and Surabaya. These universities provide higher education opportunities that integrate academic and religious instruction, primarily serving students from diverse socioeconomic and cultural backgrounds across Indonesia. The sample included 428 females and 229 males aged between 18 and 23 (M = 20.006, SD = 1.721). The participants were students in their second to eighth semesters (M = 4.079, SD = 1.913), reflecting a broad range of academic stages within undergraduate education. A convenience sampling method was

used to select participants, ensuring a diverse representation of undergraduate experiences within the public Islamic university context.

Instruments

The instrument for data collection was the Multidimensional Student Engagement Scale, a meticulously developed 19-item questionnaire designed to measure various facets of student engagement in a higher education context (see *Table 1*). This scale represents an evolution of the prior work, Ridho (2024)which was adapted specifically for undergraduate students. It encapsulates three critical subscales: Cognitive Engagement, Behavioral Engagement, and Social Engagement. Each subscale includes items rated on a five-point Likert scale, ranging from 0 (Strongly Disagree) to 4 (Strongly Agree), allowing for a precise assessment of student engagement levels.

Table 1. *Within-Item Multidimensional Engagement Scale.*

	Name	Statement	C	B	S
1	i01	I feel energized to complete my study.	*	*	
2	i02	I really pay attention to my study.	*	*	
3	i03	I devote all my intellectual effort to my study.	*	*	
4	i04	Time flies when I'm completing coursework.	*	*	
5	i05	I deeply excited with my study.	*	*	
6	i06	I am enthusiastic about my study.	*	*	
7	i07	I find my study meaningful.	*	*	
8	i08	An unfinished assignment makes me always think about it.		*	
9	i09	I am voluntarily increasing my study time.		*	*
10	i10	While exhausted, I sincerely attended the extra class hours.		*	*
11	i11	I am courageous in lectures.		*	*
12	i13	When I don't understand, I ask questions in class discussions.		*	*
13	i14	I often do extra initiatives to complete coursework		*	*
14	i15	I always actively take a role for my class		*	*
15	i16	I do more than expected by the lecturer.		*	*
16	i17	I habitually work with other students when having problems.			*
17	i19	I develop a good relationship with my lecturers.			*
18	i18	I belong to this campus.	*		*
19	i20	Being a student on this campus makes me feel passionate.	*		*

Note. C = Cognitive Dimension, B = Behaviour Dimension, S = Social Dimension, Asterisk (*) represent measuring the dimension

The multidimensional item response theory (MIRT) validated the scale's internal structure (Ridho, 2024). Cronbach's alpha coefficients were calculated to ascertain the reliability,

yielding .913, with subscale coefficients of .895 for Cognitive Engagement, .811 for Behavioral Engagement, and .754 for Social Engagement. These coefficients indicate the scale's high internal reliability level, reinforcing its consistency in assessing student engagement dimensions.

The validity of the score interpretation in this article refers to the validity evidence suggested by AERA et al. (2014). The Engagement construct relevance of the participants' was convincingly represented by their respective scores with two previous research evidence, namely content-based evidence (Ridho, 2023) and internal structure evidence (Ridho, 2024). These two pieces of evidence were sufficient to convince the authors that the participants' engagement scores truly represented their position on the engagement construct continuum.

Procedure

Aligning with a cross-sectional design, the study involved 657 Islamic university students (65% female) spread across Indonesia, selected through convenience sampling. These participants voluntarily engaged in the research process. All participating students received a consent form before participating in the survey. This form explained in detail the purpose of the study, the nature of their participation, the guarantee of confidentiality, and the voluntary nature of their involvement. The students needed to understand their rights, including the ability to withdraw from the study without any consequences.

Data Analysis

In the first step, we calibrate the data response from participants through multidimensional item response theory (MIRT), especially within-item multidimensional graded response models (Reckase, 2009; Samejima, 1997), focusing on participants' multidimensional latent properties (engagement levels) alongside item and test properties. Based on van der Linden's (2016) principles, this method provides a robust framework for analyzing responses, emphasizing the individual responses to test items, the nature of random responses, and fitting parameters that distinguish the effects of measured attributes and item characteristics. Unlike traditional sum score approaches, MIRT offers a more refined analysis by placing engagement, item features, and test properties on a unified scale continuum.

Following the scaling, the LPA was conducted using Mplus (Muthén & Muthén, 1998-2017) through the R programming package "tidyLPA," (Rosenberg et al., 2018), which adhered to the methodological guidelines set by Spurk et al. (2020) and Meyer et al. (2012). The analysis

involved a series of iterative procedures to determine the optimal number of student profiles. At the same time, selection criteria included the AIC (Akaike Information Criterion), AWE (Akaike's Weighted Evidence), BIC (Bayesian Information Criterion), CLC (Consistent Akaike's Information Criterion), and KIC (Kullback Information Criterion), and entropy measures.

Results

Descriptive Statistics

The within-item MIRT analysis revealed fascinating insights into undergraduate students' cognitive, behavioral, and social engagement dimensions. *Table 2* presents the descriptive statistics for each dimension.

Table 2. *Descriptive Statistics of Cognitive, Behavioral, and Social Dimension*

Dimension	*M*	*SD*	*Min*	*Max*	*Skewness*	*Kurtosis*
Cognitive	-0.01	0.84	-3.00	2.58	-0.30	0.43
Behavioral	0.00	0.85	-2.96	2.58	-0.03	0.41
Social	-0.01	0.87	-3.84	2.53	-0.13	0.57

The mean score for cognitive engagement was slightly below zero (-0.01), with a standard deviation of 0.84. The scores ranged from -3.00 to 2.58, indicating a broad spectrum of cognitive engagement levels among students. The negative skewness (-0.30) suggests a slight tendency towards higher engagement, while the kurtosis value (0.43) indicates a relatively moderate peak in the distribution of scores.

Behavioral engagement scores averaged around zero (0.00) with a similar standard deviation of 0.85. The scores ranged from -2.96 to 2.58. The skewness was almost negligible (-0.03), indicating a reasonably symmetrical distribution. The kurtosis of 0.41 suggests a distribution similar in peakedness to the cognitive engagement scores.

The mean for social engagement was also slightly below zero (-0.01), with a standard deviation of 0.87, somewhat higher than the other two dimensions. The range extended from -3.84 to 2.53, showing the widest variation among the three dimensions. The skewness (-0.13) and kurtosis (0.57) values indicate a distribution with a slight negative skew and moderately higher peakedness than the other dimensions.

This descriptive analysis highlights the variability in engagement levels across different dimensions. While cognitive and behavioral engagement showed similar patterns in their distribution, social engagement exhibited a slightly more comprehensive range and a marginally different distribution shape. These initial findings set the stage for a deeper analysis of the distinct student engagement profiles identified through Latent Profile Analysis (LPA).

Exploring and comparing the model and goodness of fit (see *Table 3*), the Analytic Hierarchy Process then considering fit indices such as AIC (Akaike Information Criterion), AWE (Akaike's Weighted Evidence), BIC (Bayesian Information Criterion), CLC (Consistent Akaike's Information Criterion), and KIC (Kullback Information Criterion), as outlined by Akogul and Erisoglu (2017), the study identified Model 4 as the optimal solution, especially delineates four distinct classes (groups) of student engagement pattern. In Model 4, it is assumed that this complex model allows for differences in the average values (means) and variabilities of cognitive, behavioral, and social engagement across groups (classes). However, it still assumes a uniform relationship (covariance) level between the cognitive, behavioral, and social engagement within each group identified.

Table 3. *Goodness of fit compares solutions across Six Models and 8 Classes.*

Model	Classes	AIC	AWE	BIC	CLC	KIC	Entropy
1	1	4969.30	5051.16	4996.23	4959.30	4978.30	1.00
1	2	4933.86	5072.83	4978.73	4914.64	4946.86	0.39
1	3	4915.78	5110.01	4978.61	4889.20	4932.78	0.71
1	4	4904.18	5154.22	4984.96	4869.69	4925.18	0.76
1	5	4897.96	5203.89	4996.69	4855.48	4922.96	0.76
1	6	4884.42	5246.23	5001.10	4833.96	4913.42	0.77
1	7	4879.29	5296.97	5013.92	4820.86	4912.29	0.79
1	8	4878.25	5351.91	5030.83	4811.75	4915.25	0.75
2	1	4969.30	5051.16	4996.23	4959.30	4978.30	1.00
2	2	4919.58	5099.30	4977.92	4895.55	4935.58	0.98
2	3	4872.73	5151.14	4962.49	4833.84	4895.73	0.55
2	4	4856.09	5232.08	4977.25	4803.43	4886.09	0.67
2	5	4852.93	5326.78	5005.51	4786.24	4889.93	0.66
2	6	4842.76	5414.37	5026.76	4762.14	4886.76	0.69
2	7	4852.44	5521.70	5067.85	4757.99	4903.44	0.78
2	8	4852.15	5619.35	5098.97	4743.59	4910.15	0.72
3	1	4920.51	5044.29	4960.90	4904.51	4932.51	1.00
3	2	4911.27	5091.08	4969.61	4887.14	4927.27	0.94
3	3	4897.18	5133.15	4973.47	4864.79	4917.18	0.81
3	4	4886.26	5178.08	4980.50	4845.92	4910.26	0.83

Model	Classes	AIC	AWE	BIC	CLC	KIC	Entropy
3	5	4885.20	5233.02	4997.39	4836.77	4913.20	0.79
3	6	4882.93	5286.69	5013.07	4826.45	4914.93	0.76
3	7	4872.16	5331.73	5020.25	4807.77	4908.16	0.81
3	8	4861.74	5377.21	5027.79	4789.37	4901.74	0.81
4	1	4920.51	5044.29	4960.90	4904.51	4932.51	1.00
4	2	4892.16	5113.80	4963.96	4862.12	4911.16	0.98
4	3	4868.57	5188.77	4971.79	4823.80	4894.57	0.62
***4**	***4**	***4839.35***	***5257.25***	***4973.98***	***4780.71***	***4872.35***	***0.68***
4	5	4838.68	5354.51	5004.73	4765.95	4878.68	0.63
4	6	4831.75	5445.13	5029.21	4745.30	4878.75	0.77
4	7	4837.10	5548.31	5065.97	4736.64	4891.10	0.77
4	8	4848.90	5658.34	5109.19	4734.03	4909.90	0.57
5	1	4920.51	5044.29	4960.90	4904.51	4932.51	1.00
5	2	4902.11	5123.75	4973.91	4872.07	4921.11	0.98
5	3	4888.31	5207.85	4991.53	4844.21	4914.31	0.95
5	4	4876.03	5293.97	5010.67	4817.36	4909.03	0.66
5	5	4860.83	5376.55	5026.87	4788.19	4900.83	0.68
5	6	4858.52	5471.62	5055.97	4772.33	4905.52	0.91
5	7	4855.58	5566.78	5084.45	4755.12	4909.58	0.77
5	8	4852.59	5661.69	5112.87	4738.06	4913.59	0.74
6	1	4920.51	5044.29	4960.90	4904.51	4932.51	1.00
6	2	4882.93	5146.48	4968.19	4846.91	4904.93	0.99
6	3	4860.52	5264.77	4990.67	4803.56	4892.52	0.52
6	4	4851.72	5395.47	5026.74	4775.00	4893.72	0.64
6	5	4833.61	5517.08	5053.51	4736.94	4885.61	0.66
6	6	4822.39	5645.42	5087.17	4705.91	4884.39	0.76
6	7	4818.58	5781.55	5128.23	4681.90	4890.58	0.66
6	8	4805.28	5907.66	5159.81	4648.96	4887.28	0.84

Note.
Class: Counts of groups included in the model
Model 1: Equal variances and covariances fixed to 0
Model 2: Varying variances and covariances fixed to 0
Model 3: Equal variances and equal covariances
Model 4: Varying means, varying variances, and equal covariances
Model 5: Varying means, varying variances, and varying covariances
Model 6: Varying variances and varying covariances

The selected Model 4 with 4 classes (groups), marked with asterisks in the table, stands out due to its superior goodness of fit values compared to the other models. AIC (Akaike Information Criterion) measures the relative quality of statistical models for a given data set. It is based on information entropy, balancing model complexity (number of parameters), and the goodness of fit. For Model 4 with 4 classes, the AIC value is 4839.35, which is relatively low among all models. A lower AIC value indicates a model that better explains the variance in the data with fewer parameters, suggesting that this model offers a more efficient representation of the data.

AWE (Akaike's Weighted Evidence) is similar to AIC but includes a penalty that is more severe for models with more parameters. The lower AWE value of 5257.25 for Model 4 with 4 classes implies that it strikes an effective balance between model complexity and fit quality. This model accounts for the necessary complexity to explain the data while avoiding overfitting.

Like AIC, BIC (Bayesian Information Criterion) compares models and penalizes free parameters more strongly than AIC. The BIC value for Model 4 with 4 classes is 4973.98, which is comparatively lower than other models. A lower BIC value indicates that the model can better explain the data without unnecessary complexity. This is particularly important in model selection as it suggests that Model 4 provides a comprehensive understanding of the data without being overly complex.

CLC (Consistent Akaike's Information Criterion) is a variant of AIC that corrects consistency. The CLC value for this model is 4780.71, again the lowest among the compared models. This indicates that Model 4 has a high level of consistency in accurately representing the data across different sample sizes or datasets.

KIC (Kullback Information Criterion) focuses on entropy or information loss. The KIC value of 4872.35 for Model 4 with 4 classes suggests that this model retains most of the information in the data while simplifying the model structure.

Entropy is a measure of uncertainty in the classification. For Model 4 with 4 classes, the entropy is 0.68. While not the highest, it indicates a reasonable level of certainty or clarity in classifying data into the four distinct classes of student engagement. An entropy value closer to 1 indicates higher uncertainty, so a value around 0.68 reflects a balance between distinct classification and avoiding over-segmentation of data.

In summary, the goodness of fit values for Model 4 with 4 classes indicate a balanced, efficient, and consistent representation of the student engagement data. It effectively captures the complexity inherent in the patterns of student engagement while avoiding overfitting, making it an optimal choice for understanding and categorizing different class types of student engagement.

Student Engagement Class Profile

Table 4 and Figure 1 describe the distribution of students across the four classes and their respective mean scores in the Cognitive, Behavioral, and Social dimensions of engagement. Refers to Figure 1, there are four different classes in student engagement.

Table 4. *Class Profile, Number of Students, and Mean of Dimensions.*

Class	N Students	Cognitive	Behavioral	Social
1	133	-0.90	-0.79	-0.36
2	47	0.65	1.55	-0.45
3	462	0.15	0.03	0.09
4	15	1.11	1.33	1.66

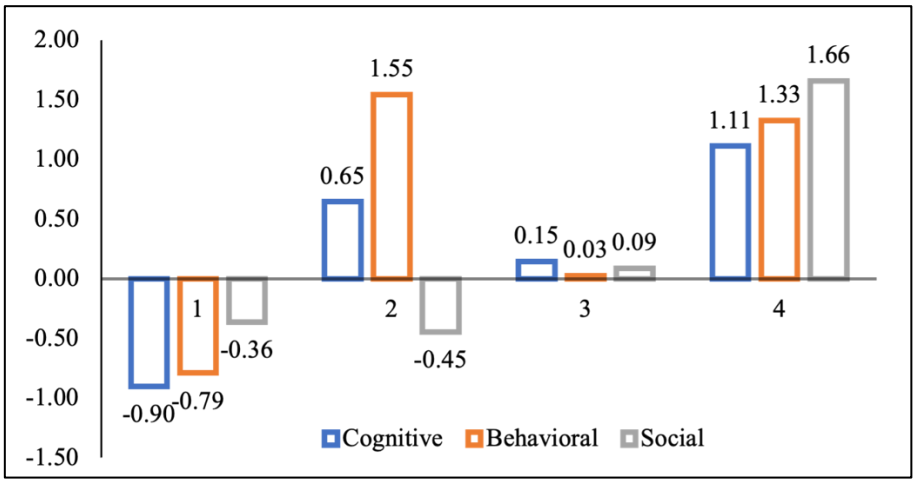

Figure 1. *Four Classes of Student Engagement Profile.*

Class 1 (Low Engagement Across Dimensions), comprising 133 students, is characterized by low mean scores in all engagement dimensions, particularly cognitive (-0.90) and behavioral (-0.79). Their social engagement mean score of -0.36 indicates lower social interaction than other classes.

Class 2 (High Cognitive and Behavioral, Low Social Engagement), with 47 students, showed high cognitive (0.65) and behavioral (1.55) engagement but a low score in social engagement (-0.45). This pattern suggests a focus on academic tasks with limited social interaction.

Class 3 (Moderate Engagement Across Dimensions), the largest class, consisting of 462 students, exhibits moderate mean scores across all dimensions: cognitive (0.15), behavioral (0.03), and social (0.09). This indicates a balanced, though not intense, engagement in various aspects of university life.

Class 4 (High Engagement Across All Dimensions), the smallest class with 15 students, is marked by high engagement levels across cognitive (1.11), behavioral (1.33), and social (1.66) dimensions, indicating an all-around engagement in academic and social aspects of university life. The analysis of these classes reveals various engagement patterns among undergraduate students. The variation in class sizes and engagement levels highlights the complexity of student experiences and the need for tailored educational strategies.

Discussion and conclusion

Integrating the findings from within-item MIRT analysis following Latent Profile Analysis (LPA) with practical implications and future research directions enriches the understanding of student engagement in Indonesian Islamic universities. The LPA's identification of four distinct engagement profiles underscores the need for tailored educational strategies. Class 1 students have low engagement in all dimensions, Class 2 students have high cognitive and behavioral but low social engagement, Class 3 represents the 'moderate' engagement group, and Class 4 exhibits high engagement across all dimensions.

Class 1: Addressing Low Engagement

Recent studies emphasize the need for a many-sided approach for students in Class 1 with low engagement across all dimensions. As highlighted in research by Al-Tameemi et al. (2023), targeted academic interventions such as personalized tutoring and mentoring programs can significantly elevate cognitive and behavioral engagement. The study underlines the importance of creating a classroom environment that fosters engagement, including active learning strategies and a positive instructor-student relationship. These factors are crucial in enhancing students' motivation and involvement in their studies and improving academic performance. Furthermore, integrating digital platforms for social interaction can enhance social engagement in a less intimidating environment. These digital platforms, especially in the post-pandemic educational era, have effectively reached students who might otherwise remain disengaged.

In addition to a multi-sided approach, studies collectively suggest that understanding student engagement profiles and leveraging personalized, technology-aided interventions can enhance engagement among disengaged undergraduate students. Söderholm et al. (2023) highlight the importance of recognizing distinct student engagement profiles in educational settings and underscore the positive impact of support systems in elevating engagement levels, particularly for students who exhibit lower levels of engagement. This suggests that personalized and tailored support strategies can effectively address disengagement issues. Complementing this, Yang and Ogata (2023) demonstrate the effectiveness of personalized learning analytics interventions in a blended learning environment. By using an e-book and recommendation system, their approach significantly improved both academic performance and behavioral engagement among undergraduate students. Thus, integrating technology and personalization in learning, catering to individual needs and preferences to re-engage disengaged undergraduate students.

Class 2: High Cognitive and Behavioral, Low Social Engagement

Class 2's high cognitive and behavioral pattern but low social engagement requires a delicate balance. Integrating interactive and cooperative learning strategies within blended learning environments can significantly enhance social engagement, particularly for students already excelling in cognitive and behavioral dimensions. Møgelvang and Nyléhn (2023) highlight the role of group dynamics in undergraduate mathematics and science education, demonstrating how cooperative learning fosters social engagement. By promoting teamwork, such strategies can improve social skills among students proficient in cognitive and behavioral aspects. Similarly, Muñoz Miguel et al. (2023) observe that Computer-Supported Collaborative Learning (CSCL) in management subjects boosts group performance and enhances overall engagement. This structured approach to social interaction is especially beneficial for students needing to develop their social engagement. Furthermore, Ali et al. (2023) indicate that blended learning in undergraduate dental education, incorporating interactive online methods, effectively supports students with lower social interaction. Tailored online modules, interactive forums, and group activities present valuable opportunities for these students to engage socially, complementing their cognitive and behavioral strengths.

Class 3: Supporting the 'Moderate' Engagement Group

Class 3 represents the 'moderate' engagement group. A balanced approach, incorporating user-friendly technology and a comprehensive learning environment, can effectively enhance engagement levels in students with moderate cognitive, behavioral, and social

engagement. Tahat et al. (2023) highlight the significance of integrating Information and Communication Technology (ICT) in education, focusing on internet accessibility, ease of use, and perceived usefulness. For students with moderate engagement, implementing user-friendly and accessible technology can enhance learning experiences, making the educational content more engaging and interactive. At the same time, Naeem et al. (2023) identify essential components of an effective technology-enhanced learning environment in medical education. It emphasizes the importance of cognitive enhancement, digital capability, and social representations. A learning environment that balances these components can provide moderately engaged students with a more holistic and stimulating educational experience.

Class 4: Capitalizing on High Engagement

Students in Class 4, exhibiting high engagement across all dimensions, present an opportunity to foster leadership and peer mentoring roles. Research by Zhang and Maconochie (2022) indicates that involving highly engaged students in peer-assisted learning benefits their less engaged peers and enhances their learning experience and skills. Furthermore, encouraging these students to participate in community engagement projects, as Fitzgerald et al. (2020) suggested, can expand their social engagement while contributing positively to their surroundings.

Effectively managing and enhancing the engagement of highly involved undergraduate students can be achieved through diverse educational practices. Couture et al. (2023) emphasize the significance of responsible and informed behavior in reducing health risks. For students with high engagement levels, integrating health awareness and preventive strategies into their academic and social activities can enhance their behavioral engagement and promote a comprehensive approach to well-being and community responsibility. This integration ensures that their engagement extends beyond academic pursuits, contributing to a holistic educational experience. Further, Trogden et al. (2023) highlight the effectiveness of data-informed approaches in augmenting student engagement. Specifically, introducing diverse and challenging High-Impact Practices (HIPs) for students already exhibiting high-performance levels can provide avenues for further growth and development. This approach ensures that their engagement is maintained and directed towards enriching and impactful educational experiences. By continuously challenging these students and providing development opportunities, educational institutions can ensure that their most involved students' engagement is sustained and effectively utilized.

Integrating Digital and Traditional Approach

Comparing recent studies with those pre-2020, Qiao et al. (2023) aligns with the post-2020 trend of integrating digital and traditional methods to enhance student engagement. This shift reflects adapting to digital platforms, advocating for a more holistic approach to student engagement. Qiao et al. demonstrate the effectiveness of mixed gamification, combining digital and non-digital elements, in improving learning outcomes and engagement. This integration exemplifies the recent focus on adaptive and flexible strategies that merge the best of both digital and traditional educational practices. This approach is particularly relevant in the context of Class 1 and 3 student recommendations, where the blend of methodologies is pivotal for effective engagement in a post-2020 educational era.

Implications for Educational Practice

The insights from these recent studies are particularly relevant in the evolving post-pandemic educational landscape. For policymakers and educators, these findings underscore the importance of agility and responsiveness to the changing dynamics of student engagement. The integration of digital tools, alongside traditional engagement strategies, is crucial in addressing the diverse needs of today's student body. Moreover, the emphasis on peer-led initiatives and community involvement for highly engaged students reflects a growing trend toward student-centered, experiential learning models. This approach enhances academic and social engagement and prepares students for real-world challenges and opportunities.

Incorporating these recent findings into educational strategies offers a pathway to more effective and inclusive educational environments. According to the latest research, tailoring interventions to specific engagement profiles can enhance student experiences and outcomes. For instance, leveraging digital platforms for Class 1 and 2 students while promoting leadership and community roles for Class 4 students represents a strategic approach aligned with contemporary educational research.

Integrating the insights derived from Latent Profile Analysis (LPA) with practical implications and future research directions enriched our understanding of student engagement within Indonesian Islamic universities. The identification of four distinct engagement profiles by LPA underscored the necessity for personalized educational strategies. For students classified under Class 1 with low engagement levels, providing personalized academic support and leveraging digital social platforms was imperative. Similarly, students in Class 2, characterized

by high cognitive and behavioral engagement but limited social interaction, would have benefited from structured social activities and collaborative learning initiatives. The moderate engagement group (Class 3) emphasized the importance of adopting a balanced approach, integrating academic support with diverse extracurricular opportunities. Conversely, highly engaged students (Class 4) were offered an opportunity to nurture leadership qualities and peer mentoring, leveraging their elevated engagement levels to influence their peers positively.

These findings resonated with the evolving landscape of educational practices, where integrating digital tools and adaptive learning environments has become increasingly crucial. This shift had been particularly pronounced post-2020, with the accelerated adoption of digital platforms. The recommendations put forth by this study advocated for a student-centric approach, underscored by the recognition of each student's unique needs and potential. Future research endeavors should delve deeper into the long-term ramifications of these tailored strategies and explore engagement profiles across diverse cultural and educational contexts. Additionally, there was a pressing need to investigate the role of technology in education, particularly in the digital age, and its impact on student well-being and mental health. Embracing this holistic approach to understanding and enhancing student engagement could inform more effective educational practices and policies, ultimately benefiting students and educational institutions. In conclusion, this study contributed significantly to our comprehension of student engagement, providing a framework for developing more adaptive and inclusive educational practices. As we navigated the educational landscape, especially in the post-pandemic era, embracing the diversity of student experiences and needs has been pivotal in fostering success and facilitating cognitive, behavioral, and social engagement.

References

AERA, APA, & NCME. (2014). *Standards for Educational and Psychological Testing*. American Educational Research Association.

Akogul, S., & Erisoglu, M. (2017). An Approach for Determining the Number of Clusters in a Model-Based Cluster Analysis. *Entropy*, *19*(9). https://doi.org/10.3390/e19090452

Al-Tameemi, R. A. N., Johnson, C., Gitay, R., Abdel-Salam, A.-S. G., Hazaa, K. A., BenSaid, A., & Romanowski, M. H. (2023). Determinants of poor academic performance among undergraduate students—A systematic literature review. *International Journal of Educational Research Open*, *4*, 100232. https://doi.org/10.1016/j.ijedro.2023.100232

Ali, K., Alhaija, E. S. A., Raja, M., Zahra, D., Brookes, Z. L., McColl, E., Zafar, S., Kirnbauer, B., Al Wahadni, A. M., Al-Fodeh, R. S., Bani-Hani, T. G., Daher, S. O., & Daher, H. O. (2023). Blended learning in undergraduate dental education: a global pilot study. *Medical Education Online*, *28*(1), 2171700. https://doi.org/10.1080/10872981.2023.2171700

Assunção, H., Lin, S.-W., Sit, P.-S., Cheung, K.-C., Harju-Luukkainen, H., Smith, T., Maloa, B., Campos, J. Á. D. B., Ilic, I. S., Esposito, G., Francesca, F. M., & Marôco, J. (2020). University Student Engagement Inventory : Transcultural Validity Evidence Across Four Continents. *Frontiers in psychology*, *10*, 1-12. https://doi.org/10.3389/fpsyg.2019.02796

Azra, A. (2012). Southeast Asia. Cosmopolitans and heretics: New Muslim intellectuals and the study of Islam. By Carool Kersten. London: Hurst & Company, 2011. Pp. xvi + 324. Notes, Bibliography, Index. *Journal of Southeast Asian Studies*, *43*(3), 540-542. https://doi.org/10.1017/S0022463412000471

Balan, P., & Metcalfe, M. (2012). Identifying teaching methods that engage entrepreneurship students. *Education + Training*, *54*(5), 368-384. https://doi.org/10.1108/00400911211244678

Ben-Eliyahu, A., Moore, D., Dorph, R., & Schunn, C. D. (2018). Investigating the multidimensionality of engagement: Affective, behavioral, and cognitive engagement across science activities and contexts. *Contemporary Educational Psychology*, *53*, 87-105. https://doi.org/10.1016/j.cedpsych.2018.01.002

Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2020). Mapping research in student engagement and educational technology in higher education: a systematic evidence map. *International Journal of Educational Technology in Higher Education*, *17*(2), 1-30. https://doi.org/10.1186/s41239-019-0176-8

Brown, A., Rich, M., & Holtham, C. (2014). Student engagement and learning: Case study of a new module for business undergraduates at Cass business school. *Journal of Management Development*, *33*(6), 603-619. https://doi.org/10.1108/JMD-04-2014-0038

Büchele, S. (2020). Evaluating the link between attendance and performance in higher education: the role of classroom engagement dimensions. *Assessment & Evaluation in Higher Education*, *46*(1), 1-19. https://doi.org/10.1080/02602938.2020.1754330

Carmona-Halty, M. A., Schaufeli, W. B., & Salanova, M. (2019). The Utrecht Work Engagement Scale for Students (UWES-9S): Factorial Validity, Reliability, and Measurement Invariance in a Chilean Sample of Undergraduate University Students. *Frontiers in psychology*, *10*, 1017-1017. https://doi.org/10.3389/fpsyg.2019.01017

Couture, M.-C., Walicek, L., L'Engle, K. L., & Regan, A. K. (2023). High engagement in nonpharmaceutical interventions and their associations with reduced COVID-19 among US college students. *BMC Public Health*, *23*(1), 971. https://doi.org/10.1186/s12889-023-15916-0

Finn, J. D., & Zimmer, K. S. (2012). Student Engagement: What Is It? Why Does It Matter? In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of Research on Student Engagement* (pp. 97 - 132). Springer Science + Business Media. https://doi.org/10.1007/978-1-4614-2018-7_5

Fitzgerald, H. E., Karen, B., Sonka, S. T., Furco, A., & Swanson, L. (2020). The centrality of engagement in higher education. In *Building the field of higher education engagement* (pp. 201-219). Routledge.

Fosnacht, K., McCormick, A. C., & Lerma, R. (2018). First-Year Students' Time Use in College: A Latent Profile Analysis. *Research in Higher Education*, *59*(7), 958-978. https://doi.org/10.1007/s11162-018-9497-z

Haug, J. C., Wright, L. B., & Huckabee, W. A. (2018). Undergraduate business students' perceptions about engagement. *Journal of Education for Business*, *94*(2), 81-91. https://doi.org/10.1080/08832323.2018.1504738

Howard, M. C., & Hoffman, M. E. (2017). Variable-Centered, Person-Centered, and Person-Specific Approaches: Where Theory Meets the Method. *Organizational Research Methods*, *21*(4), 846-876. https://doi.org/10.1177/1094428117744021

Immanuella, B. D. U., Kurniawati, F., & Rifameutia, T. (2023). Student Engagement Among Undergraduate Students in Southeast Asia: Systematic Literature Review. *Journal of Innovation in Educational and Cultural Research*, *4*(4), 602-615. https://doi.org/10.46843/jiecr.v4i4.961

Kahn, P. E. (2014). Theorising student engagement in higher education. *British Educational Research Journal*, *40*(6), 1005-1018. https://doi.org/10.1002/berj.3121

Ketonen, E. E., Haarala-Muhonen, A., Hirsto, L., Hänninen, J. J., Wähälä, K., & Lonka, K. (2016). Am I in the right place? Academic engagement and study success during the first years at university. *Learning and Individual Differences*, *51*, 141-148. https://doi.org/10.1016/j.lindif.2016.08.017

Kuh, G. D. (2009). The national survey of student engagement: Conceptual and empirical foundations. *New Directions for Institutional Research*, *2009*(141), 5-20. https://doi.org/10.1002/ir.283

Luthans, K. W., Luthans, B. C., & Palmer, N. F. (2016). A positive approach to management education: The relationship between academic PsyCap and student engagement. *Journal of Management Development*, *35*(9), 1098-1118. https://doi.org/10.1108/JMD-06-2015-0091

Marôco, J., Marôco, A. L., Campos, J. A. D. B., & Fredricks, J. A. (2016). University student's engagement: development of the University Student Engagement Inventory (USEI). *Psicologia: Reflexão e Crítica*, *29*(1), 21. https://doi.org/10.1186/s41155-016-0042-8

Maynard, B. R., Salas-Wright, C. P., Vaughn, M. G., & Peters, K. E. (2012). Who Are Truant Youth? Examining Distinctive Profiles of Truant Youth Using Latent Profile Analysis. *Journal of Youth and Adolescence*, *41*(12), 1671-1684. https://doi.org/10.1007/s10964-012-9788-1

McNeish, D. (2022). Psychometric properties of sum scores and factor scores differ even when their correlation is 0.98: A response to Widaman and Revelle. *Behavior Research Methods*. https://doi.org/10.3758/s13428-022-02016-x

Meyer, J. P., Stanley, L. J., & Parfyonova, N. M. (2012). Employee commitment in context: The nature and implication of commitment profiles. *Journal of Vocational Behavior*, *80*(1), 1-16. https://doi.org/10.1016/j.jvb.2011.07.002

Møgelvang, A., & Nyléhn, J. (2023). Co-operative Learning in Undergraduate Mathematics and Science Education: A Scoping Review. *International Journal of Science and Mathematics Education*, *21*(6), 1935-1959. https://doi.org/10.1007/s10763-022-10331-0

Muñoz Miguel, J. P., Simón de Blas, C., Anguita Rodríguez, F., & García Sipols, A. E. (2023). Collaborative learning in management subjects to university students: A multi-level research to identify group profile, engagement and academic performance. *The International Journal of Management Education*, *21*(1), 100762. https://doi.org/10.1016/j.ijme.2022.100762

Muthén, L. K., & Muthén, B. O. (1998-2017). *Mplus user's guide* (8 ed.). Muthén & Muthén.

Naeem, N.-i.-K., Yusoff, M. S. B., Hadie, S. N. H., Ismail, I. M., & Iqbal, H. (2023). Understanding the Functional Components of Technology-Enhanced Learning Environment in Medical Education: A Scoping Review. *Medical Science Educator*, *33*(2), 595-609. https://doi.org/10.1007/s40670-023-01747-6

Portoghese, I., Leiter, M. P., Maslach, C., Galletta, M., Porru, F., D'Aloja, E., Finco, G., & Campagna, M. (2018). Measuring Burnout Among University Students: Factorial Validity, Invariance, and Latent Profiles of the Italian Version of the Maslach Burnout Inventory Student Survey (MBI-SS) [Original Research]. *Frontiers in psychology*, *9*(2105), 2105. https://doi.org/10.3389/fpsyg.2018.02105

Qiao, S., Yeung, S. S.-s., Zainuddin, Z., Ng, D. T. K., & Chu, S. K. W. (2023). Examining the effects of mixed and non-digital gamification on students' learning performance, cognitive engagement and course satisfaction. *British Journal of Educational Technology*, *54*(1), 394-413. https://doi.org/10.1111/bjet.13249

Reckase, M. D. (2009). *Multidimensional Item Response Theory*. Springer.

Ridho, A. (2023). Work Engagement: A Conceptual Review [Keterikatan Kerja: Sebuah Reviu Konseptual]. *Buletin Psikologi*, *31*(1), 56-79. https://doi.org/10.22146/buletinpsikologi.55589

Ridho, A. (2024). Multidimensionality of student engagement construct: The exploratory and confirmatory item response model. *TPM: Testing, Psychometric, Methodology in Applied Psychology*, *31*(2), 239-261. https://doi.org/10.4473/TPM31.2.7

Rosenberg, J., Beymer, P., Anderson, D., van Lissa, C. j., & Schmidt, J. (2018). tidyLPA: An R Package to Easily Carry Out Latent Profile Analysis (LPA) Using Open-Source or Commercial Software. *Journal of Open Source Software*, *3*(30). https://doi.org/10.21105/joss.00978

Saks, A. M. (2019). Antecedents and consequences of employee engagement revisited. *Journal of Organizational Effectiveness: People and Performance*, *6*(1), 19-38. https://doi.org/10.1108/JOEPP-06-2018-0034

Samejima, F. (1997). Graded Response Model. In *Handbook of Modern Item Response* (pp. 85-100). Springer-Verlag.

Schaufeli, W. B., Martínez, I. M., Pinto, A. M., Salanova, M., & Bakker, A. B. (2002). Burnout and Engagement in University Students: A Cross-National Study. *Journal of Cross-Cultural Psychology*, *33*(5), 464-481. https://doi.org/10.1177/0022022102033005003

Schmidt, J. A., Rosenberg, J. M., & Beymer, P. N. (2017). A person-in-context approach to student engagement in science: Examining learning activities and choice. *Journal of Research in Science Teaching*, *55*(1), 19-43. https://doi.org/10.1002/tea.21409

Schnitzler, K., Holzberger, D., & Seidel, T. (2020). All better than being disengaged: Student engagement patterns and their relations to academic self-concept and achievement. *European Journal of Psychology of Education*, *36*(3), 627-652. https://doi.org/10.1007/s10212-020-00500-6

Sinval, J., Casanova, J. R., Marôco, J., & Almeida, L. S. (2021). University student engagement inventory (USEI): Psychometric properties. *Current Psychology*, *40*(4), 1608-1620. https://doi.org/10.1007/s12144-018-0082-6

Soane, E., Truss, C., Alfes, K., Shantz, A., Rees, C., & Gatenby, M. (2012). Development and application of a new measure of employee engagement: the ISA Engagement Scale. *Human Resource Development International*, *15*(5), 529-547. https://doi.org/10.1080/13678868.2012.726542

Söderholm, F., Viljaranta, J., Tuominen, H., Lappalainen, K., & Holopainen, L. (2023). Student engagement profiles and the role of support in general upper secondary education. *Learning and Individual Differences*, *104*, 102289. https://doi.org/10.1016/j.lindif.2023.102289

Spurk, D., Hirschi, A., Wang, M., Valero, D., & Kauffeld, S. (2020). Latent profile analysis: A review and "how to" guide of its application within vocational behavior research. *Journal of Vocational Behavior*, *120*. https://doi.org/10.1016/j.jvb.2020.103445

Tahat, D. N., Habes, M., Tahat, K., Pasha, S. A., Attar, R. W., Al-Rahmi, W. M., & Alblehai, F. (2023). Technology Enhanced Learning in Undergraduate Level Education: A Case Study of Students of Mass Communication. *Sustainability*, *15*(21).

Tight, M. (2020). Student retention and engagement in higher education. *Journal of Further and Higher Education*, *44*(5), 689-704. https://doi.org/10.1080/0309877X.2019.1576860

Timms, C., Fishman, T., Godineau, A., Granger, J., & Sibanda, T. (2018). Psychological engagement of university students: Learning communities and family relationships. *Journal of Applied Research in Higher Education*, *10*(3), 243-255. https://doi.org/10.1108/JARHE-09-2017-0107

Trogden, B. G., Kennedy, C., & Biyani, N. K. (2023). Mapping and Making Meaning from Undergraduate Student Engagement in High-Impact Educational Practices. *Innovative Higher Education*, *48*(1), 145-168. https://doi.org/10.1007/s10755-022-09608-7

van der Linden, W. J. (2016). Introduction. In W. J. van der Linden (Ed.), *Handbook of item response theory* (Vol. 1, pp. 1-10). Taylor & Francis Group, LLC.

Wefald, A. J., & Downey, R. G. (2009). Construct Dimensionality of Engagement and its Relation With Satisfaction. *The Journal of Psychology*, *143*(1), 91-112. https://doi.org/10.3200/JRLP.143.1.91-112

Wekullo, C. S. (2019). International Undergraduate Student Engagement: Implications for Higher Education Administrators. *Journal of International Students*, *9*(1), 320-337. https://doi.org/10.32674/jis.v9i1.257

Wilson, D. M., Summers, L., & Wright, J. (2020). Faculty support and student engagement in undergraduate engineering. *Journal of Research in Innovative Teaching & Learning*, *13*(1), 83-101. https://doi.org/10.1108/JRIT-02-2020-0011

Yang, C. C. Y., & Ogata, H. (2023). Personalized learning analytics intervention approach for enhancing student learning achievement and behavioral engagement in blended learning. *Education and Information Technologies*, *28*(3), 2509-2528. https://doi.org/10.1007/s10639-022-11291-2

Yin, H., Lee, J. C.-K., & Wang, W. (2014). Dilemmas of leading national curriculum reform in a global era: A Chinese perspective. *Educational Management Administration & Leadership*, *42*(2), 293-311. https://doi.org/10.1177/1741143213499261

Yin, H., & Wang, W. (2016). Undergraduate students' motivation and engagement in China: an exploratory study [Article]. *Assessment & Evaluation in Higher Education*, *41*(4), 601-621. https://doi.org/10.1080/02602938.2015.1037240

Zhang, Y., & Maconochie, M. (2022). A meta-analysis of peer-assisted learning on examination performance in clinical knowledge and skills education. *BMC Medical Education*, *22*(1), 147. https://doi.org/10.1186/s12909-022-03183-3

Zhoc, K. C. H., Webster, B. J., King, R. B., Li, J. C. H., & Chung, T. S. H. (2019). Higher Education Student Engagement Scale (HESES): Development and Psychometric Evidence. *Research in Higher Education*, *60*(2), 219-244. https://doi.org/10.1007/s11162-018-9510-6

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