Cracking the Code of Business Student Learning: Through the Lens of Fink's Taxonomy

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Abstract

Business education has increasingly emphasized learning outcomes and assessment, highlighting the need to understand how students achieve program-level competencies across diverse educational backgrounds. This study examines the multiple factors underlying program learning outcomes, guided by Fink's Taxonomy, to classify students into meaningful clusters and reveal patterns of achievement. Data were collected from a census of secondary sources in the Business program of an international institution, totaling 383 cases. The findings identify four distinct factors of program learning outcomes: Collaborative Intelligence, Adaptive Business Thinking, Holistic Decision Making, and Analytical Acumen. T-tests and ANOVA reveal differences in program learning outcomes performance by gender, entrance mode, school type, and chosen major. Cluster analysis further identifies two distinct student groups—Pathbreakers and Pathfinders—who differ in their achievement on program learning outcomes and associated characteristics. This study proposes Fink's Taxonomy as an alternative approach to curriculum assessment.

Keywords: learning outcomes, cluster analysis, educational background, higher education, performance evaluation, Fink's taxonomy

1. Introduction

Backward design principles have increasingly been employed by business education to align program learning outcomes (PLOs) with evolving stakeholder expectations and professional demands (Krotov & Krotova, 2022; Wiggins & McTighe, 1998). However, questions remain whether the current assessment approaches can capture the complex and multidimensional quality of student learning. Traditional outcome frameworks, most particularly Bloom's taxonomy, have significantly influenced curriculum design and accreditation standards. Some critics contend that conventional taxonomies, particularly Bloom's hierarchy, center on disaggregated cognitive skills, thus overlooking integrative and affective *dimensions,* which potentially result in assessments that do capture the comprehensive competencies essential in contemporary business education (Dabney & Eid, 2024; Fink, 2013). These concerns have become more important as business education has faced increased pressure from stakeholders who have expressed the need that graduates should demonstrate essential skills such as adaptability, creative problem-solving, and human-directed AI literacy (AACSB, 2025; Rios et al., 2020).

In response to these challenges, research has explored alternative frameworks that better address the changing nature of learning. Among these, Fink's taxonomy focuses on the interconnectedness of six dimensions: foundational knowledge, application, integration, the human dimension, caring, and learning how to learn. This approach encompasses both cognitive skills and affective and integrative competencies (Fink, 2013), and its application in disciplines such as nursing, engineering, and management education has demonstrated that the taxonomy could be used to account for significant learning experiences that are not fully addressed by Bloom's hierarchical structure (Dabney & Eid, 2024). However, empirical research using Fink's taxonomy in business education and across Asian countries remains limited (Harland, 2025; Harris & Clayton, 2019). Most existing studies have focused on course-level outcomes rather than program-level assessments. This raises concerns about the effectiveness of the current business curriculum in fostering the holistic competencies essential for professional success and societal impact. The study's findings offer empirical evidence of program learning outcomes, derived from a comprehensive analysis of a full cohort of undergraduate

business students. By employing Fink's taxonomy as an interpretive framework, our findings advance the understanding of the evaluation of business student performance by integrating the cognitive and affective dimensions of learning, as well as further theoretical discussions about multidimensional learning in business education (Harland, 2025).

2. Theoretical Background and Hypothesis Development

2.1 Multidimensional Learning Outcomes

Learning outcomes are precise, measurable statements that specify the knowledge, skills, and abilities learners should demonstrate upon completing the program (Harris & Clayton, 2019). At the program level, well-defined learning outcomes guide curriculum revision. Accreditation frameworks such as AACSB's Assurance of Learning and ACBSP's outcome-based model emphasize the significance of learning outcomes by requiring business schools to demonstrate measurable competencies and a commitment to continuous improvement (Brink et al., 2018). A business education equips students with skills and knowledge that extend beyond its disciplinary content. Instead of focusing on specific knowledge, business programs generally assess student success based on their development of critical thinking, social skills, moral reasoning, and creative problem-solving abilities (Martell, 2007; Rios et al., 2020) with constructive teaching and learning pedagogies (Biggs, 1996), promoting multidimensional capacity that aligned with stakeholders' expectations. Despite recognition of multidimensional graduate attributes, assessment in business education continues to be dominated by Bloom's taxonomy (Ching & da Silva, 2017; Kotee & Nguyen, 2021), in which its hierarchical structure has been criticized for fragmenting learning that fails to reflect the interconnected competencies required in practice (Dabney & Eid, 2024).

2.2 Fink's Taxonomy in Higher Education

Theoretical perspectives on higher education, particularly those emphasizing holistic development, suggest that learning outcomes should not be considered as distinct but rather as interdependent dimensions (Biggs & Tang, 2011; Fink, 2013). This is because significant learning experiences—such as project-based learning, case study analysis, or experiential learning—cannot be categorized within Bloom's level of learning structure (Fink, 2013). Consequently, there is a growing demand for alternative frameworks that can more effectively capture the integrated, multidimensional attributes of business graduate capabilities.

Fink's model emphasizes six interconnected dimensions: foundational knowledge, application, integration, human dimension, caring, and learning how to learn. Together, these dimensions broaden the scope of education beyond hierarchical cognitive skills by encompassing affective and integrative aspects (Fink, 2013). This taxonomy has been applied across disciplines to guide curriculum and assessment. For example, Dabney and Eid (2024) used Fink's six categories in nursing education to encourage students to develop reflective thinking and empathetic skills. In engineering programs, Paul et al. (2023) demonstrated how the model effectively connects project-based learning with technical knowledge, teamwork abilities, and independent learning skills. Barnes and Caprino (2016) applied this approach to examine student reflections in service-learning contexts, demonstrating significant development in interpersonal skills.

Fink's taxonomy has been predominantly employed in health sciences, nursing, and engineering. Although applications of Fink's taxonomy in business education are relatively scarce, existing studies illustrate its potential to enrich both curriculum design and assessment. Killian and Brandon (2009) employed Fink's framework to redesign an accounting course, broadening assessment beyond technical competency. Ho (2023) applied this taxonomy to examine accounting students, highlighting learning dimensions such as integration and human interaction. Likewise, Burga et al. (2023) used the taxonomy in management education to assess how outside-classroom experiences promote students' ethical engagement and self-awareness. Collectively, these studies demonstrate the value of Fink's taxonomy in conceptualizing multidimensional and holistic learning outcomes, which are essential for educational development. Nevertheless, its implementation has been predominantly at the course level, while accreditation bodies require the measurement of graduate attributes at the program level. Despite the fact that our BBA program originally formulated its PLOs using Bloom's taxonomy, this research seeks to realign those outcomes with Fink's framework. Accordingly, this study applies Fink's taxonomy to assess the attributes of BBA students across the full 2019–2023 cohorts, providing a comprehensive framework for interpreting the multidimensional outcomes of graduates. This forms the basis for our first hypothesis:

H1: The program learning outcomes can be categorized into multiple factors.

2.3 Individual Differences in Learning Outcomes

2.3.1 Demographic Influences on Academic Performance

A substantial body of research has established the impact of demographic and socioeconomic variables on academic performance in higher education. The common indicators include GPA, course grades, degree classification, school type, prior education, gender, ethnicity, nationality, and age. Among these factors, socioeconomic status (SES)—typically measured by parental education, income, and occupation—exerts a powerful influence. Students from higher SES backgrounds consistently achieve stronger academic outcomes, largely because they have greater access to educational resources, supportive school environments, and family capital (Armstrong, 2000; Rodríguez-Hernández et al., 2020; Suna et al., 2020; Thiele et al., 2016). School type and prior academic preparation are also critical determinants of performance. Students from private schools and those with stronger prior achievement, such as higher entrance test scores, generally perform better in higher education (Armstrong, 2000; Suna et al., 2020; Thiele et al., 2016).

Besides socioeconomic and educational background, demographic characteristics also influence academic performance. Demographic factors, including gender, ethnicity, and age, also affect performance, with females often demonstrating higher achievement than males, while minority and international students exhibit lower achievement due to language and cultural barriers (Mountford-Zimdars et al., 2015). In addition, Van Mol (2022) found the significance of gender differences in participation in study abroad programs, and Nguyen (2016) demonstrated that male and female students' different learning approaches result in different outcomes. More importantly, variation within demographic groups is often greater than variation between groups, indicating the complexity and context-specificity of these effects (Helal et al., 2018; Mountford-Zimdars et al., 2015).

2.3.2 Competency-Based Measures of Academic Performance

In addition to traditional indicators such as grades and degree classifications, academic performance has been evaluated based on higher-order cognitive and affective competencies. Studies have shown that competency-based education improves clinical performance (Fan et al., 2015) as well as soft skills, such as communication, teamwork, and problem-solving (Alt et al., 2023). This approach is especially relevant to business education, where competency-based models help align curriculum with industry needs. The challenges are to ensure the consistent assessment and capture the breadth of graduate competencies. Ritter et al. (2018) supported this view, arguing that business programs enhance employability by emphasizing professional competencies such as leadership, ethical reasoning, and strategic thinking. When embedded in coursework and assessment, these competencies equip graduates with the academic proficiency and professional capabilities required for entry into the workforce.

Despite the fact that the development of competencies in higher education, such as critical thinking, ethical reasoning, innovative thinking, and interpersonal skills, is affected by demographic factors, individual traits, and institutional contexts, evidence consistently shows that curriculum design, experiential learning, and supportive learning environments are also critical for developing these multidimensional skills. Critical thinking varies across cultural backgrounds and academic disciplines. Western educational systems promote questioning and debate, whereas Chinese students rely more on memorization (Fan & See, 2022; Lun et al., 2010). Arts and humanities disciplines foster deeper reflection compared to those in Science, Technology, Engineering, and Mathematics (STEM) (Dumitru, 2019).

Although ethical reasoning is influenced by demographics, particularly gender and socioeconomic status, it is developed more strongly through targeted coursework and real-world experiences than only by background (Burnett et al., 2003; Ozdogan & Eser, 2007; Shaub, 1994). According to Martín et al. (2017), innovative thinking emerges from personal traits such as openness and intrinsic motivation, as well as supportive institutional environments and collaborative learning cultures. Interpersonal skills develop most effectively in socially diverse, engagement-oriented settings rather than traditional academic settings. Interpersonal skills are enhanced by intercultural exposure and diverse demographics (Haskollar & Kohli Bagwe, 2023).

Across all competencies, although demographic factors contribute to competency development, the evidence consistently reveals that curriculum design and experiential learning opportunities exert greater influence on student performance. However, the effects may vary depending on the educational context and learning outcome dimension. This leads to our second hypothesis.

H2: Student profile variables (i.e., gender, entrance mode, school type, and major) affect different factors of program learning outcomes.

2.4 Cluster Analysis for Student Typologies

To examine how student profiles differentially affect learning outcomes, typological research demonstrates that student populations can be segmented into distinct subgroups based on demographic characteristics, academic outcomes, career orientations, and institutional choice. Cluster analysis facilitates this segmentation process. This approach has been widely applied in higher and business education research. For example,

Research demonstrates the use of cluster analysis in higher education contexts. Studies have segmented students using various combinations of demographics, academic performance, and behavioral factors to address various educational challenges—identifying distinct student types and preventing dropout (Cheong & Ong, 2014; Nafuri et al., 2022), matching instructional preferences with classroom needs (Trocchia et al., 2021) and aligning career orientations like creativity, entrepreneurship, and lifestyle preferences with graduate competencies (Sánchez-Garcés et al., 2023). Following this approach, this study identifies student attributes through the lens of the BBA program's PLOs. This approach identifies high-performing groups and at-risk groups that require intervention. The resulting typology enables us to recognize diverse learning patterns within our program, highlighting unique capabilities of our graduates while identifying competency gaps for additional support. Therefore, we hypothesize:

H3: There are distinct clusters of students that reflect different patterns of program learning achievement.

H4: Student profile variables (i.e., gender, entrance mode, school type, and major) are associated with cluster membership, with each cluster exhibiting distinct patterns in these profiles.

3. Research Design

3.1 Data Collection

The study collected census data from secondary sources, including the Admission Section and the Business Administration Division of an international institution. Data from the Admission Section, recorded for students enrolled in 2019, provides the educational background at the secondary level (i.e., school type, entrance mode, and initial major chosen). The data on PLOs were obtained from the Business Administration Division and collected from 2019 to 2022. The data from both sources were combined in a spreadsheet, totaling 441 cases. Any missing values from the dataset will be handled with listwise deletion, resulting in 383 cases.

3.2 Instruments

The current instruments to assess PLOs in the international BBA program comprise six components: teamwork, analytical skills, innovativeness, ethics and sustainability, management, and major-specific knowledge and skills. Each component includes sub-components, totaling 16 sub-PLOs. Teamwork (PLO1) comprises three sub-PLOs that measure interpersonal skills, diversity, and collaboration. The analytical dimension (PLO2) encompasses three sub-PLOs that assess students' ability to identify information, apply analytical methods, and formulate business solutions. Innovativeness (PLO3) comprises two sub-PLOs that assess students' ability to identify business opportunities/problems, and to propose practical models/frameworks. The ethics and sustainability dimension (PLO4) has two sub-PLOs that measure students' ability to assess the ethical implications and articulate sustainability in business. Management (PLO5) comprises three sub-PLOs: students' understanding of business functions, effective planning, and response to workplace changes. Major-specific (PLO6) measures students' competency in integrating stakeholders' perspectives, analyzing the impact, and employing appropriate business models. A three-point scale is used to evaluate achievement of PLOs, with 1 indicating below-expected performance, 2 indicating meeting the performance expectation, and 3 indicating exceeding the performance expectation.

3.3 Data Analysis

To test the proposed hypotheses, this study employed Principal Component Analysis (PCA) with Varimax rotation to perform factor analysis and identify multiple factors for the learning outcomes. Differences in student profile variables, including gender, entrance mode, school type, and major, were tested using ANOVA to examine their effects on the learning outcome factors. Distinct clusters were identified using Ward's method and k-means clustering, and the results were cross-validated with discriminant analysis. Finally, the associations among student profile variables within each cluster were examined using the Chi-square test.

4. Results

This study used Principal Component Analysis (PCA) with Varimax rotation to extract four factors of learning outcomes. The Kaiser–Meyer–Olkin measure (KMO = 0.681) exceeds the recommended minimum of 0.50 (Kaiser,

1974), indicating acceptable sampling adequacy. Bartlett's test of Sphericity was significant, $\chi^2(55) = 125.012$, $p < 0.01$, suggesting that the items are sufficiently correlated for factor analysis (Bartlett, 1937). The total variance explained by all four factors is 59.714%. Thus, hypothesis H1 is supported, indicating that PLOs can be evaluated using multiple factors. All loading factors in this study ranged from 0.578 to 0.836, exceeding the acceptable threshold of 0.50 (Nunnally & Bernstein, 1994). The relatively low Cronbach's Alpha values (0.479 to 0.689) likely reflect the use of secondary data with subjective instructor ratings, as is common with Likert-scale data.

The first factor comprises four sub-PLOs, which determine students' ability to assess ethical implications, understand the concept of sustainability in a business context, appreciate diversity, and work effectively with others. This factor is referred to as *Collaborative Intelligence*, highlighting students' competence in collaborating both interpersonally and within broader social contexts. This factor is evaluated in courses such as Business Communication, and Business Ethics and Sustainability. The second factor has two sub-PLOs assessing students' ability to integrate stakeholder perspectives and environmental impact for effective organizational and societal decisions. This factor, *Adaptive Business Thinking*, emphasizes developing actions from multiple perspectives and incorporating adaptability into business decision-making and is evaluated in courses such as Economic Policy Analysis, Financial Modeling, Internationalization Strategy, and Marketing Strategy.

Holistic Decision Making, the third factor, comprises three sub-PLOs: understanding of organizational functions and management, identifying key problems and opportunities, and formulating integrated practical models or frameworks. This factor emphasizes taking a holistic perspective to ensure solutions align with organizational functions and management. It is evaluated in courses such as Principles of Marketing and Business Finance. The last factor, *Analytical Acumen*, comprises two sub-PLOs: recognizing and assessing changes in the work environment and selecting appropriate frameworks or methods to analyze business issues. It emphasizes analytical skills that enable students to develop effective solutions in dynamic contexts. Courses such as Macroeconomics, Microeconomics, and Management Science support this factor through case studies and analytical methods that train students to respond effectively to changing conditions.

This study examines the contribution of students' profiles to the evaluation of four factors of PLOs, considering gender, entrance mode, school type, and chosen major. The differences by gender and entrance mode were tested using an independent-samples t-test, while differences by school type and chosen major were analyzed using ANOVA with Least Significant Difference (LSD) post hoc tests. Table 1 illustrates that *Holistic Decision Making* (Male: M = 2.328, SD = 0.422; Female: M = 2.444, SD = 0.371) differ by gender at $p < 0.01$, while *Collaborative Intelligence* (Male: M = 2.706, SD = 0.353; Female: M = 2.780, SD = 0.336) and *Analytical Acumen* (Male: M = 2.402, SD = 0.460; Female: M = 2.499, SD = 0.407) is significant at $p < 0.05$, with all three PLO factors showing higher performance for females than males.

Table 1. Differences in Learning Outcome Factors by Gender

Factor	Gender	Mean	SD	Levene's F	t	df	95% CI
Collaborative Intelligence	Male	2.706	0.353	4.143*	-2.058*	337.07	[-0.144, 0.003]
	Female	2.780	0.336				
Adaptive Business Thinking	Male	2.120	0.421	1.785	-1.624	381	[-0.145, 0.014]
	Female	2.185	0.364				
Holistic Decision Making	Male	2.328	0.422	4.610*	-2.789**	319.71	[-0.197, -0.034]
	Female	2.444	0.371				
Analytical Acumen	Male	2.402	0.460	3.415	-2.168*	381	[-0.184, -0.090]
	Female	2.499	0.407				

Note: *$p < 0.05$, **$p < 0.01$; t-value, df, and 95% CI are reported based on unequal variances assumed when Levene's test is significant.

Table 2 illustrates that *Collaborative Intelligence* (Admission: M = 2.794, SD = 0.313; Pre-college: M = 2.681, SD = 0.380), *Adaptive Business Thinking* (Admission: M = 2.200, SD = 0.398; Pre-college: M = 2.093, SD = 0.370), and *Holistic Decision Making* (Admission: M = 2.445, SD = 0.387; Pre-college: M = 2.320, SD = 0.401) differ by entrance mode at $p < 0.01$, with all three PLO factors showing higher performance for admission than pre-college students.

Table 2. Differences in Learning Outcome Factors by Entrance Mode

Factor	Entrance Mode	Mean	SD	Levene's F	t	df	95% CI
Collaborative Intelligence	Admission	2.794	0.313	8.158**	3.064**	281.67	[0.041, 0.186]
	Pre-College	2.681	0.380				
Adaptive Business Thinking	Admission	2.200	0.398	1.031	2.662**	381	[0.028, 0.187]
	Pre-College	2.093	0.370				
Holistic Decision Making	Admission	2.445	0.387	0.152	3.063**	381	[0.045, 0.206]
	Pre-College	2.320	0.401				
Analytical Acumen	Admission	2.446	0.433	0.057	-0.686	381	[-0.120, 0.058]
	Pre-College	2.477	0.432				

Note: *p < 0.05, **p < 0.01; t-value, df, and 95% CI are reported based on unequal variances assumed when Levene's test is significant.

ANOVA was conducted, and the results are presented in Table 3. For *Analytical Acumen* ($n^2 = 0.027$), students from Thai (M = 2.465, SD = 0.412), International (M = 2.541, SD = 0.378), and Overseas schools (M = 2.504, SD = 0.499) had higher performance than students who obtained a GED (M = 2.306, SD = 0.498). For *Collaborative Intelligence,* students from international schools (M = 2.843, SD = 0.270) performed better on PLOs than those from a Thai school (M = 2.712, SD = 0.372). Both were found to be significant at $p < 0.05$.

Table 3. Differences in Learning Outcome Factors by School Type

Factor	Entrance Mode	Mean	SD	F	Least Significant Difference (LSD)
Collaborative Intelligence	GED	2.775	0.322	2.756*	International > Thai
	Thai	2.712	0.372		
	International	2.843	0.270		
	Overseas	2.752	0.295		
Adaptive Business Thinking	GED	2.169	0.455	1.769	
	Thai	2.133	0.356		
	International	2.247	0.414		
	Overseas	2.097	0.431		
Holistic Decision Making	GED	2.395	0.366	1.747	
	Thai	2.364	0.396		
	International	2.487	0.444		
	Overseas	2.412	0.314		
Analytical Acumen	GED	2.306	0.498	3.532*	Thai, International, Overseas > GED
	Thai	2.465	0.412		
	International	2.541	0.378		
	Overseas	2.511	0.518		

Note: *p < 0.05, **p < 0.01; df = [3, 379]

Additionally, an ANOVA was conducted to examine differences based on students' initial major selection at admission, as shown in Table 4. For *Adaptive Business Thinking*, students from International Business (M = 2.180, SD = 0.313) and Finance majors (M = 2.279, SD = 0.430) had higher performance on learning outcomes than students who chose Marketing (M = 2.057, SD = 0.413) and Business Economics majors (M = 2.015, SD = 0.468). The results in Tables 1-5 support hypothesis H2, indicating significant differences in PLO performance by gender, entrance mode, school type, and major, as predicted.

Table 4. Differences in Learning Outcome Factors by Major

Factor	Entrance Mode	Mean	SD	F	Least Significant Difference (LSD)
Collaborative Intelligence	MK	2.771	0.335	2.120	
	IB	2.706	0.365		
	FN	2.817	0.300		
	BE	2.741	0.354		
Adaptive Business Thinking	MK	2.057	0.413	6.838**	IB, FN > MK, BE
	IB	2.180	0.313		
	FN	2.279	0.430		
	BE	2.015	0.468		
Holistic Decision Making	MK	2.306	0.411	2.105	
	IB	2.414	0.381		
	FN	2.447	0.358		
	BE	2.399	0.490		
Analytical Acumen	MK	2.468	0.447	0.204	
	IB	2.470	0.415		
	FN	2.438	0.453		
	BE	2.423	0.444		

Note: *p < 0.05, **p < 0.01; MK = Marketing, IB = International Business, FN = Finance, BE = Business Economics; df = [3, 379]

Cluster analysis was conducted in two stages. First, a hierarchical analysis using Ward's linkage was performed, and the dendrogram indicated two distinct clusters (Reutterer & Dan, 2019). Second, k-means clustering (k = 2) was used to assign cases to final clusters. Figure 1 demonstrates the variation in the four PLO factors for both clusters. Convergence was achieved after 12 iterations, with the maximum change in cluster centers reaching 0.000. Cluster 1 (n = 214), termed "*Pathbreakers*," had higher learning outcomes across all four factors, ranging from 2.35 to 2.83, with *Collaborative Intelligence* having the highest mean score, followed by *Analytical Acumen*, *Holistic Decision Making*, and *Adaptive Business Thinking*. In contrast, Cluster 2 (n = 169), labeled "*Pathfinders*," had lower mean scores across factors in the same sequence, ranging from 1.92 to 2.64, with *Adaptive Business Thinking* falling short of expectations. The Euclidean distance between the final cluster centers was 0.777, indicating moderate separation. ANOVA confirmed that the clusters differed significantly on all four factors ($p < 0.01$).

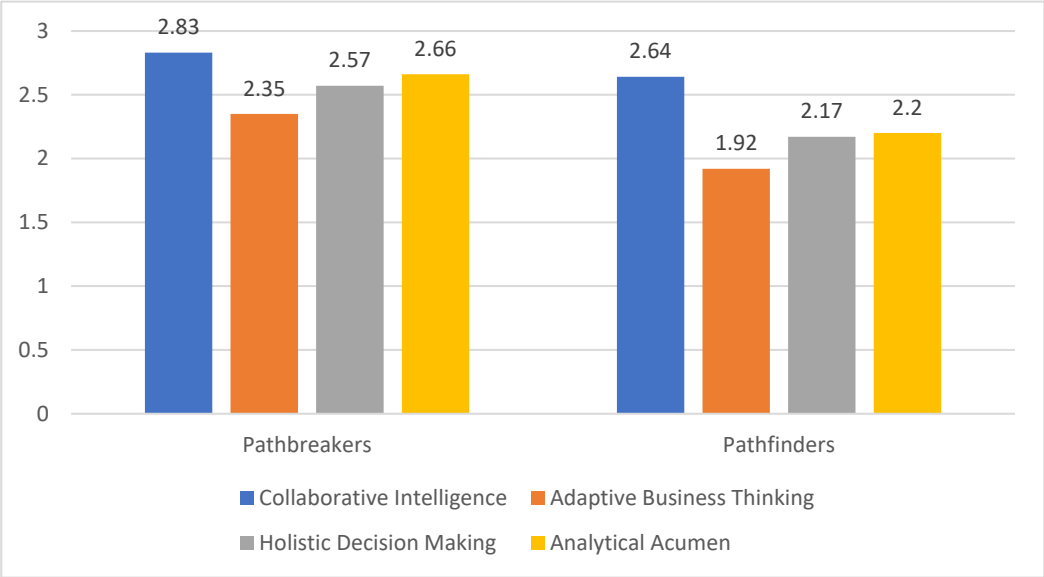

Figure 1. Cluster Result of the Four Factors of Learning Outcomes

This study also conducted a discriminant analysis to cross-validate the two clusters identified through Ward's method and k-means clustering. The analysis reveals one significant discriminant function: Wilks' $\lambda = 0.350$, χ^2 (4) = 397.932, $p < 0.01$, indicating a significant difference between the two clusters. The classification test showed that 99.2% of cases were correctly classified, demonstrating discriminant accuracy between the discriminant analysis and the original cluster solution. Thus, hypothesis H3 is supported, indicating the presence of well-defined clusters based on variation in the four PLO factors.

The chi-square test results indicate that student profiles are significantly associated with each cluster: gender and entrance mode at $p < 0.01$, and major at $p < 0.05$. *Pathbreakers* have a higher proportion of females (64.0%), compared to males (36.0%), whereas *Pathfinders* exhibit a balanced gender distribution. Among students who entered through the admission mode, a higher proportion fell into *Pathbreakers* (61.7%) than *Pathfinders* (38.3%), whereas a slightly higher number of pre-college students fell within *Pathfinders*. For different school types, *Pathbreakers* and *Pathfinders* exhibit a balanced distribution across GED and Thai schools. However, for international (71.8% in *Pathbreakers* vs. 28.2% in *Pathfinders*) and overseas schools (61.5% in *Pathbreakers* vs. 38.5% in *Pathfinders*), *Pathbreakers* contain a significantly higher proportion of students. Within the BBA Program, all majors except Finance show a relatively equal distribution across two Clusters. Among Finance majors, most students fall into the *Pathbreakers* cluster (67.9%) rather than the *Pathfinders* (32.1%). Thus, hypothesis H4 is supported, as shown in Table 5.

Table 5. Chi-Square Test of Student Profiles Across Clusters

Student Profiles	Pathbreakers	Pathfinders	Total
Gender**			
Male	77 (47.5%)	85 (52.5%)	162 (42.3%)
Female	137 (62.0%)	84 (38.0%)	221 (57.7%)
Entrance Mode**			
Admission	142 (61.7%)	88 (38.3%)	230 (60.1%)
Pre-College	72 (47.1%)	81 (52.9%)	153 (39.9%)
School Type*			
GED	29 (49.2%)	30 (50.8%)	59 (15.4%)
Thai School	118 (52.0%)	109 (48.0%)	227 (59.3%)
International School	51 (71.8%)	20 (28.2%)	71 (18.5%)
Oversea	16 (61.5%)	10 (38.5%)	26 (6.8%)
Major*			
Marketing	39 (44.3%)	49 (55.7%)	88 (23.0%)
International Business	100 (57.8%)	73 (42.2%)	173 (45.2%)
Finance	57 (67.9%)	27 (32.1%)	84 (21.9%)
Business Economics	18 (47.4%)	20 (52.6%)	38 (9.9%)
Total	214 (55.9%)	169 (44.1%)	383 (100%)

Note *$p < 0.05$, ** $p < 0.01$

5. Discussion

5.1 General Discussion

This study identifies four distinct PLO factors: Collaborative Intelligence, Adaptive Business Thinking, Holistic Decision Making, and Analytical Acumen. These factors are associated with the six dimensions of Fink's Taxonomy. Given the nature of Fink's, which suggests that their dimensions interact with one another (Fink, 2013), our findings can be explained as multiple dimensions of Fink's support for each PLO factor.

The results suggested that *Adaptive Business Thinking* appears to operate through the mechanism of Fink's Application and Integration dimensions (Fink, 2013). Students' performance shows that when they exercise their critical and creative thinking and practical skills to address business issues. Also, their tendency to draw on prior experiences to interpret new scenarios suggests that learning environments, especially those that include projects and simulations, are the key pedagogy for students to develop *Integration* skills. A comparable pattern emerges for

Holistic Decision Making and Analytical Acumen, in which the *Application* appears to support students in identifying opportunities and diagnosing problems. However, the quality of the proposed solutions also depends on the fundamental core business knowledge. The findings imply that without such underlying knowledge, students are not able to evaluate organizational strengths and make informed decisions.

Overall, the evidence suggests that the PLO on the *Application* function as the central mechanism for achieving several high-level learning outcomes across Fink's dimensions. This suggests that the program needs a stronger design and alignment of teaching–learning tools and assessments linked to the Application PLO.

The results show several performance variations across student profiles, suggesting that demographic and entry-path differences affect the development of several PLOs. For Adaptive Business Thinking, both male and female students barely met the expected outcomes, indicating a need for greater attention in the curriculum. This aligned with prior evidence that this competency is not fully supported by the current pedagogical structure (e.g., Clifford et al., 2004; Fan & See, 2022; Haskollar & Kohli Bagwe, 2023; Mountford-Zimdars et al., 2015). In contrast, female students' higher performance in *Holistic Decision Making*, *Collaborative Intelligence*, and *Analytical Acumen* is consistent with prior findings that female students frequently demonstrate stronger and sustained learning behavior (e.g., Mountford-Zimdars et al., 2015).

Entry-mode difference also shows meaningful results. The higher performance of admission students in Collaborative Intelligence suggests that prior educational experience or the admission process may better prepare them for group-based learning environments. However, the insignificant performance on Analytical Acumen between admission and pre-college students is particularly noteworthy. This is because it indicates that the program curriculum provides sufficient structure for both groups to develop their analytical capabilities, suggesting that the program instructional design is quite effective at compensating for some initial unequal disparities. Taken together, the results reinforce the view that curriculum quality plays an important role in equalizing learning outcomes across diverse student profiles.

The differences observed across secondary school types suggest that prior educational environments shape students' preparedness across several PLO domains. The highest discrepancy is in *Analytical Acumen*, with GED students performing lower than those from Thai, international, and overseas schools. This pattern may reflect variation in pre-university training in analytical writing and qualitative reasoning. Another distinct difference in performance is in *Collaborative Intelligence*, where international students outperform Thai students. Given that the international program typically emphasizes multicultural teamwork and cross-cultural communication, students from such environment appear to perform better in terms of the social aspects of learning (Haskollar & Kohli Bagwe, 2023). In contrast, no differences were observed among school types in *Adaptive Business Thinking* and *Holistic Decision.* The insignificance of performance differences across school types in these two dimensions suggests that these higher-order competencies are not strongly shaped by students' prior educational backgrounds. Consequently, the responsibility for cultivating these capabilities appears to be primarily on the BBA curriculum itself. These findings thus point to the need to design early-stage learning experiences from "general education" to "business core" to help smooth students' transition from basic to intermediate-level courses.

The clustering analysis further reinforces the patterns observed across demographic and educational backgrounds. Students were grouped into two distinct clusters—Pathbreakers and Pathfinders—with Pathbreakers consistently outperforming Pathfinders across all PLO factors. The composition of the Pathbreaker cluster, which includes a higher proportion of female students and a substantial share of international and overseas graduates, is consistent with earlier findings that these groups exhibit stronger performance in competencies such as Collaborative Intelligence and Analytical Acumen. The direct-admission students within this cluster also align with the expectation that students entering through more competitive pathways may possess stronger academic readiness or engagement patterns. These findings suggest that performance differences are not specific to PLOs but instead reflect broader students' profiles. As a result, the program may need to consider instructional strategies or targeted supports to ensure that Pathfinders are able to develop higher-order competencies at a comparable pace.

5.2 Theoretical and Practical Implications

The findings from this study provide several theoretical contributions. First, while Bloom's taxonomy is commonly used to frame learning outcomes in BBA programs, Fink's has primarily been investigated in non-BBA contexts, including health science, nursing, and engineering programs (e.g., Dabney & Eid, 2024; Paul et al., 2023), where project-based learning is emphasized. This study applied Fink's taxonomy to the BBA context and was able to explain the PLOs in alignment with Fink's dimensions, offering a different framework than Bloom's taxonomy, which relies on hierarchical evaluation (Kotee & Nguyen, 2021). This aligns with current BBA instructional and assessment

strategies, such as case studies, project-based learning, and field trips. Second, this study demonstrates methodological robustness by collecting data from the entire student population across a four-year curriculum, enabling it to pinpoint areas for program improvement.

Several practical implications for educators, curriculum directors, and instructors are revealed. First, cluster analysis identified two distinct student groups—Pathbreakers and Pathfinders—with different performance patterns across the PLOs. While overall student competencies broadly align with the intended PLOs, the pace of competence development varies considerably across student groups. This suggests that achieving learning outcomes is contingent on background characteristics such as school type, admission pathway, gender, and major. Second, the findings highlight that *Adaptive Business Thinking* emerges as an underdeveloped skill relative to other competencies. This requires ongoing practice across diverse contexts to strengthen students' abilities to analyze complex problems, collaborate innovatively, and respond effectively to uncertainty. Embedding adaptive thinking longitudinally across the curriculum enables students to progressively develop their cognitive flexibility over the four years of study, resulting in more robust and transferable learning outcomes, as noted by Saavedra and Saavedra (2011).

Finally, at the program level, the results highlight the need for formative, rather than summative-only, approaches to measuring PLO achievement. Graduation-focused assessments may overlook critical learning gaps that develop during students' academic journey. Cohort analysis revealed that certain subgroups—for example, GED entrants in *Analytical Acumen* and Thai-schooled students in *Collaboration Intelligence*—lag behind their peers in achieving PLOs. Implementing periodic formative assessments would help identify underperforming groups, enable targeted interventions, provide tailored support, and ensure competence gaps are addressed well before graduation. Such practices promote equitable learning opportunities and enhance the reliability of program-level assurance of learning.

5.3 Limitations and Future Research Recommendations

Despite careful design, it is not without limitations. The census data yielded a relatively small sample size due to the limited cohort size and the four-year data-collection period. Also, as the data were collected from BBA students at a single institution, these factors together limit the generalizability and external validity of the findings. Future research could address this by replicating the study across multiple cohorts, larger institutions, or multiple institutions to expand sample sizes and diversity. Conducting a longitudinal study could also provide insight into changes that occur over time. While secondary data generally helps reduce bias, the PLOs' assessments in this study were based on instructors' ratings, which may be subjective and compromise reliability. Undeniably, the Cronbach's Alpha in this study was relatively low. While secondary data typically minimizes bias, instructor-rated PLO assessments may introduce subjectivity concerns, as reflected in the relatively low Cronbach's Alpha scores of this study. Other sources of data should be considered in future studies, such as students' self-assessment or peer evaluation. In addition, to address inconsistent rating standards and potential biases, more objective data (e.g., standardized tests, employer feedback from internships) should be incorporated in future research. The reliance on secondary data also limits the types of analyses that can be conducted and may influence the validity and interpretation of the findings. Future research should also consider mixed-methods approaches, incorporating qualitative methods such as interviews with relevant stakeholders—including students, instructors, and future employers—to gain deeper insight into areas that need improvement. The proposed use of Fink's taxonomy in this study may raise questions about the mapping of its dimensions to the factors identified. This highlights the need for curriculum managers to reevaluate program learning outcomes and may help future researchers to better align the learning outcome factors with Fink's taxonomy.

6. Conclusion

This study is the first to explore how program learning outcomes are achieved and whether they can be mapped to Fink's well-established taxonomy. Four learning outcomes factors were identified–Collaborative Intelligence, Analytical Acumen, Holistic Decision Making, and Adaptive Business Thinking–which can be interpreted through Fink's taxonomy. These factors were demonstrated differently across distinct student profiles, providing insights for more targeted course design. Moreover, the two distinct clusters–Pathbreakers and Pathfinders–offer a framework for understanding student profiles and guiding all clusters in achieving the program learning outcomes.

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Data sharing statement

No additional data are available.