A study on the correlation between the learning strategies of college students with lower social economic status and academic achievement

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ABSTRACT

This study examines the relationship between college students' learning strategies, socioeconomic status (SES), and academic achievement. A survey was conducted with 85 prospective childcare students at a university in Taiwan. Data were collected using the Learning and Study Strategies Inventory (LASSI), course scores, and SES measures. Structural modeling and ANOVA were used for analysis. Learning strategies positively influenced students' ability to overcome learning difficulties, which in turn was linked to academic achievement. SES moderated the relationship between learning strategies and performance in required courses. Addressing learning difficulties mediates the impact of learning strategies on academic success, especially in required courses. Teachers should support students in developing learning strategies and consider SES backgrounds to better enhance academic outcomes.

Contribution/Originality: This study identifies solving learning difficulties as a core learning strategy that enhances academic success, offering practical implications for higher education.

1. INTRODUCTION

The primary determinant of higher education quality is students' learning outcomes. Academic performance is vital in shaping students' prospects and success and is supported by a vast body of academic literature. This literature highlights the importance of academic performance for college students' success in daily activity patterns, personal development, access to further educational opportunities, and future careers (Daymont & Blau, 2008; Pascarella & Terenzini, 2005). Academic success can enhance students' achievement, boost confidence, and foster positive relationships. Academic success supports students' well-being in the highly competitive field of higher education and holds great significance for institutions, as it can positively affect an institution's reputation.

University differs from high school in many ways. Students have more freedom and more responsibility. Unlike in high school, the information presented in university classes highlights essential concepts that students must organize and connect by themselves. University students must complete all reading outside class; thus, learning strategies and self-regulation are critical. It can be challenging for first-year students to understand due to their unfamiliarity with their new situation. which they must adjust to West and Sadoski (2011). Studies have explored the relationship between college students' learning outcomes and strategies. Generally, students' strategies significantly impact their academic performance and can affect it in several ways, such as better time management, improved conceptual understanding, and enhanced information retention strategies.

Many learning strategies include selecting main ideas, closely monitoring comprehension, and time management. Several strategies have shown broad effectiveness in enhancing student learning and can be widely employed. Students from different cultural and subject backgrounds may use different study strategies. Among the tools for measuring learning strategies, LASSI is one of the most widely used assessment tools. It consists of ten student learning strategies: selecting main ideas, concentration, information processing, self-testing, etc. Considering cultural differences, the Taiwan version of the LASSI scale adds one more subscale, Solving Learning Difficulties. Effective learning strategies may differ for students from different subject backgrounds. The educational goal of college is to promote student learning and success. Teaching methods have crucial aspects that affect students' learning outcomes and should include guidance on learning strategies (Caruth, 2018; Johnstonbaugh, 2017).

Parents facing economic disadvantages are more likely to enroll their children in lower-performing high schools than those with higher socioeconomic status. These schools reinforce cultural capital and social stratification by prioritizing vocational pathways over university progression and setting specific student expectations (O'Sullivan, Robson, & Winters, 2019). The University of Technology in Taiwan attracts more low-SES than high-SES students. Schools with low socioeconomic status (SES) students often need help with issues of low self-esteem and variable quality, with these students being overrepresented in some departments. To help students, teachers' assistance in obtaining effective learning strategies is a matter of consideration in teaching practice. This study aims to identify helpful learning strategies for students of the University of Technology with lower family socioeconomic status. The questions for the present study are as follows: 1. Do learning strategies predict students' success in academic performance? 2. Does the ability to solve learning difficulties influence academic performance? 3. How does family socioeconomic impact affect students' learning strategies and academic performance?

2. LITERATURE REVIEW

2.1. Types of Learning Strategies and Academic Outcomes

Learning strategies refer to techniques used to acquire, organize, and transform information, vital for academic success (Alexander, Graham, & Harris, 1998). A leading cause of frustration and academic underperformance is ineffective learning and study strategies. These strategies can be likened to tools for tackling academic challenges and aiding in developing the necessary skills to excel. Identifying and improving these strategies is essential for students to navigate their college education successfully, enabling them to rely on their capabilities and uncover and reinforce their strengths. It is crucial to understand how to study in a manner that promotes retaining knowledge and skills. Identifying the most effective learning strategies for academic success is essential for students and their instructors. This knowledge allows instructors to incorporate supportive and effective techniques into their curriculum (Donker, De Boer, Kostons, Van Ewijk, & van der Werf, 2014).

McKeachie, Pintrich, Lin, Smith, and Sharma (1990) first, described a widely accepted classification of learning strategies. They categorized learning strategies into metacognitive, cognitive, and resource management. The cognitive strategies encompass simple and complex approaches (such as rehearsal and organization) that can be directly applied to specific tasks or courses (Alexander et al., 1998). Metacognitive strategies include devising plans, closely monitoring comprehension, and adjusting or adapting mental processes. Resource management strategies are non-cognitive strategies involving various resource management aspects. These strategies encompass efforts to regulate commitment and persistence while studying, effectively manage time and study environments, seek assistance from teachers or peers, and collaborate with fellow learners (Duncan & McKeachie, 2005). Investigating the connection between learning, academic performance, and study strategies can help identify barriers to learning and develop practical methods to improve learning experiences (Schutz, Gallagher, & Tepe, 2011). Economically disadvantaged college students often need to work, causing them to neglect their studies and fail to learn effective reading strategies. The demand for academic support services among college students continues to rise.

Colleges and universities employ different assessment tools to support students facing academic challenges. One widely used instrument is the LASSI (2nd edition) (Weinstein, Palmer, & Schulte, 2002) which has been utilized in higher education institutions for many years. Sexton (2012) highlighted the value of the instrument at her college in creating personalized student interventions and evaluating the strengths and weaknesses of the overall program. LASSI includes ten scales that evaluate a student's knowledge and application of learning and study strategies: Attitude, Anxiety, Concentration, Motivation, Selecting Main Ideas, Information Processing, Self-Testing, Test Strategies, Time Management, and Study Aids. The Taiwan version of the Learning and Reading Strategies Scale, based on the LASSI scale, adds a new subscale named "Solving Learning Difficulties," which includes seven questions, such as: "When doing homework at home, if I encounter a problem that I don't know, I will look for reference materials," "If I encounter questions that I don't know how to solve during the exam, I will read the questions again," etc.

Many studies have examined the relationship between LASSI results and academic achievement. Cano (2006) Pinpointed two notable GPA predictors: Goal Strategies and Affective Strategies. Goal Strategies include Test Strategies, Anxiety, and Selecting Main Ideas, whereas Affective Strategies encompass scales such as Motivation, Time Management, Concentration, and Attitude. The predictive value of the LASSI scales on students' academic performance has been the focus of numerous studies. Marrs, Sigler, and Hayes (2009) conducted a study on eighty-eight students in an introductory psychology course and found that motivation scale scores were the best predictor of a student's grade. West and Sadoski (2011) explored the predictive value of various factors, including the ten LASSI scales and undergraduate GPA, on the first-semester GPA of 106 medical students. They found that Time Management and Self-Testing scales were strongly related to final averages. From the research mentioned above, the learning strategies of students in different departments may differ, so there are variations in the correlation between different LASSI subscales and learning achievements.

In previous research, there has been no investigation into students' learning strategies within early childhood education-related majors. This study aims to address this gap to assist early childhood teachers in improving their learning outcomes and acquiring solid professional knowledge. Many students in the Child Care Department of the University of Technology come from families with low socioeconomic status. This study examines the relationship between family educational resources, students' learning strategies, and academic achievements. The researchers anticipate that the findings can serve as a reference for teachers to guide low-SES college students.

2.2. SES, School Choice and Academic Achievement

A critical educational study known as The Coleman Study (Coleman et al., 1966) utilized data from over 3,000 schools and approximately 600,000 students in the US to investigate the impact of school choice on student achievement. The research revealed that, after accounting for students' family and social backgrounds, schools had limited influence on student success. Moreover, the mean level of student SES and ethnic composition in schools significantly explained variations in student learning outcomes compared to school and classroom instructional processes (Kim, 2019; Kim, Cho, & Kim, 2019). Family SES has consistently emerged as a robust predictor of academic achievement and one of the most reliable. Extensive research across various countries and cultures has supported the consistent relationship between SES and academic performance (Gabriel, Muasya, Mwangi, Mukhungulu, & Lomeyan, 2016). Case in point, meta-analysis involving 101,157 students from 6,871 schools revealed moderate to strong associations between SES and achievement (Sirin, 2005). In a separate study, White et al. (2016) found that race and SES accounted for 59% of the variation in mathematics proficiency and 52% of the variation in language proficiency.

According to regulations in Taiwan, two types of workers can legally teach in kindergartens: childcare givers and early childhood teachers. The former mainly graduate from the Department of Child Care at the University of Science and Technology, while the latter mainly graduate from the Department of Early Childhood Education at the

National University. Although childcare givers' salaries are less than those of early childhood teachers, most child caregivers work hard and remain committed to their posts. According to statistical results, in kindergartens across the country, the number of child caregivers is about three times that of early childhood teachers (Ministry of Education, 2024). In other words, child caregivers are the primary human resources for caring for and educating children. The quality of caregivers is the most crucial factor influencing the quality of early childhood education in Taiwan.

Taiwan's junior high school graduates have two options for enrollment: an academic-oriented general high school or a technical-oriented vocational school. In principle, general high school students will move on to academic universities. In contrast, vocational school students enroll in technical colleges if they want to attend post-secondary education. Compared to general universities, vocational universities offer a greater emphasis on practical coursework and a dedicated focus on nurturing students' professional skills, ultimately facilitating their job placement with greater ease. Because of society's emphasis on diplomaism, most believe obtaining academic qualifications from higher education institutions will provide a better competitive advantage in their future career prospects than acquiring a technological education. Therefore, when students, parents, and teachers face the choice of further education, most will choose ordinary high schools over vocational schools. Furthermore, when going to university, most students prefer to study in ordinary universities rather than technical colleges.

In addition, in Taiwan, public schools rank higher than private schools for both high schools and universities, and relevant data can corroborate the choice and quality of students. According to the registration rates of national senior high schools in the 2018 academic year, public high schools had the highest rate, at 93.08%. Public higher vocational schools were at 85.67%, private high schools were at 77.4%, and private higher vocational schools were at 59.9%. In addition, according to the results of a survey on students who have just entered high school from the Taiwan Upper Secondary Database, the average entrance examination score of all students was 12.75 for the 2014 school year, the average score of students admitted to general high schools was 18.12 points, and 8.16 points for vocational high schools. The results for the 2015 school year were similar. The average total score of all students was 12.41 points, the average score of those who passed the general high school examination was 17.84 points, and the average score for higher vocational schools was 7.91 (Huang, 2019). The data from these two years consistently show that general senior first-year high school students have the highest scores in entrance examinations, and higher vocational students have lower scores. (Huang, 2019).

The research of Chen, Liao, and Chang (2017) found that children from economically disadvantaged families in Taiwan tend to attend technical and vocational schools. This result echoes many studies that follow the Coleman Report, showing that family SES significantly impacts academic achievement and school choice. The data on family income based on the 2015 school year from the Taiwan Upper Secondary Database also suggests that the proportion of higher vocational students from low-income households reached 59.79%, higher than high school students at 21.43%. Disadvantaged students with lower grades and SES are much more likely to enroll in higher vocational education than in high school (Huang, 2019). A similar situation also occurs when entering college. Students with better grades and higher family SES are more likely to attend public general universities. On the other hand, students with poorer grades, as well as lower family SES and educational resources, tend to enroll in private vocational schools (Chou, 2015).

As described above, most child caregivers in Taiwan are trained by private technology universities. A high proportion of these students come from economically disadvantaged families. Their academic performance during college and their ability to complete the degree are not only related to their future but also to improving the family's economic situation. This indicates that private technology universities can play a more critical role in addressing the problem of lack of family resources by helping students develop effective learning strategies and achieve academic success. Economically disadvantaged students are more likely to improve their socioeconomic status through enhanced academic achievement and college degree completion.

Past research has paid less attention to the awareness and use of learning strategies by economically disadvantaged college students. This study can fill this research gap in the literature. Suppose students of education departments better understand how to use learning methods that can produce meaningful results; when they become teachers, they will be better able to guide students appropriately.

3. MATERIALS AND METHODS

3.1. Research Design

The learning strategies for preservice teachers at the Department of Child Care may differ from those of other professions. To achieve this, we developed a distinct model, depicted in Figure 1. The bold lines trace the relationships between primary variables and their impacts, while the dashed lines highlight the interplay between the moderating variables and their influence. We examined students' experiences in the Department of Child Care, considering the mediating role of their ability to solve learning difficulties. Furthermore, we examined how the influences of the required and general courses vary for students from different SES levels.
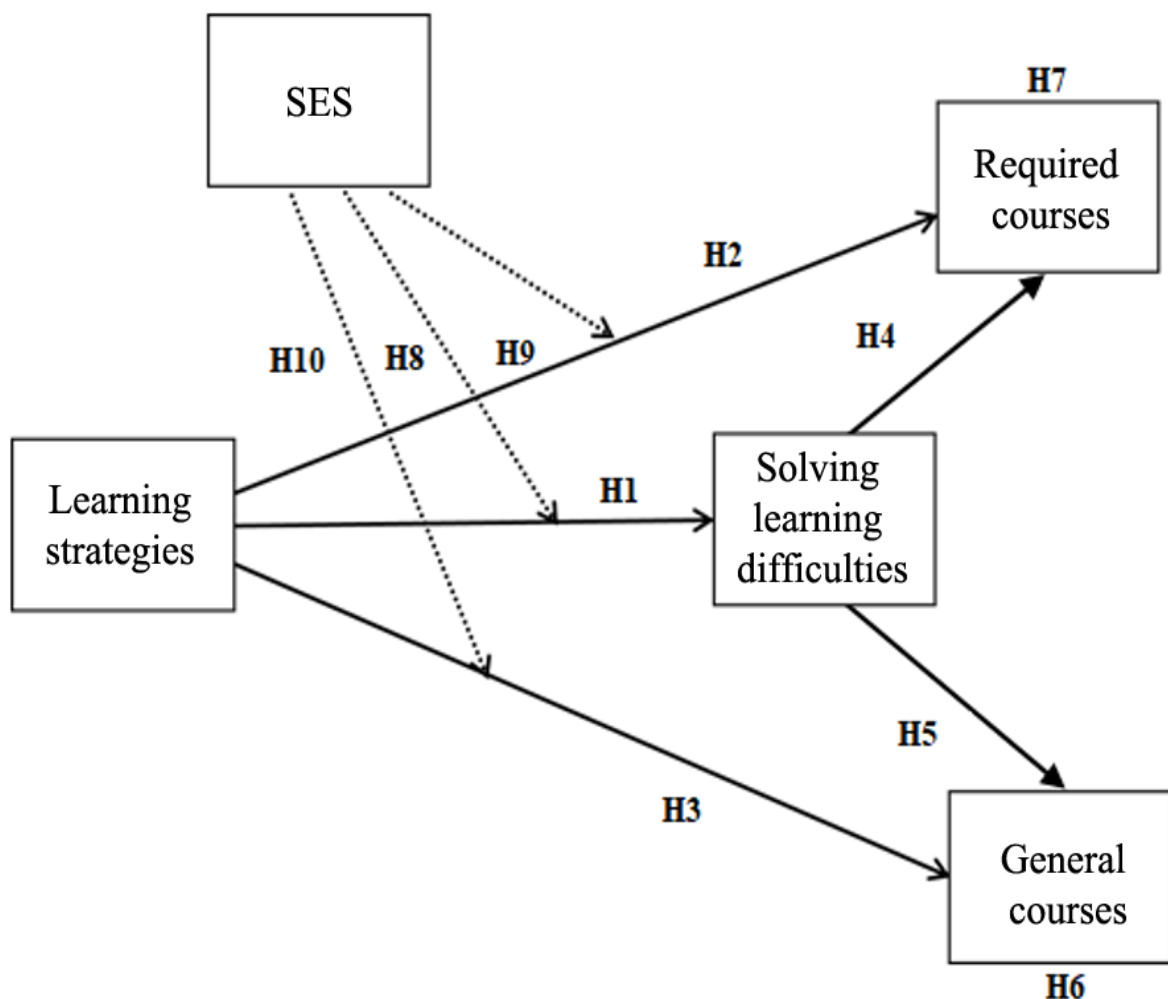

Figure 1. Research model.

The following research hypotheses were proposed based on the aforementioned literature review (Table 1).

Table 1. Models and correspondence hypotheses.

Model	Hypothesis
Direct Effect	H1. Learning strategies are positively related to solving learning difficulties. H2. Learning strategies are positively related to success in required courses. H3. Learning strategies are positively related to success in general courses.
	H4. Solving learning difficulties relates positively to success in required courses.
	H5. Solving learning difficulties relates positively to success in general courses.
Mediation	H6. Solving learning difficulties mediates the learning strategies–general courses relationship.
	H7. Solving learning difficulties mediates the learning strategies–required courses relationship.
Moderation	H8. SES moderates the learning strategies–solving learning difficulties relationship.
	H9. SES moderates the learning strategies–required courses relationship.
	H10. SES moderates the learning strategies–general courses relationship.

3.2. Research Sample

Based on the literature review previously discussed, the subsequent research involved recruiting 85 prospective child caregivers from the Department of Child Care at a University of Technology in the central area of Taiwan in 2022. Of these participants, 83 were seniors, with 2 males and 81 females. The response rate to the questionnaire was 97.70%, with 97.65% female and 2.35% male respondents.

According to the family background information of this group of students, 20% of fathers and 21% of mothers have a college degree or higher. According to OECD statistics, in 2024, the average higher education attainment rate for individuals aged 25 to 64 globally is approximately 41%, while in Taiwan, it is about 55%. It shows that the proportion of parents of students sampled in this study has a lower level of higher education (OECD, 2024). The education level of parents of students in this department is lower than the national average.

This study was approved by the Institutional Review Board of Cheng Ching Hospital, Taiwan, under protocol number HP180006, dated February 5, 2018. Informed verbal consent was obtained from all participants, and all data were anonymized to protect participant confidentiality.

3.3. Instrument Validity and Administration

3.3.1. Learning and Study Strategies Inventory (LASSI)

We adopted Hung (1992)'s Taiwanese version of the LASSI scale for college students, which considers the specific circumstances of pre-child caregivers when selecting a learning strategy scale. The scale's Cronbach's α value was 0.85. Assessment was conducted using a 5-point Likert scale, where higher scores indicated more advanced learning strategies among respondents. The group test duration ranged from 20 to 25 minutes.

3.3.2. Required Courses

In the Department of Child Care, "required courses" are essential courses students must complete and successfully pass to graduate. A minimum accumulation of thirty-two credits from professional childcare courses is obligatory for students in childcare-associated disciplines. Once they pass, the institution provides them with a credit certification, which is necessary for acknowledgment as certified childcare professionals, combined with a diploma from an advanced educational establishment. These pivotal courses encompass subjects such as Child Development, Child Observation, Preschool Curriculum and Instruction, and Early Childhood Education and Care Curriculum Design. For our study, required courses represent students' scholastic achievements and learning scores in childcare and education-centric courses throughout their educational tenure.

3.3.3. General Courses

General courses typically refer to the courses that universities mandate all students to take, regardless of their primary specialization. These courses aim to equip students with a broad academic foundation. They are designed to foster critical thinking, problem analysis, and other core skills, giving students a basic understanding of various

disciplines and fields, such as sociology, psychology, etc. In the context of this study, "general courses" pertain to students' academic performance and learning scores in these broad-based courses during their educational tenure.

3.3.4. Socio-Economic Status

Socioeconomic Status (SES) encompasses factors such as educational level, occupation, and income, and it can be used to determine an individual's or group's hierarchical position within a societal structure. This study assessed SES using parents' educational levels and occupational ranks, with weights applied to each factor. The research methodology follows the formula proposed by Lin (2005): (Parent 1's Educational Level + Parent 2's Educational Level) x 4 + (Father's Occupational Rank + Mother's Occupational Rank) x 7. Based on the results, SES is classified into five levels: lower level, lower-middle level, middle level, middle-higher level, and higher level.

3.4. Data Analysis

This study used SPSS 21 and Partial Least Squares regression (PLS) to conduct confirmatory factor analysis. Additionally, a path model was used to explore mediations between variables. Subsequently, the study employed PROCESS to examine the moderation effect of SES on the path coefficients. Structural Equation Models (SEM) were used to describe the relationships between latent variables (Gefen, Straub, & Boudreau, 2000). However, determining the sample size requirements for SEM is a joint research challenge. This study considered the limitations of small sample sizes. The PLS, its statistical power with small sample sizes, and the overall model fit have been the focus of recent discussions (Henseler, 2017). In this study, PLS was deemed more suitable than other SEM analysis methods for investigating the causal relationship by reducing measurement errors and avoiding collinearity. This study intends to use PLS to address the small sample size issues.

4. RESULTS AND DISCUSSION

4.1. Outer Model and Scale Validation

Evaluating the model involved testing the reliability and the internal consistency, as well as the discriminant and convergent validity of the construct. Presenting factor loadings with a threshold value above 0.5, this measure represented the reliability of individual items (Hair, Risher, Sarstedt, & Ringle, 2019). Demonstrating the composite reliability (CR) for the construct, Table 2 reveals that all CR values surpassed the threshold of 0.7, confirming the internal consistency. Concerning convergent validity, the analysis of AVE indicators for each construct was crucial. With indices exceeding 0.5, the constructs demonstrated good convergent validity. Table 2 shows that AVEs for the constructs of potential variables ranged from 0.550 to 0.779, affirming good convergent validity.

Table 2. The reliability and average variance extracted.

Construct	Cronbach's alpha	Composite reliability	AVE
General courses	0.702	0.835	0.629
Learning strategies	0.858	0.914	0.779
Required courses	0.581	0.784	0.550

Assessing discriminant validity involves determining the degree of differentiation between the criteria of the tested variables. Henseler (2017) recommended the use of the heterotrait-monotrait ratio (HTMT) of correlations derived from the multitrait-multimethod matrix for this purpose. Discriminant validity is confirmed when HTMT values are below 0.90. In this study, HTMT values for constructs are below the 0.90 threshold, confirming that discriminant validity has been achieved (Table 3). The Goodness of Fit (GOF) was used to assess the overall quality of the proposed model, serving as the comprehensive model. According to Vinz, Henseler, and Chin (2010), a GOF of 0.1 is considered weak, 0.25 is moderate, and 0.36 represents a strong fit. The findings of this study show a GOF of 0.529, confirming a robust fit degree.

Table 3. Discriminant validity by HTMT.

Construct	General courses	Learning strategies	Required courses	Solve learning difficulties
General courses	−	0.497	0.274	0.444
Learning strategies	0.497	−	0.448	0.588
Required courses	0.274	0.448	−	0.480
Solve learning difficulties	0.444	0.838	0.480	−

4.2. Inner Model and Hypotheses Testing

The path coefficients indicate the intensity and direction of the relationships between variables, as well as the cause-and-effect between observed and latent variables. Referring to the percentage that explains the dependent variable, the R-square value represents the model's predictive ability. Additionally, the study used bootstrapping to determine the significance of path coefficients and to identify significant relationships between variables (Hair et al., 2019). Table 4 and Figure 2 present that Learning Strategies significantly affected Solving Learning Difficulties and Solving Learning Difficulties affected Required courses, supporting H1 and H4 (Learning Strategies -> Solving Learning Difficulties $\beta = 0.777$, t-value = 16.084; Solving Learning Difficulties -> Required courses $\beta = 0.305$, t-value = 1.914). However, Learning Strategies exhibited no significant direct effect on Required courses. Consequently, H2 was not supported ($\beta = 0.079$, t-value = 0.511). Additionally, data indicated that Learning Strategies had no significant impact on General Courses. Therefore, H3 ($\beta = 0.245$, t-value = 1.675) was not supported. H5 also failed to gain support ($\beta = 0.184$, t-value = 1.189). Learning Strategies ($\beta = 0.074$), General Courses ($\beta = 0.002$), Required Courses ($\beta = 0.022$), and Solving Learning Difficulties ($\beta = 0.596$) being above zero indicate that our proposed model has predictive power.

The research findings underscore a positive association between Learning Strategies and Resolving Learning Challenges, as well as between Solving Learning Difficulties and Required courses. Interestingly, Learning Strategies showed no direct connection between Required courses and General Courses. Addressing Learning Difficulties also did not significantly influence General Courses. Researchers speculate that many students in technology universities are more interested in and familiar with the required major courses than in general courses such as language or mathematics. A certain proportion of students can use appropriate learning strategies to study the required major courses and obtain good grades. However, in general courses, it may have been affected by more learning frustration experiences in the past, so the results of learning strategies on promoting grades were not shown. There is a pressing need to delve deeper into the nexus between students' learning strategies and academic performance in a broader academic spectrum. Key focus areas could be motivation (as noted by Marrs et al. (2009)), attitude, anxiety, and test strategies (Seabi, 2011).
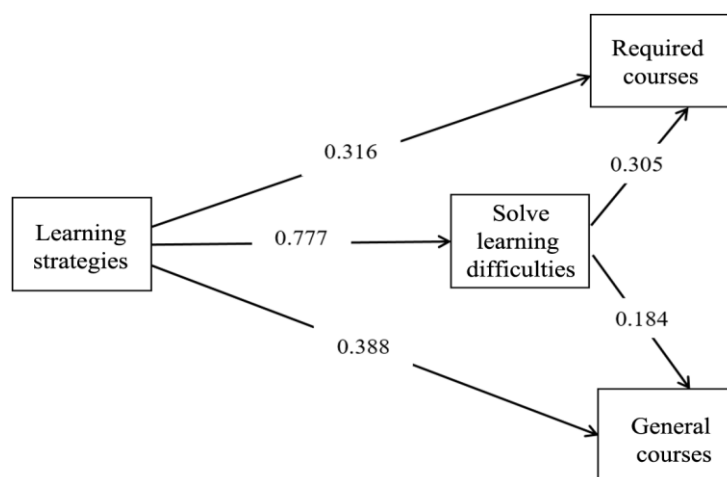
Figure 2. Solving learning difficulties in this model.

Table 4. Summary of inner model results.

Hypothesis	Path coefficient	*t*-value	Result
H1: Learning strategies -> Solving learning difficulties	0.777***	16.084	Supported
H2: Learning strategies -> Required courses	0.316	0.511	Not supported
H3: Learning strategies -> General courses	0.388	1.675	Not supported
H4: Solving learning difficulties -> Required courses	0.305*	1.984	Supported
H5: Solving learning difficulties -> General courses	0.184	1.189	Not supported

Note: * p - value < 0.05; *** p - value < 0.001.

4.3. Testing of Mediation Effects

The study used bootstrap hypothesis testing to derive Z values, approximating p-values to determine whether a significant indirect effect exists (Table 5).

An absolute Z-value of a mediator greater than 1.96 signifies a significant mediation effect between the independent and dependent variables. This was determined using a 95% confidence interval for the specific mediating effect, derived from 1,000 bootstrap resamples. The present study estimated the effects of the mediators through bootstrapping with bias-corrected confidence estimates. The study measures the mediation effects using Solving Learning Difficulties as the criterion variable.

The indirect effects are 1.171 and 1.981, respectively, and the bias-corrected 95% confidence intervals range from 0.122 to 0.373 and 0.045 to 0.46. Since both intervals do not include 0, the indirect effects are validated. This indicates that Solving Learning Difficulties may serve as a mediating variable (as shown in Table 5), meaning it has an indirect influence. Thus, hypotheses H6 and H7 are supported.

The study's findings reveal that the ability to address and solve learning difficulties mediates the relationship between learning strategies, required courses, and general courses. As part of the broader category of learning strategies, the ability to solve problems can range from fundamental to complex methodologies, such as rehearsal and organization, which can be tailored to specific tasks or courses (Alexander et al., 1998). Solving strategies encompass reading the question multiple times or searching for references. These strategies are indispensable in achieving academic success.

Educators knowledgeable about the most efficacious learning techniques can seamlessly integrate these approaches into their course design, further bolstering student success (Donker et al., 2014). Recognizing the pivotal role of these strategies, our study emphasizes the importance of addressing learning difficulties, as they directly impact the connection between the application of these learning strategies and outcomes in required courses and general courses.

Table 5. Mediation effects testing.

Relationship	Z-Value of the Sobel test	Bias-corrected percentile bootstrap confidence intervals (95%)	Result
H6: Learning strategies -> Solving learning difficulties ->General courses	1.171*	(0.122, 0.373)	Supported
H7: Learning strategies-> Solving learning difficulties -> Required courses	1.981*	(0.045, 0.468)	Supported

Note: * p-value < 0.05.

4.4. Discriminant Analysis with SES as the Criterion Variable

The research seeks to understand the influence of the three predictive variables of Lower SES, Middle SES, and Higher SES on academic achievement as the criterion variable through discriminant analysis.

Table 6. Summary of the discriminant analysis of different SES levels.

SES	Learning strategies		Solving learning difficulties		Required courses		General courses	
	M	SD	M	SD	SD	SD	M	SD
Lower	28.28	3.44	33.70	5.17	77.46	4.36	74.03	5.96
Lower->middle	29.14	3.74	33.25	4.19	77.43	3.74	75.95	5.61
Middle	27.94	4.67	33.78	5.75	74.58	5.09	72.49	5.41
Middle->higher	27.59	5.91	32.15	6.62	78.70	4.68	76.12	5.79
Higher SES	23.78	4.44	29.00	6.56	80.60	3.40	78.93	6.15
Standardized canonical discriminant function coefficients	0.092		0.739		1.037		−0.056	
Structural analysis	0.227		0.342		0.772*		0.582	
Wilks' Lambda							0.731*	
Eigenvalue							0.204	
Canonical correlation							0.41	
The original group is correctly classified.							58.8%	

Note: * p-value < 0.05.

The aim is to determine which type of prospective early childhood educator adopts which learning strategies. In this study, the calculation method for SES is based on multiplying parents' educational level by a weighted value of parents' occupational status, with a weighted value of 7. The sum of these weighted scores is used as the SES score, which is categorized into three levels: lower SES, middle SES, and higher SES. In discriminant analysis, the greater the eigenvalues, the more variance they represent. In this study, the eigenvalue of the discriminant analysis is 0.287, and the Wilks' Lambda value is 0.731, reaching statistical significance ($p < 0.001$). This shows that discriminant analysis is an effective measure. The coefficient weights and structure of the discriminant analysis determine how to discern which category an individual belongs to. Regarding values, required courses stand at 0.772, making it primarily significant in differentiating among the four types. General Courses is at 0.582, ranking second in terms of its effect. Lastly, Solving Learning Difficulties and Learning Strategies are 0.342 and 0.227, respectively. The accuracy rate for distinguishing SES is 58.81%. The results indicate that using five SES variables can effectively predict Learning Strategies, Solving Learning Difficulties, required courses, and General Courses (as seen in Table 6).

Table 7. ANOVA for different SES levels.

Item	Item	SS	df	MS	F	Cohen's *d*	Result
Solving learning difficulties	Between groups	78.77	4.00	19.69	0.71	0.19	Not supported
	Within groups	2234.92	80.00	27.94			
	Total	2313.69	84.00	−			
Required courses	Between groups	190.39	4.00	47.60	2.50*	0.67	Supported
	Within groups	1523.37	80.00	19.04			
	Total	1713.96	84.00	−			
General courses	Between groups	220.63	4.00	55.16	1.69	0.41	Not supported
	Within groups	2606.58	80.00	32.58			
	Total	2827.21	84.00	−			

Note: * p-value < 0.05.
Cohen's d is reported only for significant differences ($p < .05$).

Therefore, it is hypothesized that SES is significant when considering required courses. Following the determination of the influence weights of the independent variables, subsequent comparisons were made to see if significant differences existed in the average scores of the five SES groups. It was found that SES levels significantly differed for required courses, with F=2.50, P < .05, and *d*=0.67.

This indicates a substantial effect size. The learning outcomes of required courses tend to be better for those with higher SES than for those with middle SES (Table 7). Although general courses did not reach statistical significance (F = 1.69, p > .05), the effect size was moderate (Cohen's d = 0.41), suggesting a potentially meaningful difference. Therefore, hypothesis 7 is supported. The research findings highlight that SES moderates the relationship between learning strategies and required courses. If students with higher socioeconomic status can use learning strategies effectively, the impact on learning performance will be more pronounced.

This study found that among many learning strategies, solving learning difficulties is critical in predicting academic achievement. This result has yet to be mentioned in past studies. Solving learning difficulties is also a new subscale of the Taiwan version of the LASSI scale to consider the characteristics of Taiwanese students.

Researchers infer that learning strategies are related to different cultural backgrounds and student characteristics. When teaching students learning strategies, their backgrounds and characteristics should be considered.

The part result of this study is similar to previous studies that have shown moderate to strong correlations between SES and academic performance (Perry & McConney, 2010; Sirin, 2005). It is evident from the research that the impact of SES is not limited to individual student attributes but includes broader contextual elements (Kim, 2019; Kim et al., 2019). Collectively, these findings emphasize the profound effect of SES on educational achievements and its crucial role in moderating the link between learning strategies and required courses.

5. CONCLUSIONS AND IMPLICATIONS

5.1. Conclusion

The conclusions of this study are as follows:

1. The analysis of direct effects showed that while learning strategies significantly contribute to solving learning difficulties, and solving these difficulties significantly contribute to success in required courses, neither learning strategies nor solving learning difficulties significantly contribute to success in general courses.

2. The mediation analysis demonstrated that solving learning difficulties, which acts as a pivotal mediating variable, is essential in the relationship between learning strategies and learning success in required and general courses. This finding indicates that the effectiveness of learning strategies on academic achievement is significantly enhanced through their influence on addressing learning difficulties.

3. SES significantly moderates the relationship between learning strategies and success in required courses. However, it does not influence the relationship between learning strategies and solving learning difficulties, nor between learning strategies and success in general courses. This indicates that socioeconomic status has a specific moderating effect on the impact of learning strategies; it does not affect success in required courses, learning difficulties, or general courses.

5.2. Implication

1. Based on the research findings, learning strategies are positively related to solving learning difficulties and achieving successful required major outcomes. By recognizing the importance of learning strategies in addressing educational challenges and enhancing success in required courses, educators in the Department of Child Care should prioritize integrating lessons or modules on these strategies into their curriculum. This forward-thinking approach ensures that students specializing in early childhood care are well-prepared to navigate the complexities in their field. Meanwhile, students within the department are encouraged to actively seek out resources, workshops, or courses that focus on these strategies. By honing such techniques, they can surmount learning obstacles and significantly elevate their performance in their core subjects.

2. It is paramount for the Department of Child Care to recognize the influence of socioeconomic factors on student academic trajectories. Teachers must constantly seek effective learning strategies, especially as students from

low socioeconomic backgrounds may not receive reading guidance at home. The programs should consider offering targeted support and resources for students from economically disadvantaged backgrounds. This can include mentoring programs, scholarships, or specialized workshops to hone learning strategies. Furthermore, required courses should integrate the practice field, emphasizing the importance of understanding and addressing the challenges students from low SES backgrounds face. By doing so, graduates from this program will be better equipped to serve diverse communities and foster holistic growth in children, regardless of socioeconomic status.

5.3. Research Limitation

Considering the major limitation of the study, the small sample size likely means the data is not representative of the population. In future studies, research can increase the sample size and expand sampling areas.

REFERENCES

Alexander, P. A., Graham, S., & Harris, K. R. (1998). A perspective on strategy research: Progress and prospects. *Educational Psychology Review, 10*(2), 129–154. https://doi.org/10.1023/A:1022185502996

Cano, F. (2006). An in-depth analysis of the learning and study strategies inventory (LASSI). *Educational and Psychological Measurement, 66*(6), 1023-1038. https://doi.org/10.1177/0013164406288167

Caruth, G. D. (2018). Student engagement, retention, and motivation: Assessing academic success in today's college students. *Participatory Educational Research, 5*(1), 17-30. https://doi.org/10.17275/per.18.4.5.1

Chen, C.-H., Liao, T.-L., & Chang, C.-C. (2017). A study of the influence of family education resources and academic performance on educational tracking for economically disadvantaged high school students. *Educational Policy Forum, 20*(4), 33–62.

Chou, C. P. (2015). Who benefits from Taiwan's mass higher education? In F. Shin, J., Postiglione, G., Huang (Ed.), Mass Higher Education Development in East Asia. In (pp. 231–243). Cham: Springer.

Coleman, J. S., Campbell, E., Hobson, C., McPartland, J., Mood, A., Weinfeld, F., & York, R. (1966). *Equality of educational opportunity OE-38001.* Washington, DC: Government Printing Office.

Daymont, T., & Blau, G. (2008). Student performance in online and traditional sections of an undergraduate management course. *Journal of Behavioral & Applied Management, 9*(3), 275–294. https://doi.org/10.21818/001c.17151

Donker, A. S., De Boer, H., Kostons, D., Van Ewijk, C. D., & van der Werf, M. P. (2014). Effectiveness of learning strategy instruction on academic performance: A meta-analysis. *Educational Research Review, 11*, 1-26.

Duncan, T. G., & McKeachie, W. J. (2005). The making of the motivated strategies for learning questionnaire. *Educational Psychologist, 40*(2), 117-128. https://doi.org/10.1207/s15326985ep4002_6

Gabriel, M. G. N., Muasya, I., Mwangi, J., Mukhungulu, M. J., & Lomeyan, E. (2016). The influence of parental socioeconomic status, involvement in learning activities and its influence on children's academic performance in urban informal settlements in Westlands division-Nairobi county. *International Journal of Education and Social Science, 3*(2), 54–65.

Gefen, D., Straub, D., & Boudreau, M.-C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the Association for Information Systems, 4*(1), 7.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2-24. https://doi.org/10.1108/EBR-11-2018-0203

Henseler, J. (2017). Partial least squares path modelling. In P. N. Gaur & S. S. Saini (Eds.), Advanced Methods For Modeling Markets. In (pp. 361–381). Cham: Springer.

Huang, K. H. E. (2019). *Towards justice and excellence—a study on problems and countermeasures of Taiwan education.* Taipei: Professor Huang Kunhui Educational Foundation.

Hung, B. L. (1992). Revision and investigation of college students' learning and reading strategies scale. *Wenzao Journal, 6*, 173–209.

Johnstonbaugh, M. (2017). Conquering with capital: Social, cultural, and economic capital's role in combating socioeconomic disadvantage and contributing to educational attainment. *Journal of Youth Studies, 21*(5), 590-606. https://doi.org/10.1080/13676261.2017.1406069

Kim, S. (2019). The long-term impact of family SES on student achievement. *International Journal of Educational Studies, 14*(1), 22–37.

Kim, S. W., Cho, H., & Kim, L. Y. (2019). Socioeconomic status and academic outcomes in developing countries: A meta-analysis. *Review of Educational Research, 89*(6), 875-916. https://doi.org/10.3102/0034654319877155

Lin, N. (2005). Social capital and individual SES achievement: A structural theory. *Journal of Social Structure, 6*(1), 1–22.

Marrs, H., Sigler, E., & Hayes, K. (2009). Study strategy predictors of performance in introductory psychology. *Journal of Instructional Psychology, 36*(2), 125-134.

McKeachie, W. J., Pintrich, P. R., Lin, Y. G., Smith, D. A. F., & Sharma, R. (1990). *Teaching and learning in the college classroom. A review of the research literature.* Ann Arbor: University of Michigan, National Center for Research to Improve Post-secondary Teaching and Learning.

Ministry of Education. (2024). *Number of kindergarten education and care service personnel.* Retrieved from https://www.gender.ey.gov.tw/gecdb/Stat_Statistics_DetailData.aspx?sn=ZViStQdk5IMDCajYSMDW5Q%40%40

O'Sullivan, K., Robson, J., & Winters, N. (2019). 'I feel like I have a disadvantage': How socio-economically disadvantaged students make the decision to study at a prestigious university. *Studies in Higher Education, 44*(9), 1676-1690.

OECD. (2024). *Population with tertiary education (indicator).* Retrieved from https://www.oecd.org/en/data/indicators/population-with-tertiary-education.html. [Accessed 06 May 2024]

Pascarella, E. T., & Terenzini, P. T. (2005). How college affects students: A third decade of research. In (Vol. 2). San Francisco, CA: ERIC.

Perry, L., & McConney, A. (2010). School socio-economic composition and student outcomes in Australia: Implications for educational policy. *Australian Journal of Education, 54*(1), 72-85. https://doi.org/10.1177/000494411005400106

Schutz, C. M., Gallagher, M. L., & Tepe, R. E. (2011). Differences in learning and study strategies inventory scores between chiropractic students with lower and higher grade point averages. *The Journal of Chiropractic Education, 25*(1), 5-10. https://doi.org/10.7899/1042-5055-25.1.5

Seabi, J. (2011). Relating learning strategies, self-esteem, intellectual functioning with academic achievement among first-year engineering students. *South African Journal of Psychology, 41*(2), 239-249. https://doi.org/10.1177/008124631104100212

Sexton, S. M. (2012). Learning strategies course leads to improvement in LASSI content areas. *LASSI in Action.*

Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research, 75*(3), 417-453. https://doi.org/10.3102/00346543075003417

Vinz, S., Henseler, J., & Chin, W. W. (2010). *Goodness-of-fit indices for PLS path modeling.* Paper presented at the Proceedings of the International Conference on Information Systems (ICIS). Association for Information Systems.

Weinstein, C. E., Palmer, D., & Schulte, A. C. (2002). *Learning and study strategies inventory* (2nd ed.). Clearwater, FL: H & H.

West, C., & Sadoski, M. (2011). Do study strategies predict academic performance in medical school? *Medical Education, 45*(7), 696-703. https://doi.org/10.1111/j.1365-2923.2011.03929.x

White, G. W., Stepney, C. T., Hatchimonji, D. R., Moceri, D. C., Linsky, A. V., Reyes-Portillo, J. A., & Elias, M. J. (2016). The increasing impact of socioeconomics and race on standardized academic test scores across elementary, middle, and high school. *American Journal of Orthopsychiatry, 86*(1), 10-23. https://doi.org/10.1037/ort0000122