

Classroom Learning Environment And Academic Resilience: A Person-Based Approach

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Abstract

This study provided a person-based approach to explore the impact of classroom learning environment (CLE) on academic resilience among students with low socioeconomic status (SES) in Vietnam. Using the data from Programme for International Student Assessment (PISA) 2018, the study discovered the disparity in CLE factors reported by students. From a total of 5773 Vietnamese participants from all backgrounds, a sample of 1695 low-SES students was drawn for analysis, 32 percent of whom was identified as resilient. Through their response to the PISA items regarding different instructional practices and disciplinary climate in reading lessons, Latent Profile Analysis (LPA) divided children into five subgroups: Teacher-centered (34.8%), Student-centered (14.6%), High Practice (21.1%), Low-practice (20.5%) and Disorderly (9%). These subgroups varied substantially in reading achievement and resilience rate. As educational equity is reflected by the relationship between academic performance and socioeconomic status, pairwise homogeneity of regression slopes was conducted between the subgroups. The High-practice group obtained the largest proportion of resilient students whereas having the weakest SES gradient. In contrast, the Low-practice group reported the lowest achievement and equity. The study provides evidence of the role of teachers and CLE in fostering academic resilience and moderating educational equity.

Index Terms – academic resilience, classroom learning environment, educational equity, person-based

Introduction

The association between a student's socio-economic status and their academic performance serves as an indicator of inequity existing in an

education system. [1]. In most countries or economies, this correlation is strong, suggesting that students from disadvantaged backgrounds are less likely to achieve academic success regardless of the subjects. It was found that students from higher socioeconomic backgrounds exhibit better academic performance, with a roughly two-year advantage over their disadvantaged peers [2]. This gap leads to a disparity in learning outcomes and contributes to educational inequality. Addressing this equity issue in education is crucial as academic achievement is strongly linked with an individual's overall quality of life [3]. The main explanation to this phenomenon are a restricted education budget and a shortage of learning resources such as books, electronic devices, and private studying space. The disparity worsens when students lack attention from parents, schools, and communities. Specifically, students with limited access to educational resources at home are less likely to perform well on assessments unless they receive adequate support from schools [4]. These students are also more susceptible to unemployment, limited career choice and lower living quality in the future [5]. In Vietnam, the country of interest in this study, the disparity becomes more pronounced when comparing children from rural areas and ethnic minorities with those in urban areas [6]. Closing the achievement gap between disadvantaged and advantaged students and fostering academic resilience is an essential responsibility for modern educators. When students' academic performance becomes less dependent by their socio-economic background, the education system provides greater equity in learning opportunities among children [7]. Nevertheless, there is a segment of students who demonstrate remarkable success despite facing adversity, creating a phenomenon known as academic resilience. These students serve as evidence that one's future is not solely determined by their background, but can be improved through personal effort and support from the community. The topic of academic resilience has drawn international attention, primarily from Western scholars, and has later gained interest from researchers in Eastern countries as well [8]. Education organizations like the International Association for the Evaluation of Educational Achievement (IEA) and the Organization for Economic Co-operation and Development (OECD) have dedicated significant efforts to promote academic resilience, particularly in developing nations. In Vietnam, the government has also implemented educational reform policies aimed at mitigate inequity, particularly among students from rural areas and ethnic minorities [9].

Resilience, although an internal attribute, is not solely reliant on individual effort. It is influenced by the dynamic interplay of multiple factors, including the family, school, and society [10]. Among these factors, teachers have been shown to play a pivotal role in fostering student resilience and their overall well-being [11], [12]. Alongside

teacher qualifications, teaching practices and strategies are also regarded as vital for nurturing resilience among students [13]. Whereas it may be challenging to quickly modify teacher quality elements such as experience and pedagogical background, it is more plausible to implement and improve teaching practices. The combination of instruction practices, interaction activities, and management methods creates classroom learning environment (CLE). By identifying CLE factors that potentially enhance students' resilience, teachers can contribute to a more successful and equitable education system. Previous studies have demonstrated that classroom-level variables have a greater impact on explaining educational outcomes compared to the school or contextual level [14], [15]. To our best knowledge, there has been no research regarding the effect of CLE on academic resilience, especially in Vietnam.

International academic assessments offer resourceful databases to obtain insights of educational equity. The 2012 Programme for International Student Assessment (PISA) marked Vietnam's first participation in such assessment. Despite having the lowest socioeconomic index out of 65 countries, Vietnam ranked highly in Mathematics, Science, and Reading Literacies, placing 17th, 19th, and 8th, respectively. Vietnam's PISA 2012 performance showed no significant variation within the country, across regions, or among social groups, indicating that Vietnam provided equal access to education and learning opportunities for all children [16]. In PISA 2015 cycle, out of 72 countries, only 14 reported at least 30 percent of disadvantaged students scoring at Level 3 or above in all PISA subjects, with Vietnam being the only representative from developing countries. Around 17 percent of the poorest 15-year-old pupils in Vietnam belonged to the top quarter of students among all the participating countries and economies in the PISA exams, whereas the OECD average in this criterion was only 6 percent [17]. In 2012, Vietnam had an equity in education index approximately equals to OECD average, in which closely 15 percent of variation in mathematics performance was explained by socio-economic status. This index lowered in 2015 to around 13 percent, bringing Vietnam into the section of countries with above average equity and above average science performance. As OECD also provides valuable information regarding CLE reported by students in the form questionnaire responses, this study aims to examine the role CLE factors in these favorable outcomes using PISA database.

LITERATURE REVIEW

1. Academic resilience

Many researchers share a common understanding of academic resilience in their studies, as they define and measure academic resilience in students who come from challenging backgrounds, such as foster youth, new generations of immigrants, or those with low socio-economic status,

but are able to overcome these challenges and achieve academic success [18]- [19]. According to the Organization for Economic Co-operation and Development (OECD), academically resilient students are those who come from disadvantaged backgrounds and rank in the bottom 25% of the economic, social, and cultural status (ESCS) index in their country, but still manage to score in the top 25% of academic achievement in their country (OECD, 2019). Socioeconomic status is a comprehensive idea that endeavors to capture the various financial, social, cultural, and human-capital resources that are accessible to students [20]. PISA utilizes the PISA index of economic, social, and cultural status (ESCS) to gauge a student's socioeconomic status, which is a composite metric that amalgamates the financial, social, cultural, and human-capital resources available to them into a single score [21]. The estimation of a student's ESCS is based on various factors that are linked to their family background, which are then divided into three categories: the education level of the parents, the occupation of the parents, and home possessions. Although there were notable variation, the link between socio-economic disadvantage and poor academic performance was statistically significant in all PISA-participating countries/economies, with the exception of Macao (China). In PISA 2018, disadvantaged students were 2.7 times more likely than their advantaged counterparts to fall short of the minimum proficiency level in reading. In 25 out of the 79 participant countries and economies, disadvantaged students were at least three times more likely than advantaged students to rank in bottom group of achievers in reading.

2. Classroom Learning Environment

Research has shown that the classroom learning environment (CLE) is a reliable factor in predicting student academic success [22], [23]. OECD emphasizes that it is crucial to establish a positive and supportive learning environment in classrooms, where students feel engaged, motivated, and comfortable taking risks and learning from their mistakes. Lee and Huh (2014) used eighth-grade American students' mathematics data from TIMSS 2007 and found that teachers' instructional strategies explained around 12% of the variance in learning outcomes at student level and 17% at the teacher level [24]. However, studies have found that the specific characteristics of a successful CLE, which positively influence students' academic achievement, vary depending on the research [25], [26]. OECD first defined the contextual factors of science CLE in PISA 2015, including disciplinary climate, teacher support, teacher-directed science instruction, perceived feedback, adaption of instruction, instrumental motivation, and inquiry-based science teaching and learning practices [27]. In PISA 2018, the structure of these variables are almost identical, however, since the focus was shifted to reading from science, inquiry-based practice is no longer included. The new variables in PISA 2018 that

are plausible for further investigation are: disciplinary climate, teacher support, teacher-directed instruction, perceived feedback, adaption of instruction, and teachers' stimulation of reading engagement [28].

Several studies have demonstrated the connections between the aforementioned variables in the CLE and students' achievement, however, the specific characteristics of effective CLEs that are associated with positive academic outcomes vary among studies [29]. Most of these studies have found that the disciplinary climate, teacher support, direct instruction, and adaptive instruction are positively correlated with students' achievement in terms of motivation, engagement, and test scores [13], [30]- [31]. As reading education has unique qualities, an effective CLE for reading may differ from one in other disciplines. As a result, the CLE components that are previously measured may not fully capture an effective reading CLE. Therefore, it is essential to conduct empirical research that examines the multi-facet aspects of effective CLEs in reading lessons.

3. Person-based approach

The majority of previous studies on CLE and educational outcomes take the variable-centered approach such as regression (single or multi-level) and path-analysis. However, this approach overlooks the possibility of the existence of sub-populations, which may be homogeneous with respect to specific variables, but differ from other sub-populations. Meanwhile, person-centered methods are effective in identifying homogeneous subgroups in the data based on individual reports. This approach estimates a distinct set of parameters for each subgroup, as it takes into account the heterogeneity of the sample [32]. As a person-based approach, LPA or LCA have served as a handy tool to measure the intensity or frequency of teaching practices, as well as identify possible clusters of students who experience similar patterns although under different classroom and teachers. Marsh et al. (2009) suggest that latent class and profile analyses can help identify unobserved heterogeneity by grouping individuals into different classes or profiles based on patterns of observed variables [33]. Additionally latent class analysis (LCA) and latent profile analysis (LPA) enables researchers to examine how certain variables can predict class or profile membership or identify differences in relation to a distal outcome variable [34]. However, research aimed at identifying different classes or profiles of students' perceptions of school climate, based on multiple indicators and examining the contribution of individual factors to the formation of such unobserved (latent) groups of students, remains limited [35].

Research questions

This research adopts a quantitative approach to examine the relationship between CLE and academic resilience by analyzing the achievement of Vietnamese students in the latest large-scale assessment, namely the Programme for International Student Assessment (PISA) 2018 cycle by the OECD, in which reading literacy is the main focus. The study is guided by the following questions:

1. Are there underlying subgroups of CLE within which students experience common patterns in teacher management and instructional practices?
2. How does the disparity in these CLE subgroups affect reading performance and resilience?
3. To what extent is education equity is associated with the variation in CLE?

METHODOLOGY

1. Data source and sample

The OECD database contains information of 15-year-old Vietnamese students who participated in PISA 2018. After filtering for only those students with low socioeconomic status (ESCS), out of the total of 5,773 participants, a sample of 1,695 students (53.6% female and 46.4% male) had their achievements and questionnaire responses collected for further analysis. To ensure representative accuracy for the population, the full student sampling weight variable was taken into account, resulting in a total of 292,828 low-ESCS weighted cases.

2. Variables

2.1. Dependent variables

The study defines a student as resilient if they meet two conditions: low socio-economic status and high academic achievement. Various methods exist for identifying disadvantaged homes and achievement thresholds, as outlined in Appendix 1. To maximize data size, the study identifies the bottom 33 percent of Vietnamese students based on their ESCS index as being of low socio-economic status, so called disadvantaged. As the focus of the PISA 2018 questionnaire is reading, the study uses the first plausible value for Reading Literacy (PV1READ) to measure student achievement. The selection methods for top achievers also vary, as different thresholds can be applied, such as the top quartile or tertile of the country distribution, or by comparing residuals of a predetermined regression model [7], [36]. In this study, a linear regression is executed between the ESCS index and PV1 Reading across the country. The participant's observed score residual is then compared to the predicted score based on this regression. If a student's observed score is equal to or higher than the

67th percentile of the predicted score distribution, they are considered academically resilient. The outcome of this selection process is a new dichotomous variable named Resilience, 1 (resilient) and 0 (non-resilient).

2.2. Independent variables

In the context of large-scale assessments, the evaluation of teaching quality often hinges on assessing how individual students perceive various aspects of classroom teaching and learning [37], [38]. The assessment of teacher characteristics from the perspective of students is conducted individually, without aggregating data at the school level. This approach is favored because students are considered to be more precise and reliable assessors of teachers' classroom behaviors compared to teachers themselves [39]. To gather this information, students were asked to rate the frequency of specific practices using a 4-point Likert scale. Given that these ratings represent increasing levels of frequency in ordinal fashion, they were treated as continuous variables in the subsequent latent profile analysis, as seen in prior studies [40], [41]. To maintain consistent order in the response options, the value 1 consistently denoted the lowest frequency "Never or hardly ever", whereas 4 represented the highest frequency "Every lesson". Consequently, the two constructs, namely Teacher support and Teacher-directed instruction, required recoding to align with this standardized order. Table 1 presents the names and internal reliability values for the independent variable within the Vietnamese sample of PISA 2018.

Figure 1: Identification of resilient students

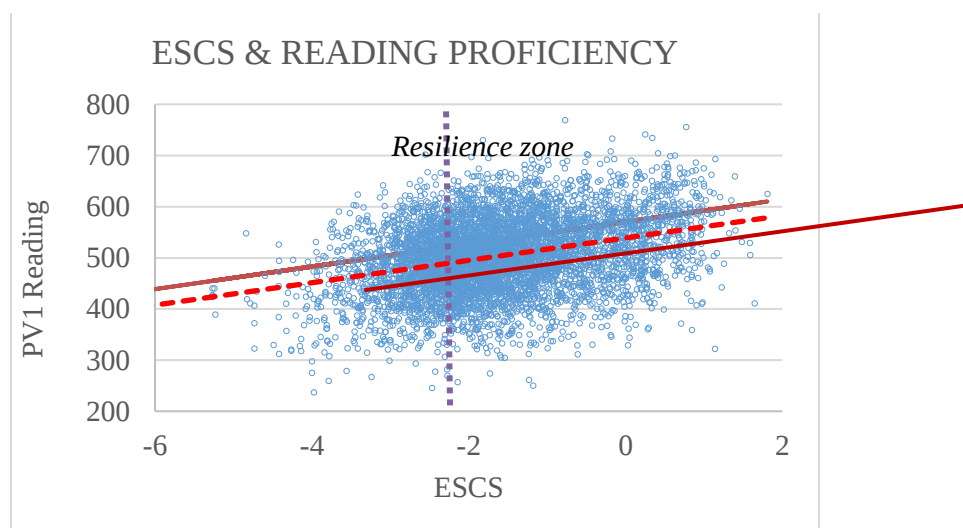


Table 1: Classroom learning environment factors and reliability

Construct	Variable	Example items	Cronbach's α
Disciplinary climate in test language lessons	DISCLIMA	How often during <test language lessons>: Students don't listen to what the teacher says; There is noise and disorder	0.745
Teacher support in test language lessons	TEACHSUP	How often during <test language lessons>: The teacher shows an interest in every student's learning; The teacher gives extra help when students need it	0.796
Teacher-directed instruction	DIRINS	How often during <test language lessons>: The teacher sets clear goals for our learning; The teacher tells us what we have to learn	0.669
Adaptation of instruction	ADAPTIVITY	How often in <test language lessons>: The teacher adapts the lesson to my class's needs and knowledge; The teacher provides individual help when a student has difficulties	0.628
Perceived feedback	PERFEED	How often during <test language lessons>: The teacher gives me feedback on my strengths in this subject; The teacher tells me in which areas I can still improve	0.731
Teacher's stimulation of reading engagement	STIMREAD	In your <test language lessons>, how often: The teacher encourages students to express their opinion about a text; The teacher helps students relate the stories they read to their lives	0.763

3. Analysis

In order to perform Latent Profile Analysis (LPA), Mplus 8.6 is used to classify groups of students based on their responses to the PISA 2018 questionnaire about common classroom experience. Goodness of fit indicators such as Akaike's information criterion (AIC), Bayesian information criterion (BIC), and the sample-size-adjusted BIC (a-BIC) are used to assess the models, in which lower values indicating better fit. The Lo-Mendell-Rubin adjusted likelihood ratio test (LRT) is employed to

determine model improvement, in which a p-value less than .05 indicating significantly higher accuracy of model k classification compared to model k-1. Entropy is also extracted to measure the precision of classification, with values closer to 1 indicates the approach to 100 percent accuracy. It's important to emphasize that the determination of the number of profiles is not solely reliant on model fit indices, and there are several reasons for this. Firstly, it's possible for information criteria to consistently decrease when adding more profiles to the model, as observed in some cases [42]. Moreover, likelihood-ratio tests may not always successfully identify the optimal model, especially when dealing with large sample sizes [43]. Ultimately, interpretability should be considered, if not the most crucial factor, when selecting the final model. If it becomes challenging to distinguish between profiles, making their interpretation complex, then it's advisable to favor a solution with fewer profiles [33], [44], [45]. Following the classification, an in-depth analysis of descriptive statistics and reading achievement within each profile is conducted to compare the academic performance of students from different CLEs and its correlation with academic resilience. Since equity in education is reflected in the relationship between students' ESCS and their academic performance, linear regression is performed separately for subgroups of CLE to identify instructional practices that might influence this relationship. In this study, both the slope and r-squared values of this relationship will be compared among the profiles to assess the potential moderating effect of different instructional practices on academic equity. Pairwise homogeneity of regression slopes is also examined to determine the significance of these effects. Figure 2 illustrates the research model of this study.

RESULTS

1. Descriptive statistics & correlation

OECD provides a standardized scale for the six variables DISCLIMA, TEACHSUP, DIRINS, ADAPTIVITY, PERFEED, and STIMREAD. Table 2 provides descriptive statistics of CLE variables included in this study using the standardized scale.

2. CLE subgroups reported by students

The first step of LPA is to determine the number of profiles underlying the population, by comparing the fit indices of the 1 to 7-profile models. From the result in Table 1, it can be seen that the AIC, BIC and aBIC consistently decreases as we add more profile into the model. The log-likelihood ratio test results in significant p-value from 2 to 6-profile model. Theoretically, the six-profile model is the best fit for our data. However, the profiles in this model are not distinctive with each other, making it difficult to interpret the result. In comparison, the 5-profile model is much more

distinguishable and also where entropy reaches its peak. Therefore, we decide the 5-profile model should be the best fit in this study.

Figure 2: Research model

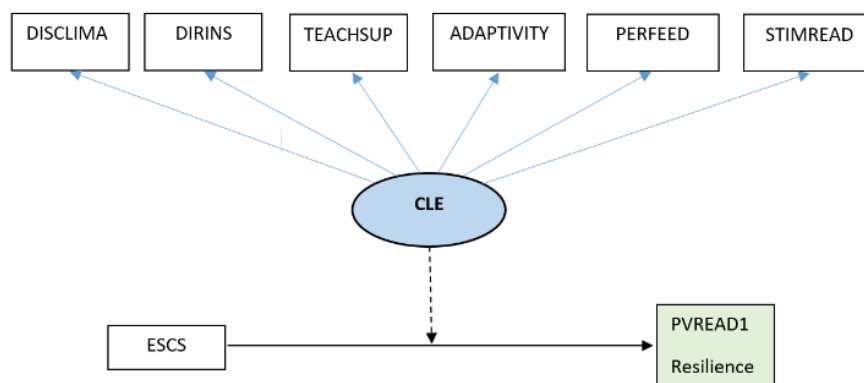


Figure 3 provides the standardized probability scale of each item in the 5-profile model. The first profile reports extremely low disciplinary climate compared to the rest of the profiles, whereas other variables are about average level. Therefore, this group is called Disorderly group. The second profile reports low frequency of all teacher activities, thus named as Low Practice group. The third profile experience high frequency of teacher-direct instruction and teacher support. Considering teacher support items are also curriculum-emphasized, similar to teacher-directed instruction, other than student emotional/psychological support, this profile is called Teacher-Centered group. In contrast, the forth profile receives more student-focused approach such as adaptation of curriculum, feedback, and stimulation of engagement. Therefore, they are classified as Student-centered group. And finally, since the fifth group reports high frequency in all of the items, they are named High Practice group. Results in probability of scale is provided in Appendix 2.

1. Reading literacy and academic resilience in different CLE subgroups

Table 4 shows the reading achievement mean and standard deviation of the CLE subgroups. The High-practice group has the best performance ($M = 496.47$), followed by the teacher-centered group ($M = 481.51$).

Table 2: Model fit indices

Model	AIC	BIC	aBIC	LMR's LRT	p-value	Entropy
1-profile	92743.637	92993.667	92847.530			
2-profile	88,136.673	88,517.154	88,294.773	4,629.023	0.0000	0.844
3-profile	86,762.036	87,272.967	86,974.341	1,414.710	0.0000	0.819

4-profile	85,889.201	86,530.583	86,155.712	915.703	0.0000	0.840
5-profile	85,252.770	86,024.603	85,573.486	680.617	0.0041	0.842
6-profile	84,831.893	85,734.175	85,206.814	466.265	0.0055	0.820
7-profile	84541.460	85574.193	84970.587	329.852	0.7064	0.822

These two groups also have the lowest standard deviation, indicating a less achievement gap compared to the other groups. The Low-practice group has the lowest reading mean, followed by Student-centered group. Post-hoc analysis using Tukey's HSD finds significant difference among all of the means, as shown in Appendix 3.

Figure 1: Standardized means of the items in the profiles

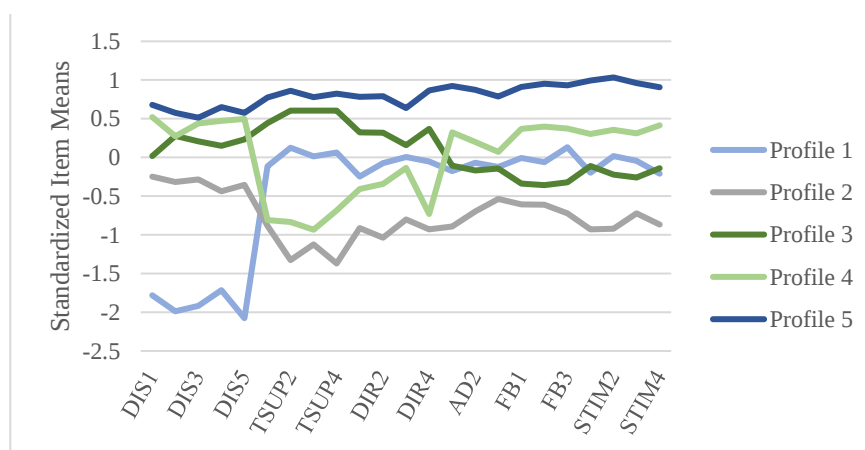


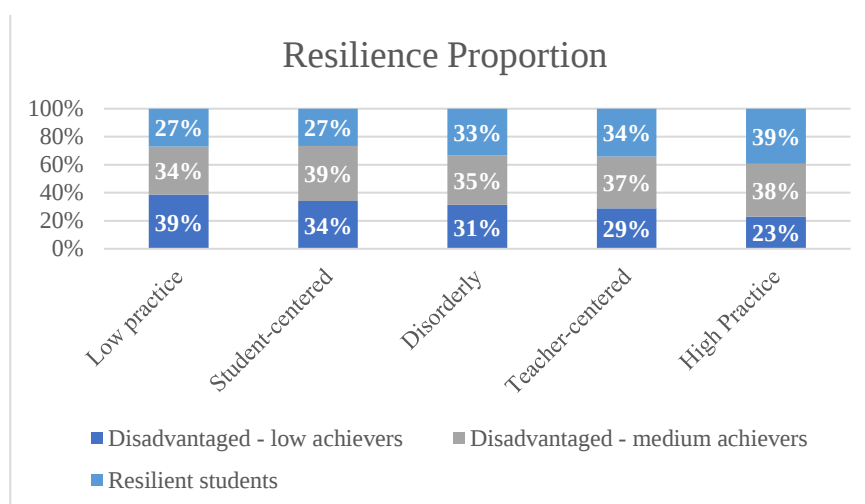
Table 3: Reading achievement of five profiles (N = 292830)

Profile	N	Minimum	Maximum	Mean	Std. Deviation
Low Practice	59962	275.79	651.98	468.12	70.92
Student-centered	42737	315.54	640.07	473.81	66.76
Disorderly	26384	237.32	643.60	478.36	71.78
Teacher-centered	102051	269.87	702.36	481.51	66.41
High Practice	61694	299.56	666.80	496.47	63.98

For better comparison among the profiles, we create more achievement levels in the Resilience variable mentioned above. The non-resilient students were divided into low achievers, whose reading literacy lies in the bottom third of the residual distribution, and medium achievers. Figure 4 shows the proportion of resilient students and disadvantage middle/low achievers in each subgroup. Chi-squared test was conducted

to compare cell percentages in each resilience category among the profiles. The Low Practice group has the highest portion of low achievers, followed by the Student-centered group. These two groups also have the lowest resilience rate. Meanwhile, the High Practice group has the best result with the largest proportion of resilient students and the smallest of low-achievers. The Teacher-centered approach reports second best results. Within disadvantaged low-achievers, all of the profiles' proportions are significantly different. Meanwhile, Low-practice and Student-centered have no significant difference in proportion of resilient student, as well as between Teacher-centered and Disorderly groups. The result of Chi-squared test is presented in Appendix 4.

Figure 2: Resilience in five profiles



2. ESCS gradient

Table 5 provides the regression coefficients of the ESCS gradients in five different profiles. The Low Practice profile has the highest slope and r-squared, indicating the strongest dependency of reading score on socioeconomic status, followed by Teacher-centered profile. In these two groups, around 25 to 30 percent of reading score variation is explained by ESCS, which is much higher than OECD average. The weakest relationship is found in High Practice profile, with correlation coefficient much lower than the other profiles as well as OECD average. Homogeneity of regression slopes found significant difference among all of the profiles, except between Student-centered and Disorderly groups, as described in Appendix 5. Therefore, there is evidence that the combination of different instructional practices helps promoting equity, whereas a lack of these practices in classroom might put disadvantaged students at risk.

Table 4: ESCS gradient in five profiles

Profile	Coefficient	R-squared
Low Practice	38.998	.299**
Teacher-centered	33.671	.255**
Student-centered	31.900	.248**
Disorderly	31.198	.220**
High Practice	14.573	.118**

** p-value < .01

DISCUSSION

The primary aim of this study is to investigate the link between classroom learning environment and students' academic resilience. Academic resilience emerges when students achieve commendable academic results despite facing unfavorable socio-economic and socio-cultural circumstances. The analysis result serves as an evidence of the moderating effect of CLE on the relationship between student socioeconomic background and academic achievement.

The study provides empirical proof that students do not have a homogeneous view of the classroom learning environment. There are five subpopulations in the sample of disadvantaged students in Vietnam that experience different frequency in teaching strategies and level of discipline. Based on students' report to the PISA 2018 questionnaire, latent profile analysis divides them into five subgroups: Disorderly (9.01%), High Practice (21.07%), Teacher-centered (34.85%), Student-centered (14.59%), and Low Practice (20.48%). High percentage of Teacher-centered and low percentage of Disorderly group reflects the traditional teaching-learning style in Vietnamese classrooms. Although Vietnam is in the transition from traditional pedagogy to a more modern style, teacher-directed instruction is still considered an important approach to student learning. 21% of the sample belongs to the High-practice group is consistent with McAleavy, Fitzpatrick, & Ha (2018) study, in which a majority of teachers reported mix-approach in classroom.

Individuals belonging to these distinct profiles exhibit varying levels of resilience and reading achievement. The High Practice and Teacher-centered group reports the most favorable results regarding resilience and reading score, which aligns with previous studies [46]. This result indicates that teacher-direct instruction and teacher support are important factors in CLE that as great impact on students' academic performance. However, we should not overlook the importance of other practices. Regression analysis shows that when combine with feedback, adaptation and stimulation of engagement, there is higher chance of

equity provided for students, as we consider the profound difference in the ESCS gradient between the Teacher-centered profile and the High Practice profile.

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APPENDIX

Table A1: Definitions of resilience in previous literature

Authors	Databas e	Disadvantage	Resilience
OECD (2010)	PISA 2009	p25 ESCS	Greater than p75 achievement
Cheung et al. (2014)	PISA 2015	p25 ESCS	$y = \alpha + \beta_1 \text{ESCS} + \beta_2 \text{ESCS}^2 + \epsilon$ top quarter ϵ
Agasisti & Longobardi (2014)	PISA 2009	p33 school level ESCS	$y = \alpha + \beta_1 \text{ESCS}^2 + \epsilon$, top third ϵ
Cordero et al. (2015)	PISA 2012	p33 school level ESCS	Greater than p75 achievement
Erberer et al. (2015)	TIMSS 2011	Under 25 books, do not have own room or internet access and neither of parents have higher education	Above average score in mathematics (475 points).
Sandoval- Hernandez & Bialowolski (2016)	TIMSS 2011	Under 25 books, do not have own room or internet access and neither of parents have higher education	Above mean of disadvantage students achievement within each education system
Cheung (2016)	PISA 2012	p25 ESCS	$y = \alpha + \beta_1 \text{ESCS} + \epsilon$, top quarter ϵ
Agasisti et al. (2017)	PISA 2010 - 2012	p33 school level ESCS	$y = \alpha + \beta_1 \text{ESCS} + \epsilon$, top third ϵ
Agasisti et al. (2021)	PISA 2015	p25 ESCS	Level 3 or higher for all three competencies (reading, math and science)

Cordero & Mateos- Romero (2021)	TIMSS (2015)	p33 Home Learning	$y = \alpha + \beta_1 \text{HRL} + \beta_2 \text{HRL2} + \varepsilon$, greater than p75 ε
	PIRLS (2016)	Resouce (HLR) index	$y = \alpha + \beta_1 \text{HRL} + \beta_2 \text{HRL2} + \varepsilon$, greater than p67 ε
			$y = \alpha + \beta_1 \text{HRL} + \varepsilon$, greater than p75 ε
			$y = \alpha + \beta_1 \text{HRL} + \varepsilon$, greater than p67 ε
			Greater than p75 in the achievement distribution

Table A2: Mean answers for items in each profile

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Profile 1	2.65	2.34	2.09	2.44	2.27	3.35	3.44	3.43	3.43	3.10	3.26
Profile 2	3.29	3.22	3.06	2.97	3.20	2.92	2.63	2.79	2.60	2.68	2.69
Profile 3	3.40	3.54	3.35	3.22	3.52	3.66	3.71	3.75	3.74	3.47	3.49
Profile 4	3.61	3.54	3.49	3.35	3.66	2.96	2.90	2.90	3.00	3.00	3.10
Profile 5	3.67	3.70	3.53	3.43	3.70	3.85	3.85	3.85	3.86	3.76	3.77
Mean	3.39	3.39	3.23	3.16	3.39	3.42	3.37	3.42	3.39	3.26	3.30
SD	0.42	0.53	0.60	0.42	0.54	0.56	0.56	0.56	0.57	0.64	0.59
	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	
Profile 1	2.96	2.66	2.28	2.13	2.27	2.87	2.78	2.78	2.58	2.84	
Profile 2	2.47	2.13	1.88	1.69	1.84	2.23	2.26	2.13	2.08	2.39	
Profile 3	3.01	2.58	2.26	1.89	2.04	2.53	2.84	2.61	2.42	2.89	
Profile 4	3.30	2.89	2.47	2.40	2.63	3.05	3.13	3.01	2.85	3.28	
Profile 5	3.71	3.45	3.17	2.80	3.06	3.46	3.62	3.48	3.33	3.62	
Mean	3.08	2.72	2.40	2.13	2.32	2.77	2.92	2.77	2.62	2.99	
SD	0.68	0.84	0.98	0.73	0.78	0.74	0.71	0.69	0.74	0.69	

Table A3: Post-hoc comparison of reading achievement among profiles

		N	1	2	3	4	5
Tukey HSD ^{a,b}	Low Practice	5996 2	468.1 19				
	Student- centered	4273 7		473.81 21			
	Disorderly	2638 3			478.3 61		
	Teacher- centered	1020 50				481.5 13	
	High Practice	6169 3					496.4 72

Table A4: Resilience * PROFILE Crosstabulation

		Low practice	Student - centere d	Disorder ly	Teacher - centere d	High Practi ce	Total
Disadvantaged - low achievers	Count	23146 ^a	14583 ^b	8287 ^c	29460 ^d	14164 ^e	89640
	% within PROFILE	38.60%	34.12%	31.41%	28.87%	22.96%	30.61%
Disadvantaged - medium achievers	Count	20592 ^a	16753 ^c	9270 ^a	37689 ^b	23273 ^d	107577
	% within PROFILE	34.34%	39.20%	35.13%	36.93%	37.72%	36.74%
Resilient students	Count	16225 ^a	11402 ^a	8827 ^b	34902 ^b	24257 ^c	95613
	% within PROFILE	27.06%	26.68%	33.46%	34.20%	39.32%	32.65%
	Count	59963	42738	26384	102051	61694	292830
	% within PROFILE	20.48%	14.59%	9.01%	34.85%	21.07%	100.00%

Each subscript letter denotes a subset of PROFILE categories whose column proportions do not differ significantly from each other at the ,05 level.

Table A5: Post-hoc analysis of homogeneity of regression slopes

Profile	N	1	2	3	4
Low Practice	59962	38.998			
Teacher-centered	42737		33.671		
Student-centered	61693			31.900	
Disorderly	102050			31.198	
High Practice	26383				14.573