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Validation of the Short Form of My Class Inventory Within the Vietnamese Educational Context

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Abstract: Recently, researchers have paid more attention to the aspects of classroom learning environments because of their effects on students' cognitive and effective outcomes. However, current literature reveals the lack of research that explores the factors of classroom environments in Vietnamese context. The present study, therefore, aims to validate the psychometric properties of the 25-items version of the My Class Inventory (MCI), translated into Vietnamese for 487 secondary school students. Factorial analysis showed an acceptable fit for the four-factors structure of the MCI – cohesiveness, competitiveness, satisfaction, and friction – to be appropriate for secondary school students. Internal consistency reliabilities of the general scales and four subscales were satisfactory. Results support the suitability of the MCI to assess students' classroom environment within Vietnam's educational context. The study recommended, among other things, that future studies should be conducted to explore the validity of the MCI on other samples of Vietnamese secondary students.

Keywords: Classroom environment, confirmatory factor analysis, learning environment, my class inventory, Vietnam.

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Introduction

Social science research has paid increasing attention to the importance of the classroom environment and its effect on student performance and development, and has drawn on a variety of different theoretical and conceptual models to assess these effects (Adelman & Taylor, 2002; Frederickson & Monsen, 1999; Henderson et al., 1998; Idiris & Fraser, 1994; Mariani et al., 2019). Classroom climate, or learning environment, can be defined as “the interpersonal relationship among pupils, relationships between pupils and their teachers, relationships between pupils and both the subject matter studied and the method of learning, and finally, pupil perception of the structural characteristics of the class” (Fraser et al., 1982, p. 7). Fraser (1998a) elaborates on learning environments, capturing “the social, psychological, and pedagogical contexts in which learning occurs and which affect student achievement and attitudes” (p. 3). The learning environment also entails the perceptions and the participation of the students and the teachers within it (Fraser, 1998a).

Researching classroom environments can help elucidate the association between the environment and students' development in various dimensions. The ultimate goal of education is to create a positive classroom environment (Fraser, 2012) — which is characterized as safe, friendly, warm, supportive, and non-threatening — to enhance students' socio-psychological, intellectual, and academic development (Fraser & Fisher, 1982; LaRocque, 2008; Murphy et al., 1986). A positive classroom environment or climate enables students to improve their achievement, self-esteem, and positive learning attitudes (Chionh & Fraser, 2009), as well as to build their sense of enjoyment and accomplishment (Charles, 2002). Research suggests that it is crucial to create the elements of the classroom environment in accordance with the students' preferences to effectively improve their learning outcomes (Fraser & Fisher, 1982; LaRocque, 2008). To explore classroom environments, Moos and Trickett (1974) proposed three fundamental dimensions. First, the “Relationship Dimension” examines the nature and intensity of personal relationships with the environment and the level of involvement and support that individuals have for each other. Second, the “Personal Development” dimension investigates students' personal growth and self-enhancement. Finally, the “System Maintenance and System Change”

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dimension detects the level of order in the environment, clarifies the expectations embedded in the environment, and measures the level of control and response to changes.

Despite a growing body of research on learning environments in social sciences in recent decades (Chionh & Fraser, 2009; Fraser, 2012), elements of classroom environments are under-researched at both the classroom and school levels in the Vietnamese context. Until now there have not been any studies done to examine the factor structure of classroom environments in Vietnamese schools. Therefore, the current study presents the results of an investigation to examine the psychometric properties of the 25-item version of the My Class Inventory (MCI), implemented within the Vietnamese educational context. The results of the study and its validated model are significant to measure students' learning environments.

Measures and Consequences of the Classroom Environment

Learning environment research founded in the USA and initiated in The Netherlands and Australia has been a topic of research worldwide. The primary focus is on developing instruments that measure students' perceptions of classroom environments (Fraser, 1998b). Three widely-recognized instruments employed in previous research include the Individualized Classroom Environment Questionnaire (ICEQ) (Rentoul & Fraser, 1979), the My Class Inventory (MCI) as an adapted and simplified version of the well-known Learning Environment Inventory (LEI) model (Fraser et al., 1982), and the Classroom Environment Scale (CES) (Moos & Trickett, 1974). These scales have been validated, widely employed, and translated into various languages in Asian countries, including Singapore, Indonesia, China, Korea, Taiwan and Arab countries (Afari et al., 2013; Aldridge et al., 1999; Aldridge & Fraser, 2000; Chionh & Fraser, 2009; Fraser, Aldridge, & Adolphe, 2010; Fraser, Aldridge, & Soerjaningsih, 2010; Fraser & Lee, 2009; Goh & Fraser, 1998; Khoo & Fraser, 2008; Kim et al., 2000; Lang et al., 2005; Lee et al., 2003; MacLeod & Fraser, 2010; Margianti et al., 2001a, 2001b; Wong & Fraser, 1996). These studies support the correlation between students' positive learning and the extent of cohesiveness, satisfaction, and task orientation in the classroom environment. Similarly, negative learning was shown to result from friction and disorganization. These findings suggest the need for pedagogical implications to create a positive classroom environment to improve student learning.

Because various models have been proposed as measurements of classroom environments, it is necessary to select a model that is perceived to be relevant for the purpose of evaluating classroom environments in Vietnam. This study focuses on the MCI, a simplified version of the LEI, and consists of five scales: satisfaction, friction, competitiveness, difficulty, and cohesiveness. The MCI has been used for students aged 8 to 12 years who are in junior high school (Fisher & Fraser, 1981; Fraser, 1991; Fraser et al., 1982; Sink & Spencer, 2005). To investigate how students perceive classroom activities, the socio-psychological characteristics of the MCI can be employed as both dependent and independent variables, a methodology that has been confirmed in the literature (Fraser & Walberg, 1995). Furthermore, previous research has implemented the MCI and found a strong correlation between its aspects and the measures of students' cognitive and affective learning outcomes (Aldridge et al., 2000; Chionh & Fraser, 2009; Hofstein et al., 1979; LaRocque, 2008; Majeed et al., 2002; Wong & Fraser, 1996; Wong et al., 1997). This correlation includes the association between positive classroom climates and student academic and behavioral elements (Adelman & Taylor, 2002; Fraser & Walberg, 2006; Reyes et al., 2012; Wilson et al., 2007). Specifically, the classroom environment may serve as a factor that assists in the prediction of student cognitive and affective learning outcomes (Chionh & Fraser, 2009; LaRocque, 2008; Majeed et al., 2002; Webster & Fisher, 2003; Wong & Fraser, 1996).

The Present Study

This study aims to examine the psychometric properties of the MCI to evaluate whether its five factors would be applicable in Vietnamese secondary school students, in an effort to verify the instrument's cross-cultural validity in the Vietnamese context. Previous research has shown that the MCI effectively assesses students' learning environments in a variety of contexts, and its wide implementation in previous research suggests its validity and usefulness (Fisher & Khine, 2006; Fraser, 2007; Goh et al., 1995; Majeed et al., 2002; Mink & Fraser, 2005; Scott Houston et al., 2008; Sink & Spencer, 2005). This implementation of the MCI also suggests that its multidimensional structure is its original factor structure (Mariani et al., 2019; Sink & Spencer, 2005, 2007; Villares et al., 2016). Despite evidence of its stable factor structure in some cross-cultural studies, the validity and reliability of the MCI across educational contexts is unknown, heightening the need for further testing and validation of this instrument. Therefore, the findings of the present study are valuable to offer teachers effective feedback on how to create a positive classroom environment for students by improving or making changes to the aspects of the classroom activities.

Methodology

Participants

The convenience sample of student participants consisted of 487 ninth grade students (212 females [55%] and 275 males [45%]) from 14 classes in 7 Vietnamese government lower secondary schools. Among students, there were 291 (59%) urban participants and 196 (41%) suburban participants. The participants had an average age of 14.50 (SD = 7.75). The

average age was 14.75 (SD = 7.07) for females and 14.25 (SD = 8.53) for males. All participants voluntarily joined the research and were informed of the research process. Survey response rates were high, averaging over 97%. All responses collected from the MCI survey remained completely anonymous and confidential.

Measure

The 25-item version of the MCI (Fraser & Fisher, 1983), translated into Vietnamese, was used to collect data from participants using a paper-and-pencil format. To create a Vietnamese version of the MCI, two bilingual translators who were accustomed to teachers' work were invited to work independently and translate the instrument from English into Vietnamese. Both translators were encouraged to consider linguistic, functional, and cultural factors of the target population. Back translation was then conducted by other two bilingual translators of different backgrounds. Each translator worked independently, and the outcomes of back translation indicated that a high level of linguistic and cultural equivalence was achieved between the original and translated versions of the instrument. The Vietnamese version of the MCI was given to 487 secondary students. Participants had approximately 45 minutes to complete the questionnaire.

The scale consisted of 25 items, which were designed to measure five subscales of the classroom environment. The first subscale of MCI, Cohesion (CH), comprised five items, e.g., "All pupils in my class are close friends." The second subscale, Competitiveness (CM), contained five items, e.g., "Some pupils always try to do their work better than the others." The third subscale, Satisfaction (ST), comprised five items, e.g., "The pupils enjoy their schoolwork in my class." The fourth subscale, Friction (FI), included five items, e.g., "Some pupils don't like other pupils." The last subscale, Difficulty (DF), consisted of five items, e.g., "Only the smart pupils can do their work." The responses were selected from a five-point scale for each item. The items designated (+) were scored as 1, 2, 3, 4 and 5, respectively, for the responses SD (Strongly Disagree), D (Disagree), U (Undecided), A (Agree), and SA (Strongly Agree). The items designated (-) were scored in the opposite way. Internal consistency was checked in the students' responses to the five components by computing respective Cronbach's alpha coefficients. Table 1 reports the means, standard deviations, and Cronbach's alpha coefficients of internal consistency for each of the components.

Data Analysis

Both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were carried out to explore the factor structure of the MCI by using IBM SPSS Statistics 20.0 and IBM SPSS Amos 20.0. In the first phase, EFA was performed with principal-axis factoring followed by varimax rotation to explore the possible factor structure of the scale. Kaiser-Meyer-Olkin (KMO) measure ($0.50 < \text{KMO} < 1$), Bartlett's test ($p < 0.50$), factor loading > 0.50 , and Eigenvalue > 1 were set (Hair et al., 2006). In the second phase, the latent structural validity of the model was verified using CFA. The *maximum likelihood estimation (MLE)* method was run setting standardized estimates and modification indices as output for model fit estimation. The model fit was further inspected with the following goodness of fit indexes: the Chi-square/degrees of freedom ratio ($\chi^2/df \leq 3$) (Tabachnick & Fidell, 2013), even ≤ 5 (Marsh & Hocevar, 1985); the goodness-of-fit index ($\text{GFI} \geq 0.90$), the comparative fit index ($\text{CFI} \geq 0.90$) and the Tucker-Lewis index ($\text{TLI} \geq 0.90$) (Hu & Bentler, 1999); and the root mean square error of approximation ($\text{RMSEA} \leq 0.08$) (Steiger, 2007). The MCI's internal consistency was calculated using Cronbach's alpha coefficient, which was also applied to each of the three subscales separately. The Cronbach's alpha coefficient should be ≥ 0.70 (DeVellis, 1991) and the corrected item-total correlation should be ≥ 0.30 (Nunnally & Bernstein, 1994). The correlation coefficient (r) among factors of the instrument was set at $r \geq 0.05$. The alpha level was set at $p < 0.01$. The descriptive statistics (averages and standard deviations) and bivariate correlations were obtained for all items.

Results

EFA was performed with the principal axis factor (PAF) analysis followed by varimax rotation to explore the possible factor structure of the 25-item scale. The KMO measure verified the sampling adequacy for the analysis, where $\text{KMO} = 0.83$ and Bartlett's test of sphericity had $\chi^2_{(253)} = 4207.03$ and $p < 0.000$, indicating that the factor analysis was appropriate. PAF followed by varimax rotation yielded a structure of five factors with eigenvalues greater than one, explaining 56.03% of the total variance. All items were loaded on each of the original five subscales, respectively. Items 7, 9, 14, 17, 21 and 24 were removed because these items had low communalities and loadings of less than 0.40 within each of the three factors. In addition, because items 4 and 19 on the difficulty subscale had the Cronbach's alpha value of less than 0.70, these were removed. The results of factorial analysis further showed the 17-item MCI with four factors (cohesiveness, competitiveness, satisfaction, and friction). Using these 17 items, PAF with varimax rotation confirmed the same four factors with eigenvalues greater than one and with loadings ranging from 0.68 to 0.79. The five factors together accounted for 56.3% of the variance in the students' responses. The first factor, cohesiveness, consisted of five items with loadings from 0.69 to 0.79. The second factor, competitiveness, included five items with loadings from 0.68 to 0.75. The third factor, satisfaction, comprised four items with loadings from 0.72 to 0.78. The fourth factor, friction, contained three items with loadings from 0.73 to 0.79.

Table 1 shows a summary of the MCI factors from EFA.

Table 1. EFA for My Class Inventory

Item	Mean	SD	Factor Loading				
			CH	CM	ST	FI	
20 All of the pupils in my class like one another. (ch20)	3.34	0.77	0.79				CH
25 Children in our class like each other as friends. (ch25)	3.32	0.69	0.77				
5 In my class, everybody is my friend. (ch5)	2.81	0.67	0.76				
10 Some people in my class are not my friends. (ch10)	2.69	0.65	0.72				
15 All pupils in my class are close friends. (ch15)	3.39	0.71	0.69				
18 Some pupils always try to do their work better than the others. (cm18)	3.22	0.77		0.75			CM
23 A few children in my class want to be first all of the time. (cm23)	3.43	0.68		0.72			
8 Most children want their work to be better than their friend's work. (cm8)	3.39	0.73		0.71			
3 Children often race to see who can finish first. (cm3)	3.38	0.74		0.71			
13 Some pupils feel bad when they don't do as well as the others. (cm13)	3.35	0.72		0.68			
16 Some of the pupils don't like the class. (st16)	3.32	0.70			0.78		ST
6 Some pupils are not happy in class. (st6)	3.44	0.68			0.76		
1 The pupils enjoy their schoolwork in my class. (st1)	2.88	0.70			0.76		
11 Children seem to like the class. (st11)	3.39	0.76			0.72		
2 Children are always fighting with each other. (fi2)	3.40	0.72				0.79	FI
12 Many children in our class like to fight. (fi12)	3.34	0.69				0.74	
22 Children in our class fight a lot. (fi22)	3.37	0.72				0.73	
Eigenvalue			4.24	2.20	1.90	1.23	
Cum %			24.96	37.84	49.02	56.29	

Note: Factor loadings < 0.40 were omitted.

CH = cohesion; CM = competitiveness; ST = satisfaction; FI = friction.

Using these 17 items, the CFA results confirmed the same four-factor structure as reported in Sink and Spencer (2005). The fit indices of the model were good, $\chi^2 = 232.50$, $df = 113$, $\chi^2/df = 2.05$, $p = 0.000$, $TLI = 0.96$, $CFI = 0.96$, and $RMSEA = 0.04$. The high factor loadings (standardized estimates) ranged from 0.68 to 0.79 for all four subscales. The results indicated the model fit well with the data and the four-factor model was suitable for explaining the classroom environment structure. The fit model of MCI is presented in Figure 1.

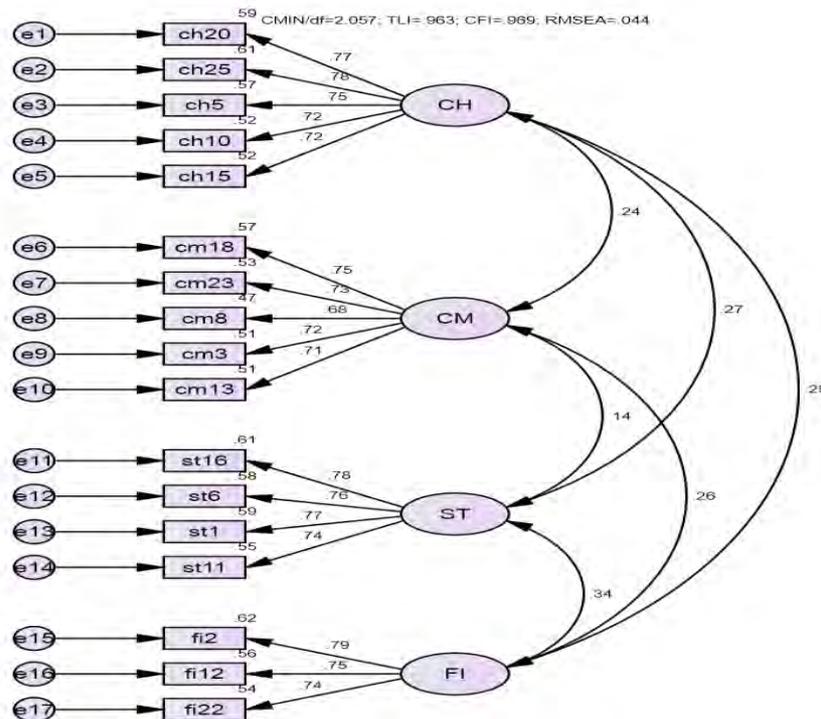


Figure 1. The best fit model of MCI

Table 2. Means, Standard deviations, Cronbach's alpha (α) and Inter-factor correlations

	No. of items	Mean	SD	α	MCI	CH	CM	ST	FI
MCI	17	3.26	0.36	0.83	1	0.68**	0.63**	0.61**	0.59**
CH	5	3.10	0.56	0.86		1	0.21**	0.22**	0.24**
CM	5	3.35	0.57	0.84			1	0.12**	0.21**
ST	4	3.25	0.59	0.85				1	0.28**
FI	3	3.36	0.60	0.80					1

Note: $N = 487$, $*p < 0.05$, and $**p < 0.01$

MCI = My Class Inventory; CH = cohesion; CM = competitiveness; ST = satisfaction; FI = friction; DF = difficulty.

The results of descriptive and inferential analyses were presented in Table 2. Means and standard deviations of the four subscales ranged from 3.10 (0.56) to 3.36 (0.60). All items have corrected item-total correlation values above the minimum threshold of 0.30 (ranging from 0.37 for item 6 to 0.51 for item 15), indicating the discriminant capacity of each item. In addition, all Cronbach's alpha values are above the threshold of 0.70 ($\alpha = 0.86$ for cohesiveness, $\alpha = 0.84$ for competitiveness, $\alpha = 0.85$ for satisfaction, and $\alpha = 0.80$ for friction).

The correlations among subscales were presented in Table 2. The high correlations between the MCI and the four subscales of cohesiveness, competitiveness, satisfaction, and friction ranged from 0.59 to 0.68, indicating the MCI had good convergent validity. The moderate positive correlations between the four subscales ranged from 0.12 to 0.28, indicating that the factors are distinct and support the four-factor structure of the MCI for secondary students.

Discussion

This study aims to examine the validity of the revised version of the MCI in the Vietnamese setting of secondary education. EFA results indicated a structure of the four factors of the classroom learning environment. An inspection of the items showed that they grouped around the same four factors. This finding supports the factorial structure of the four-factor solution identified in some previous research (Mariani et al., 2019; Sink & Spencer, 2005). The results support the configural equivalence of the MCI in the Vietnamese educational context.

Although the factorial validity of the 25-item MCI is stable and consistent with previous studies (Fraser, 1982; Fraser & Fisher, 1983; Villares et al., 2016), our analysis found that eight items had low factor loadings (< 0.50), communalities (< 0.30), and Cronbach's alpha value ($\alpha = 0.67$). Therefore, these eight items were removed. The possible reasons for the low factor loadings and communalities of eight items may be due to cognitive developmental differences and potential dependency on the cultural and social settings of the selected sample in the study. Three of the five items (items 2, 12, and 22) in the friction subscale loaded together and addressed student perceptions of classroom conflict, e.g., item 12: "Many children in our class like to fight." The two items, item 7 ("Some of the children in our class are mean") and item 17 ("Certain pupils always want to have their own way") had low factor loadings. Given these issues, three items were removed, and the friction subscale contained only three items. The possible reasons for the removal of two items may be the fact that items 7 and 17 did not mention classroom conflict. This finding was slightly supported by Sink and Spencer (2005) who showed that item 7 loaded with cohesiveness questions, and item 17 loaded with competitiveness items based on exploratory factor analysis (EFA).

Some psychometric concerns regarding the difficulty subscale were found. For EFA solutions, two items related to students' self-assessment of the level of classroom difficulty (item 4, "In my class the work is hard," and item 19, "School work is hard to do") loaded on the same component and had high factor loading, while the remaining three difficulty items about students' judgments of their peers (item 9, "Most children can do their schoolwork without help," item 14, "Only the smart pupils can do their work," and item 24, "Most students in my class know how to do their work") had low factor loading. Given these issues, items 9, 14 and 24 were removed, and the difficulty subscale contained only two items. In addition, an inspection of the reliability using Cronbach's alpha showed that items 4 and 19 had the low value ($\alpha < 0.70$). Therefore, these two items were further deleted from the from the MCI. The possible reasons for the deletion of all items on the difficulty subscale may be due to the fact that students may view the content of items 4 and 19 as their self-assessment of the level of classroom difficulty while students may consider the content of items 9, 14 and 24 as their judgments of their peers. This result was slightly consistent with the results of the study conducted by Sink and Spencer (2005) which reported that three difficulty items (9, 14, and 24) loaded on the another subscale out of its original five-factor scale.

Additionally, item 21, "The class is fun," under the satisfaction subscale, did not fit well. Consequently, item 21 was excluded from the final proposed subscale because it had low factor loading. The possible reason for this may be the fact that this item mentioned "the class" while the other four satisfaction items mentioned "pupils" and "children" regarding the class. Finally, a structure of four factors with 17 items was proposed based on the 25-item MCI scale, and CFA was further conducted to test the model-data fit.

CFA results confirmed the factorial structures of MCI for the four-factor model. Although it has fewer items than the original (i.e., deletion of difficulty subscale and problematic items), it is still reliable and has satisfactory psychometric

properties after removing eight items. The results showed that the four-factor model did fit well for this group of Vietnamese secondary students. The results of fit index values suggested that the 17-item model offered a potential model-data fit for the Vietnamese group of students. The tridimensional factorial structure of the MCI agreed with Fraser and Fisher (1983)'s conceptual framework, as well as empirical studies conducted in different countries (Mariani et al., 2019; Sink & Spencer, 2005, 2007; Villares et al., 2016), indicating that the tridimensional factorial structure for MCI is relatively stable across different countries and cultures. The results support the implementation of this scale in non-Western and cross-cultural studies on students' classroom environments. In addition to factorial validity, an examination of the predictive and convergent validity, results of correlation coefficients among scales and subscales suggested that predictive validity and convergent validity of the MCI were good. The moderate correlations among four subscales of the MCI supported a tridimensional model for this group of students in Vietnam.

Conclusion

This study sheds light on the stability and psychometric properties of the four-factor structure of MCI. Despite the removal of eight items for potential dependency on the cultural and social settings of the selected sample in the study, the four-factor structure held true. This study is innovative for being the first validation of its kind regarding classroom inventory conducted with students in Vietnam's educational context. The results help establish a four-factor model of the MCI with acceptable data fit, consisting of cohesiveness, competitiveness, satisfaction, and friction in the educational setting of Vietnam. Despite few studies exploring how the MCI functions in diverse settings, the results displayed that the 17 selected items of the MCI had strong internal consistency in the Vietnamese context. These findings show that this group of Vietnamese students share some cultural practices and educational values in the classroom environment. The study offers further validity evidence to strengthen the appropriateness of using the MCI to measure students' learning environments in Vietnam and supports cross-cultural comparisons to expand the generalizability and cultural appropriateness of the construct.

Limitations

Although the structure of the four-factor model for secondary students was accomplished, this study is not without limitations. The present study utilized a non-probability sampling technique, as the participants were chosen based on their convenient accessibility. Future research should consider randomized samples to increase the generalizability of the results and assist in controlling for other external variables. Second, very few studies have been conducted in Vietnam on student learning environments, which call for further studies to explore the validity of the MCI, such as drawing on another sample of Vietnamese secondary students to compare to the current results. The research context should be expanded to include both primary school and high school students, in a variety of regions. Moreover, the relationships between the MCI and other outcomes of students — such as responsibility, achievement, self-esteem — are potential for further investigations to confirm the significant effects of the MCI.

Disclosure of interest

The author declares no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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