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Autonomy-Supportive Classroom Climate in Mixed-Grade Classes in a Japanese Elementary School

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Abstract

The purpose of this study was to examine the effects of an autonomy-supportive classroom climate on intrinsic motivation in mixed-grade classes. A total of 398 children (eight to twelve years old) in a Japanese elementary school participated in a questionnaire study with two measurement occasions. Path analysis revealed that perceived autonomy-supportive classroom climate was related to perceived active participation structure, which, in turn, was related to intrinsic motivation. The effects of perceived autonomy-supportive classroom climate on intrinsic motivation were mediated by the perceived active participation structure. These relationships did not vary with the children's grades. These results suggest that an autonomy-supportive classroom climate promotes children's intrinsic motivation in mixed-grade classes.

Keywords: autonomy-supportive classroom climate, mixed-grade class, intrinsic motivation, elementary school children

1. Introduction

1.1 Autonomy-Supportive Classroom Climate

Elementary school children spend a significant amount of time in their classrooms at school every day, studying subjects and engaging in various academic activities with their classmates. Therefore, the environmental features of classrooms can impact children's learning. It should be one of the most important tasks for educators to create classrooms where children can actively learn and interact with each other.

Researchers have examined the effects of classroom environments. Among environmental factors in calssrooms, social or interpersonal features, that is, classroom climate has powerful effects on children's learning. It has been revealed that classroom climate affects children's motivation (Wang, Degol, Amemiya, Part, & Guo, 2020; Urdan & Schoenfelder, 2006). Classroom effects were examined in terms of achievement goal structures (Ames, 1992), classroom social environment (Patrick, Ryan, & Kaplan, 2007), cooperative goal structures (Roseth, Johnson, & Johnson, 2008), etc.

Autonomy support is a useful theoretical framework for capturing classroom climate. Autonomy support is conceptualized to comprehensively explain the environmental factors that influence intrinsic motivation in cognitive evaluation theory (Deci & Ryan, 1985). Deci and Ryan (1987) defined autonomy support as encouraging people to make their own choices. In theory, autonomy is an inner endorsement of one's thoughts, feelings, and behaviors (Reeve, 2016). This means that the classroom, where children feel that they can voice their opinions and decide their own behaviors, has an autonomy-supportive climate.

Researchers have paid attention to teachers' roles in shaping an autonomy-supportive classroom climate. Some studies have used the Learning Climate Questionnaire (Williams & Deci, 1996), which measures perceived teachers' autonomy-supportive teaching using items such as "My teacher tries to understand how I saw things before suggesting a new way to do something," or "I feel that my teacher provides choices and options to me." When children feel understood and cared for by teachers in their classroom, they perceive their classroom as autonomy-supportive. Studies have revealed that an autonomy-supportive climate leads to intrinsic motivation and academic engagement (Reeve, 2016; Yu, Traynor, & Levesque-Bristol, 2018).

Classmates and peers also seem to play a critical role in shaping an autonomy-supportive classroom climate. Recent studies have examined the effects of autonomy support provided by peers or friends (Deci, La Guardia,

Moller, Scheiner, & Ryan, 2006; Guay, Lessard, & Dubois, 2016). For example, in a sample of seventh graders, Beiswenger and Grolnick (2010) found that autonomy within friendships influenced autonomous motivation for after-school activities. Sicilia, Águila, Posse, and Alcaraz-Ibáñez (2020) revealed that peers' autonomy support led to higher levels of exercise intention in leisure time. These results suggest that peer autonomy support can motivate children. Classroom research has shown that support from classmates and quality of relationships among peers in the classroom considerably contribute to shaping classroom climate (e.g., Patrick et al., 2007; Wang & Degol, 2016). Therefore, capturing the autonomy-supportive classroom climate in terms of peer relationships and interaction (i.e., to what extent classmates support one's autonomy in the class), would provide educators with useful insights.

1.2 Autonomy-Supportive Classroom Climate in Mixed-Grade Classes

Elementary school children sometimes spend time in classrooms comprising students of different grades; approximately 80% of elementary schools in Japan set some mixed-grade activities (Mouri, 2013). In mixed-grade classes, an autonomy-supportive classroom climate may be important, as children may have some interaction difficulties due to their cognitive abilities or developmental stages. However, empirical studies have reported certain positive effects of mixed- or multi-grade classes. For example, students have a more positive attitude toward school (Miller, 1990) or engage in less peer victimization (Rambara, van Duijin, Dijkstra, & Veenstra, 2019) in mixed-grade or multi-grade classes.

These results suggest that positive relationships among children of different grades can be formed in mixed-grade classrooms, although they have different levels of abilities or developmental features. Rambara et al. (2019) highlighted the importance of encouraging the provision of help across grades within the same classroom in forming prosocial relationships. In mixed-grade classes, similar to same-grade classes, the classroom climates in which different grade peers respect each other's autonomy and provide support may be influential.

1.3 The Present Study

It was predicted that an autonomy-supportive classroom climate affects children's motivation for activities in mixed-grade classes. The construct of autonomy support has been proposed to integrate the environmental factors that influence intrinsic motivation (Deci & Ryan, 1985, 1987). This should apply to classroom climate in mixed-grade classes. Children can encounter unique difficulties derived from interactions among students of different grades. They may need more effort to communicate with their classmates, or perceive more peer pressure, especially for lower graders. These seem to be motivational challenges for children in mixed-grade classes. Therefore, a more autonomy-supportive classroom climate would have an impact on their intrinsic motivation for activities in mixed-grade classes.

The purpose of this study was to examine the effects of an autonomy-supportive classroom climate in mixed-grade elementary school classes. The model in which perceived autonomy-supportive classroom climate affected intrinsic motivation for activities in mixed-grade classes, mediated by the perceived active participation structure was tested. Hypotheses were as follows: H1. Children who perceived more autonomy-supportive classroom climate would show higher levels of perceived active participation structure and intrinsic motivation. H2. Children who perceived more active participation structure would show higher levels of intrinsic motivation. In addition, it was exploratorily examined whether the effects of perceived autonomy-supportive classroom climate varied with children's grades.

2. Method

2.1 Participants and Field

Children between the third and sixth grades belonging to a Japanese elementary school, attached to a university, participated in the study. This study focused on a learning activity (hereinafter referred to as "Activity A") conducted in mixed-grade classes in the participating school. Activity A was conducted by creating a mixed-grade class consisting of approximately 35 students (five to seven students each from the first to sixth grades). Further, 175 hours per year were assigned for this activity. One class hour (45 minutes) per day from Tuesday to Friday was devoted to this activity, and the activities were continuously conducted throughout the year. The children participated in problem-solving tasks called "projects" in the classes, also going out into the local community and conducting activities with the support of other entities such as municipalities, local theatrical companies, television stations, etc. The central role of children in discussing the purpose and contents of the project and conducting activities on their own initiative was emphasized.

A total of 413 third to sixth grade children (eight to twelve years old) were recruited from the participating school and asked to answer a questionnaire at two measurement occasions, October 2020 (T1) and February 2021 (T2).

Fifteen children's data were removed because they did not complete the questionnaire on two occasions due to changing schools. Thus, data from 398 children were analyzed. The sample consisted of 94 third graders (48 boys, 46 girls), 104 fourth graders (51 boys, 53 girls), 104 fifth graders (50 boys, 54 girls), and 96 sixth graders (50 boys, 46 girls). There were 18 mixed-grade classes.

2.2 Measures

2.2.1 Perceived Autonomy-Supportive Classroom Climate

Okada's (2014) five items measuring perceived teachers' autonomy support were used after modifying them so that they were suitable for peer support in Activity A. Items were "Everyone tries to listen to the opinions of each student in this class," "Everyone tries to listen to how classmates feel and think about each other in this class," "Everyone thinks what to do on their own," "Everyone accepts the classmates' own way of thinking and behaving," and "Everyone tries to keep pace with classmates." Participants were asked to rate each item in remembering daily Activity A classes on a 4-point Likert scale of 1 (not true), 2 (rarely true), 3 (sometimes true), and 4 (true). Scale scores at each measurement occasion were calculated by averaging the five item scores. To assess the relatability, the estimated reliability coefficients (McDonald's ω) were calucluated. The values were .82 for T1 and .90 for T2, suggesting the good reliability.

2.2.2 Perceived Active Participation Structure

To assess perceptions of the structure of active participation in Activity A classes, Okada's (2021) items were used. Although there are three items originally, an item was omitted because of its similarity to the intrinsic motivation item mentioned below. Two items were "There is a place where I can actively participate in a mixed-grade class" and "There is a place where I can present my ideas in a mixed-grade class." Participants were asked to rate each item in remembering daily Activity A classes on a 4-point Likert scale of 1 (not true), 2 (rarely true), 3 (sometimes true), and 4 (true). Scale scores at each measurement point were calculated by averaging the two item scores. The estimated reliability coefficients calculated using the Spearman-Brown formula (Eisinga, Te Grotenhuis, & Pelzer, 2013) were .86 for T1 and .82 for T2, suggesting good reliability.

2.2.3 Intrinsic Motivation

Okada's (2019) Intrinsic Motivation Scale was used to assess the children's intrinsic motivation. The scale comprises six items covering various features of intrinsic motivation (Harter, 1981). In this study, the wordings were slightly modified to measure the motivation for Activity A. The items are "It is fun to participate in activities," "I'm interested in what I do at classes," "When I attend classes, time passes fast," "I do useful things for me in the activity," "I challenge difficult tasks," and "I want to engage in various activities more." Participants were asked to rate each item in remembering daily Activity A classes on a 4-point Likert scale of 1 (not true), 2 (rarely true), 3 (sometimes true), and 4 (true). Scale scores at each measurement occasion were calculated by averaging the six item scores. The estimated reliability coefficients (McDonald's ω) were .86 for T1 and .90 for T2, suggesting good reliability.

2.3 Ethical Considerations

The participating school conducted a questionnaire survey among the children twice a year (October and February) to assess curricular achievement. This study used part of the data collected during the questionnaire survey conducted from 2020 to 2021. The participating school was an elementary school that was attached to a university, and parents consented to participate in the research. The class teachers administered the questionnaire at the same time in all the classes. The children were informed (both through written documents and orally) that participation was voluntary and that it would not affect their academic records in any way. The participants were asked to write their names on the questionnaires to match the data collected at the two time points. However, the analysis was conducted after the responses were anonymized.

2.4 Analytic Procedures

A path analysis was used to examine the effects of perceived autonomy-supportive classroom climate in mixed-grade classes. The model in which perceived autonomy-supportive classroom climate affects intrinsic motivation, mediated by perceived active participation structure, was tested using T2 data. Scale scores were used in the model. The T1 score was controlled for intrinsic motivation, which was set as the focal outcome in the model. Covariances were set among T1 intrinsic motivation, T2 perceived autonomy-supportive classroom climate, and T2 perceived active participation structure. In addition, the path coefficients were compared between the two populations of middle grades (3rd and 4th) and higher grades (5th and 6th). First, the model with no equality constraints in all paths and covariances was tested (Model 1). Next, the model with equality constraints on all paths

and covariances was tested (Model 2). The parameters were estimated using the maximum likelihood method. The full information maximum likelihood method was used to cope with missing data.

3. Results

3.1 Intra-class Correlations and Pearson's Correlations among Variables

Perceived autonomy-supportive classroom climate and perceived active participation structure focused on the features of the classroom; thus, they might vary among classrooms. However, intra-class correlations ranged from .03 to .04, suggesting little variance among classrooms in the two variables. Therefore, the two variables were treated not as class-level variables but as individual-level variables. The Pearson's correlation coefficients were calculated (Table 1). Correlations among variables ranged from .48 to .63 in same measurement occasions.

Table 1. Pearson's Correlations among Study Variables and Descriptive Statistics

	1	2	3	4	5	*Mean*	*SD*	*t* value	*d*
1. Perceived autonomy-supportive classroom climate (T1)						3.11	0.68	3.52^{***}	0.18
2. Perceived autonomy-supportive classroom climate (T2)	$.48^{***}$					2.97	0.74		
3. Perceived active participation structure (T1)	$.44^{***}$	$.34^{***}$				2.93	0.92	2.01^{*}	0.10
4. Perceived active participation structure (T2)	$.27^{***}$	$.45^{***}$	$.58^{***}$			2.85	0.90		
5. Intrinsic motivation (T1)	$.62^{***}$	$.42^{***}$	$.54^{***}$	$.36^{***}$		3.23	0.78	3.25^{***}	0.16
6. Intrinsic motivation (T2)	$.44^{***}$	$.61^{***}$	$.37^{***}$	$.50^{***}$	$.63^{***}$	3.10	0.80		

Note. N = 388 to 398. * $p < .05$, *** $p < .001$.

3.2 Changes of the Study Variables

The differences between T1 and T2 scores were examined (Table 1). For all variables, T1 scores were significantly higher than T2 scores: perceived autonomy-supportive classroom climate (t (387) = 3.52, $p < .001$, $d = .18$), perceived active participation structure (t (394) = 2.01, $p < .05$, $d = .10$), and intrinsic motivation (t (391) = 3.25, $p < .001$, $d = .16$). The effect sizes were small, according to Cohen (1988). These results show that children's perceived autonomy-suppritive classroom climate, perceived active participation structure, and intrinsic motivation slightly declined from T1 to T2.

The difference between middle grades (3rd and 4th) and higher grades (5th and 6th) were also examined. However, there were no significant differences in perceived autonomy-supporitve classroom climate (T1: t (386) = 1.31, *n.s.*, $d = .13$; T2: t (396) = 1.78, *n.s.*, $d = .18$) and perceived active participation structure (T1: t (394) = 1.90, *n.s.*, $d = .19$; T2: t (395) = 1.09, *n.s.*, $d = .11$). Intrinsic motivation scores were siginificantly different between grades (T1: t (393) = 3.18, $p < .01$, $d = .32$; T2: t (393) = 3.76, $p < .001$, $d = .38$). Middle grade children (T1: *Mean* = 3.35, *SD* = .75; T2: *Mean* = 3.26, *SD* = .76) reported higher levels of intrinsic motivation than higher grade children (T1: *Mean* = 3.10, *SD* = .80; T2: *Mean* = 2.96, *SD* = .82).

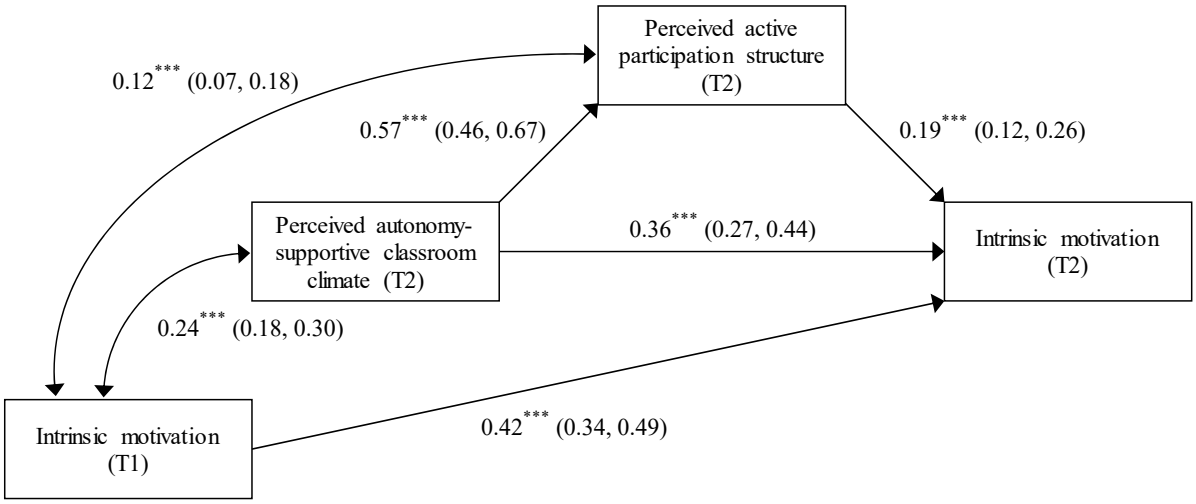
3.3 Examination of the Effects of Perceived Autonomy-Supportive Classroom Climate on Intrinsic Motivation

The effects of autonomy-supportive classroom climate were examined. The model in which perceived autonomy-supportive classroom climate affects intrinsic motivation, mediated by perceived active participation structure, was tested using T2 data. The model is shown in Figure 1. The model with no equality constraints (Model 1) and the model with equality constraints (Model 2) were tested.

The fit indices were compared between Models 1 and 2. Both AIC and BIC were lower in Model 2 than in Model 1: AIC = 3303.77 for model 1 and 3294.13 for model 2, and BIC = 3415.39 for model 1 and 3381.83 for model 2. In addition, the chi-square value of model 2 was not significant ($\chi^2 = 2.36$, $df = 6$, *n.s.*), suggesting that there were no differences between Model 1 and Model 2. Therefore, a more parsimonious model with equality constraints (i.e., Model 2) was adopted. Other fit indices of the model showed adequate values: CFI = 1.00, RMSEA = 0.00, and SRMR = 0.02.

The path from perceived autonomy-supportive classroom climate to perceived active participation structure was significant ($B = 0.57$, $p < .001$, 95%CI [0.46, 0.67]), and the path from perceived active participation structure to

intrinsic motivation was significant (B = 0.19, p < .001, 95%CI [0.12, 0.26]). The path from perceived autonomy-supportive classroom climate to intrinsic motivation was also significant (B = 0.36, p < .001, 95%CI [0.27, 0.44]). These results suggest that children who perceived more autonomy-supprotove classroom climate showed higher levels of perceived active participation structure and intrinsic motivation. Also, childlen who perceived more active participation structure showed higher levels of intrinsic motivation. Mediation analysis was conducted using the bootstrap method (5,000 times). The indirect effect of perceived autonomy-supportive classroom climate on intrinsic motivation through perceived active participation structure was significant (B = 0.11, p < .001, 95%CI [0.06, 0.16]). That is, the effects of autonomy-supporitve classroom climate on intrsic motivation was partly mediated by perceived active participation structure.



Note. The values show unstandardized coefficients and 95% confidence intervals. *** p < .001.

Figure 1. The results of path analyses of the model in which perceived autonomy-supportive classroom climate affects intrinsic motivation through perceived active participation structure

4. Discussion

4.1 Findings in Present Study

The present study aimed to examine the effects of autonomy-supportive classroom climate on intrinsic motivation in mixed-grade classes. Path analyses revealed that perceived autonomy-supportive classroom climate was related to perceived active participation structure, which, in turn, was related to intrinsic motivation. The effects of perceived autonomy-supportive classroom climate on intrinsic motivation are mediated by the perceived active participation structure. These results supported two hypotheses. Also, these relationships did not vary with the children's grades.

Research literature has revealed that an autonomy-supportive classroom climate fosters children's intrinsic motivation (Reeve, 2016; Yu et al., 2018). The previous findings were mainly obtained from samples of the same-grade classes. This study extends the findings to mixed-grade classes. In mixed-grade classrooms, if children perceive that their autonomy is respected, they are intrinsically motivated to engage in activities.

The present findings emphasize the role of peers in a classroom climate. Previous studies have focused on teachers' autonomy-supportive teaching to shape classroom climate (Deci, Schwartz, Sheinman, & Ryan, 1981; Reeve, 2016). Teachers' daily behavior and instructional styles significantly contribute to classroom climate (Stefanou, Perencevich, DiCintio, & Turner, 2004; Urdan & Schoenfelder, 2006). In addition, peers also have considerable effects on shaping the classroom climate (e.g., Patrick et al., 2007; Wang & Degol, 2016). The present study highlights the role of peers in mixed-grade classes. In classrooms where peers from various grades support each other, children feel that they can actively participate in class activities and are intrinsically motivated. Although few studies have focused on peers' roles in mixed-grade classroom climate, the present study verified them.

The effects of autonomy-supportive classroom climate did not vary with children's grades. Autonomy-supportive classroom climate in mixed-grade classes almost equally affects intrinsic motivation in both middle (i.e., 3rd and

4th grades) and higher grade (i.e., 5th and 6th grades) children. Research literature focused on adults' autonomy support such as teachers, parents, or coaches (Gillet, Vallerand, Amoura, & Baldes, 2010; Reeve, 2016; Vasquez, Patall, Fong, Corrigan, & Pine, 2016). Given that the effects of autonomy support from older people (e.g., teachers) to younger people (e.g., school children) were verified, autonomy-supportive classroom climate seems to have a greater impact on younger students. However, the present study focused not on a specific person's autonomy support but on perceived autonomy-supportive climate as a subjective environment in classrooms. The present findings suggest that autonomy-supportive climate has effects so that children at all grades intrinsically engage in the activities in mixed-grade classes.

The findings of this study have several practical implications. Teachers make efforts to manage relationships among peers in mixed-grade classes. The contents of learning and activities are certainly important, and they influence children's motivation. On the other hand, social factors such as peer relationships have been also documented in motivational research (e.g., Ladd, Herald-Brown, & Kochel, 2009; Wentzel, Jablansky, & Scalise, 2021). The present study verified that classroom climate characterized by peer relationships and interactions affects intrinsic motivation for academic activities in mixed-grade classes. Thus, teachers build mixed-grade classrooms in which children support each other's autonomous acts. It may be useful to convey the importance of autonomy-supportive communication to children. To buld autonomy-supportive classroom climates in a mixed-grade classes, teachers can tell childlen how to commuciate with their classmates in clases. Also, teachers' modeling the autonomy-supporitve communication may be useful.

4.2 Limitations

This study has three main limitations. First, classroom-level effects were not sufficiently examined. This study focused on educational activity in one school; thus, the number of classrooms was relatively small. Although each child's perceived classroom climate is important, the climate shared by members (i.e., classroom-level climates) may also be impact their motivation. The values of the intra-class correlation of perceived autonomy-supportive classroom climate were small, perhaps due to the small number of classrooms. Future studies should examine classroom-level effects with more mixed-grade classes.

Second, autonomy-supportive classroom climate was measured only in terms of children's perceived climate. Previous studies assessed teachers' autonomy support by students' perceptions, teachers' self-rated teaching, observers' ratings, and counting behavioral measures (Deci et al., 1981; Reeve, 2016; Reeve & Jang, 2006). Other assessment methods, such as observation or teachers' ratings, may provide more suggestions.

Third, scale items of autonomy-supporitve classroom climates have not been validated enough. The scale was partly validated and used in previuous study (Okada, 2014). In this study, the reliability of the scale was confirmed and yielded results matched with theretical prediction. However, the scale items need more multiple examination about its validity.

5. Conclusions

This study revealed that an autonomy-supportive classroom climate affects children's intrinsic motivation in mixed-grade classes. Mixed-grade classes can yield educational gains for children that are different from those in same-grade classes. To acquire these gains, the classroom climate plays an important role. Teachers can support children in mixed-grade classes by fostering an autonomy-supportive classroom climate. This would lead to intrinsic motivation, which can be the basis for various academic activities.

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