

Investigating Students' Motivation Toward Small-group Learning

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Abstract

Small-group work has often been considered a useful active learning instructional strategy. However, small-group learning involves many obstacles and challenges that may weaken student motivation. Motivation in small-group learning is an internal state that arouses, directs, and maintains behaviors for successful collaborative learning. This study developed and validated a new instrument called the Motivation for Small Group Learning (MSGSL) scale based on expectancy-value theory, which was used to investigate junior high school students' motivation for participating in small-group learning. The study sample included junior high school students from Greater Taipei, Taiwan. A random sample of 30 schools was used, and 1950 students completed the survey. The study revealed the following results: (1) The MSGSL scale is valid and reliable, and it includes 32 items loaded onto six factors, namely positively valuing, negatively valuing, self-efficacy, team efficacy, academic anxiety, and social anxiety. This scale has potential as an index for evaluating students' internal states and desires in a small-group context. (2) Some aspects of student motivation exhibited gender differences. Boys had significantly higher levels of positive valuing and academic anxiety than girls. (3) Experience in small-group learning might affect student motivation. Students who perceived their teachers as using small groups more had significantly higher overall motivation toward small-group learning. (4) Students who had higher academic achievement scores exhibited higher levels of self-efficacy and team efficacy and lower levels of academic anxiety in small-group learning.

Keywords: Small-group learning, Motivation, Active learning, Expectancy-value theory

Introduction

Many aspects of education have changed in recent decades. New ideas, methods, and technologies may have a profound impact on teaching and learning in the classroom. Despite changes in educational theories and practices, small-group learning is an essential and indispensable component of encouraging students and enhances the deep learning process. Small-group learning is considered “central to all curriculum planning” (Johnson & Johnson, 2005, p. 13) in school settings.

Allowing students to work in small groups has many practical advantages (Barkley, Cross, & Major, 2014; Johnson & Johnson, 2005). First, Vygotsky (1978) claimed that learning is an interactive and social process. Students have an active role in this process, and teachers must play the role of facilitators. In this process, effective teaching should center learning activities on the interactions between teachers and students rather than on one-way knowledge transfers. Small-group learning can reduce lecturing by teachers, increase opportunities for students to engage and discuss their learning, and motivate students to develop their own minds through active and meaningful information processing. Second, small-group work offers students opportunities to learn effective teamwork and interpersonal skills and dispositions. Except for students who will work completely independently in their future careers, most students will work alongside colleagues. Teamwork skills are vital in today’s workforce. Beyond improving subject matter learning, small-group work assists students to develop vital teamwork skills that prepare them for their careers. Third, we live in a fast-changing multicultural world. Our classrooms, workplaces, and societies are becoming more diverse. The educational system should prepare students for citizenship in multicultural democracies. Small-group work can open students’ eyes to ideas or solutions that they may never have considered, develop an understanding for the perspectives of students from different backgrounds, and learn to function in a multicultural, multiethnic environment. Finally, small-group learning provides students with new opportunities to self-control and self-direct their learning and encourages them to self-reflect on their work and self-regulate their behavior to optimize learning. Such opportunities foster lifelong learning skills.

However, successful group work entails certain challenges. One of the greatest is interpersonal conflicts between group members. Interpersonal conflicts are unavoidable when a group comprises individuals with different personalities, attitudes, and values because people, particularly young students, do not naturally know how to work in groups. Some students cannot seem to work together and sometimes argue (Sapon-Shevin, 1999). Another challenge is ensuring the equitable division of workloads among team members. Sometimes, high-ability students might perform most of the learning task to complete the task quickly and correctly rather than assist struggling students to progress and complete the learning goals. Subsequently, struggling students may feel frustrated and exhibit pessimism toward their self-worth, draining motivation in small-group learning. Alternatively, some students consciously or unconsciously avoid their group responsibilities. These social loafers or free riders do not effectively perform their tasks, which can cause stress and frustration for the other group members. Classroom management is another challenge for small-group learning. When students work in groups, they talk or move around the room, which can be a loud process. In noisy classrooms, off-task behavior, conversations, and pursuit of nonacademic goals by some group members increase significantly, which may undermine the motivation of other group members (Rogat, Linnenbrink-Garcia, & Didonato, 2013). Ultimately, these challenges can reduce group cohesiveness and productivity and weaken students’ motivation for small-group learning.

Although small-group learning is considered effective for engaging student learning, few studies have investigated students’ motivation in a small-group context. The challenges that are caused by social interaction might hinder rather than support students’ motivation. Motivation in small-group learning is an internal state that arouses, directs, and maintains behaviors for successful small-group work. It can be used to analyze students’ internal states

and desires in a small-group context. The purposes of this study were to develop and validate a new instrument, the Motivation for Small Group Learning (MSGSL) scale, based on expectancy-value theory and investigate junior high school students' motivation for participating in small-group learning.

Literature Review

Small-Group Learning

Small-group learning is a learner-centered instructional approach in which students work in pairs or small groups to learn, and activities are structured to emphasize cooperative, interactive, and dialogic learning. It is an umbrella term for numerous instructional approaches, including cooperative learning, collaborative learning, peer-assisted learning, small-group discussion, and team-based learning. It is supported by various learning theories, including Piaget's social-cognitive conflict perspective, Vygotsky's social constructivist theory, and Bandura's social learning theory. When small-group learning works effectively, it can allow students to "negotiate meanings, express themselves in the language of the subject, and establish more intimate contact with academic staff" (Oneschuk, 2006, p. 132). A meta-analysis of 375 experimental studies related to cooperative learning concluded that small-group learning resulted in significantly higher achievement and retention than did competitive and individualistic learning (Johnson & Johnson, 1989). Furthermore, small-group learning tends to result in higher level reasoning and metacognitive thought, more positive attitudes toward the subject of study, and greater psychological health and social competencies. It is also a powerful method for teaching 21st century skills, such as collaboration, communication, critical thinking, and problem-solving (Barkley, Cross, & Major, 2014; Johnson & Johnson, 2005).

Some researchers consider some instructional approaches of small-group learning extremely different. For example, collaborative learning appears to differ from cooperative learning because of different epistemological assumptions. Barkley et al. (2014) argued that if any instructional approach to small-group learning is effective, it must have three essential elements: intentional design, collaborating, and meaningful learning. The first element means that teachers must design intentional learning activities for students. Teachers cannot simply tell students to form groups and subsequently hope that they work effectively together. Facilitated, intentional group activities provide students with structural methods to share experiences, discuss ideas, clarify understandings, or generate new insights. Collaborating is the second crucial element. All members of the group must engage actively in working together toward the stated goals. Several group members completing a task while the others simply watch does not constitute effective small-group learning. Finally, when students work together on group tasks, meaningful learning must occur. Small-group learning must help students to increase their knowledge or deepen their understanding.

Expectancy-value Theory

Over the past few decades, numerous theories have been proposed by researchers for understanding and explaining our behavioral motivations. Expectancy-value models of motivation obviously stand out for their ability to adopt an integrative perspective of multiple constructs from different motivational theories, capture the key elements that motivate people, and explain many human behaviors (Barron & Hulleman, 2015). Expectancy-value theory has now been applied to many different fields, such as education, management, marketing, and economics.

According to Wigfield and Eccles (2000), individuals' achievement performance, persistence, and choice of achievement tasks are most directly determined by two constructs: expectancies for success and subjective task values. They defined expectancies for success as individuals' beliefs about how competently they can complete an upcoming task, including both ability beliefs focused on their present ability and expectancies focused on the future. Subjective task value is defined in terms of whether a task meets the needs of individuals. Subjective task

values include four components: (1) attainment value, which is the personal importance attached to performing effectively; (2) intrinsic or interest value, which is similar to the idea of “flow” when people feel immersed in the task; (3) utility value, which is related to how a task fits into an individual’s goals; (4) perceived cost, which is the cost of participating in the task (Eccles, 2005).

Methodology

Participants

The population in this study comprised junior high school students from Greater Taipei, Taiwan. The study used a proportionate stratification sampling method. The total population was divided into two subgroups: (i) 80,483 students from Taipei City and (ii) 125,520 students from New Taipei City. The Taipei City subgroup sample comprised 900 students who were selected through random cluster sampling from 36 classrooms of 12 schools in the city’s 12 educational districts (three classrooms in each school, and one school from each educational district). The New Taipei City subgroup sample comprised 1350 students who were selected through random cluster sampling from 54 classrooms of 18 schools in the city’s nine educational districts (three classrooms from each school, and two schools from each educational district). The proportions of the samples in the total populations were approximately equal in the two subgroups.

The MSGSL scale was distributed to the 90 classrooms. The number of scales distributed was 2250, and the number returned was 1950 (return rate: 86.67%). Table 1 shows the participants by sex and grade.

School region	Grade level			Sex		Total*
	7	8	9	male	female	
Taipei City	269	267	238	385	378	774
New Taipei City	388	437	346	614	552	1171
Total*	657	704	584	999	930	

Table 1 Participants by sex, grade, and city

Note: *Five participants did not report grade data, and 21 participants did not report sex data.

Instrument Development

The MSGSL scale was developed through a three-step procedure to ensure its validity and reliability. First, 40 items were generated for the preliminary instrument on the basis of expectancy-value theory, small-group learning practice, and the Taiwanese educational context. A 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*) was used to respond to each item in the instrument.

Second, the preliminary scale was administered to 164 junior high school students in Taipei. Subsequently, exploratory factor analysis (principal component factoring and orthogonal varimax rotation) was performed for the collected data to screen for the most valuable items to include in the formal version of the instrument. On the basis of the results of the factor analysis, this study retained 32 of the 40 items. The result also yielded a six-factor solution with a simple structure that explained 74.92% of the variance (all factor loadings $\geq .63$).

These six factors were labeled as follows:

Positively valuing: This factor refers to the student's evaluation of the positive aspects of small-group learning. It comprises nine items, including "small-group learning is an effective method for motivating students to learn."

Negatively valuing: This factor refers to the student's evaluation of the negative aspects of small-group learning. It comprises three items, including "small-group learning always makes the course fall behind schedule." The three items are scored inversely.

Team efficacy: This factor refers to the student's confidence in the team's capacity to succeed at small-group learning. It comprises six items, including "I have confidence that my team can successfully complete small-group tasks."

Self-efficacy: This factor refers to the student's confidence in his or her ability to succeed at small-group learning. It comprises six items, including "I know how to get along with my group members."

Academic anxiety: This factor refers to the student's feeling of being distressed, fearful, or stressed because of academic learning during small-group learning. It comprises three items, including "I worry that I can't learn the subject matter correctly in a small group." The three items are scored inversely.

Social anxiety: This factor refers to the student's unpleasant feeling of nervousness, distress, or worry in social situations related to small-group learning. It comprises five items, including "I always worry that some group members are freeloaders." The five items are scored inversely.

Positively valuing, team efficacy, and self-efficacy are positive motivation factors. These responses are scored on a scale from 1 to 5 (1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, and 5 = *strongly agree*). Negatively valuing, academic anxiety, and social anxiety are negative motivation factors. These responses are scored inversely.

The total score is obtained by calculating the arithmetic mean of the item scores across all items and thus can range from 1 to 5. Higher scores indicate greater motivation for small-group learning.

Finally, the reliability of the new scale was estimated using the internal consistency coefficient and test-retest method. The Cronbach's alpha coefficients of the positively valuing, negatively valuing, team efficacy, self-efficacy, academic anxiety, and social anxiety subscales were .94, .82, .82, .96, .91, and .89, respectively. The whole motivation scale comprised 32 items, and the Cronbach's alpha coefficient was .94. The subscales and whole scale had high internal consistency. To estimate the test-retest reliability, the scale was re-administered to the same 34 students after 5 weeks. The retest correlation coefficients of the positively valuing, negatively valuing, team efficacy, self-efficacy, academic anxiety, and social anxiety subscales were .87, .67, .84, .78, .73, and .77, respectively. The retest correlation coefficient of the combined motivation scale was .92. The subscales and combined scale had high test-retest reliability.

Results and Discussion

Frequency of Small-group Learning

Table 2 shows students' perceptions of the frequency of small-group learning. In total, 17.2%, 23.5%, 30.1%, 12.8%, and 12.9% of students perceived that small-group learning was "rarely," "occasionally," "sometimes," "frequently," and "usually" implemented in their classroom, respectively. In other words, approximately four-tenths of students (40.7%) perceived a low frequency of small-group learning, and only approximately one-quarter of students (25.7%) perceived a high frequency.

In today's global economy and fast-paced world, students must be prepared for the future. Teaching practice must be transformed to foster 21st century skills in students. Small-group work can effectively improve student collaboration, communication, critical thinking, and problem-solving skills; therefore, it is considered an effective approach for responding to this need (Johnson & Johnson, 2010). Many Taiwanese education administrators, scholars, and experts urge increased use of small-group learning in classrooms. However, this study determined that 40.7% of students perceived a low frequency of small-group learning, and only 25.7% of students perceived a high frequency. The findings were similar to those obtained by Huang (2016), who studied teachers' self-reported cooperative learning use. Huang reported that 57% of Taiwan's teachers were low-frequency users of cooperative learning and that only approximately 22.2% were high-frequency users. By contrast, Bassett, McWhirter, and Kitzmiller (1999) revealed that approximately 16%, 43%, and 41% of U.S. teachers were low-frequency, medium-frequency, and high-frequency users, respectively, of cooperative learning. The realities of the 21st century learner in Taiwan require schools and teachers to dedicate more effort to implement small-group learning.

Frequency	Number	Percentage
Rarely (Almost no lessons)	335	17.2
Occasionally	459	23.5
Sometimes (About half the lessons)	587	30.1
Frequently	250	12.8
Usually (Almost every lesson)	252	12.9

Table 2 Students' Perceived Frequency of Learning in Small Group
Note: N = 1883, missing data = 67.

Motivational Levels

The MSGL scale is a 5-point scale that assesses an individual's agreement or disagreement with a particular statement. The total scale and subscale scores are the means of the item scores. Scores of 1, 2, 3, 4, and 5 reflect extremely low, low, moderate, high, and extremely high motivation, respectively.

Table 3 shows the means of the MSGL scale for the total sample. The means of the total sample were 3.88, 3.40, 3.84, 3.87, 3.41, and 3.19 for positively valuing, negatively valuing, team efficacy, self-efficacy, academic anxiety, and social anxiety, respectively, and 3.67 for the total scale. In particular, the students' motivation levels for the total scale and the six factors were between moderate and high. These results are similar to those of Bhansali and Trivedi (2008), who used a questionnaire to obtain the views of intermediate-level students toward small-group learning. Their results indicated that the respondents generally held a positive view of the implementation of small-group work in a teaching and learning context.

According to the expectancy-value model, individual behavior is a function of expectancies for success and task value. Expectancies and values are influenced by prior experience, cognitive factors, and social and cultural factors. The positive motivational levels toward small-group learning may show that students have successful prior experience, positive

cognitive beliefs, and beneficial social and cultural impacts. It also implies that students will desire to, rather than resist, participating in small-group learning if their teachers design the lesson effectively.

Factor	Overall		Male		Female		t
	Mean	SD	Mean	SD	Mean	SD	
Positively Valuing	3.88	0.81	3.94	0.81	3.81	0.80	3.43 ^{***}
Negatively Valuing	3.40	0.97	3.39	1.01	3.41	0.93	0.31
Team Efficacy	3.84	0.92	3.86	0.94	3.80	0.88	1.36
Self-Efficacy	3.87	0.80	3.87	0.84	3.86	0.76	0.42
Academic Anxiety	3.41	1.09	3.34	1.17	3.49	0.99	3.19 ^{**}
Social Anxiety	3.19	1.02	3.21	1.09	3.17	0.95	-0.79
Total	3.67	0.64	3.69	0.64	3.65	0.62	1.33

Table 3 Means, SDs, and t-test results of Students' Motivation toward Small-group Learning

Note: total: N = 1950, boys: N = 999, girls N = 930, ^{**} p<.01, ^{***} p<.001.

Gender Differences

Table 3 shows the means of the MSGL scale for boys and girls and the results of t-tests comparing the means by sex. Although the motivations of girls and boys were between the moderate and high levels, the independent sample t-test results indicated that boys and girls differed significantly in terms of positively valuing and academic anxiety. Boys had significantly higher positively valuing and academic anxiety (inverse scoring) than girls. That is, boys exhibited higher levels of positive evaluation toward small-group learning and higher levels of academic learning anxiety during small-group learning. Nevertheless, total motivation did not differ significantly between girls and boys.

Gender differences in the learning styles of girls and boys are widely recognized. For example, Gurian (2006) suggested that task-oriented discussion and interaction and physical movement access boys' neurological strengths to keep them energized and attentive. James (2015) claimed that cooperative competition is one of the most effective methods for engaging boys in the learning process. This study suggested that boys prefer task-oriented discussion, interaction, and cooperative competition, which are involved in small-group learning; therefore, boys exhibited a higher positive evaluation toward small-group learning. Further study is required to understand why boys experience higher levels of academic anxiety than girls. However, comparing the means of this study indicated that students' total motivation for small-group learning did not significantly differ between genders. Generally, all middle-school students, both girls and boys, can benefit from group work (Gurian & Ballew, 2003).

Differences between Frequency Groups

Table 4 presents the means, standard deviations, and F-test results of the frequency groups. The one-way analysis of variation indicated significant differences between groups for the six factors and the total scale motivation. Post hoc comparisons using Scheffe's method revealed the following results:

The mean score of positively valuing in the usually frequency group was significantly higher than those in the sometimes, occasionally, and rarely frequency groups. It was significantly higher in the frequently frequency group than in the occasionally and rarely frequency groups, and it was significantly higher in the sometimes frequency group than in the occasionally and rarely frequency groups.

The mean score of negatively valuing in the usually frequency group was significantly higher than those in the occasionally and rarely frequency groups. It was significantly higher in the frequently frequency group than in the rarely frequency group, significantly higher in the

sometimes frequency group than in the rarely frequency group, and significantly higher in the occasionally frequency group than in the rarely frequency group.

The mean score of team efficacy in the usually frequency group was significantly higher than those in the sometimes, occasionally, and rarely frequency groups. Moreover, the mean scores of team efficacy in the frequently and sometimes frequency groups were significantly higher than that in the rarely frequency group.

The mean score of self-efficacy in the usually frequency group was significantly higher than those in the sometimes, occasionally, and rarely frequency groups. In addition, the mean score of self-efficacy in the frequently frequency group was significantly higher than that in the rarely frequency group.

The mean score of academic anxiety in the usually, frequently, and occasionally frequency groups were significantly higher than that in the rarely frequency group.

The mean score of social anxiety in the usually frequency group was significantly higher than that in the rarely frequency group.

The mean score of total motivation in the usually frequency group was significantly higher than those of the sometimes, occasionally, and rarely frequency groups. It was significantly higher in the frequently frequency group than in the occasionally and rarely frequency groups, and it was significantly higher in the sometimes and occasionally frequency groups than in the rarely frequency group.

In summary, this study revealed a positive association between the frequency of group work and the motivation toward small-group learning. Students who perceived their teachers as using group work more often had significantly higher motivation toward small-group learning. This indicates that, as students gain more experience in group works, they tend to have higher expectation for success in group work and higher subjective task values toward small-group learning. This result is similar but not identical to the findings of Gurian and Ballew (2003), who demonstrated that frequent high-quality group experiences were associated with a more positive classroom environment and greater intrinsic motivation, whereas frequent low-quality group interactions were associated with negative perception. Battistich, Solomon, and Delucchi (1993) suggested that the “quality” of group interaction is a moderator variable between frequency and motivation. This point provides a basis for additional investigations into the effect of quality on frequency and motivation.

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Factor	Frequency	M	SD	F	Post Hoc
Positively Valuing	1.Rarely	32.48	8.13	22.41***	3>1***, 3>2*
	2.Occasionally	33.97	7.38		4>1***, 4>2**
	3.Sometimes	35.40	6.93		5>1***, 5>2***
	4.Frequently	36.13	5.99		5>3***
	5.Usually	37.42	6.30		
Negatively Valuing	1.Rarely	9.24	3.13	15.75***	2>1***, 3>1***
	2.Occasionally	10.20	2.76		4>1**, 5>1***
	3.Sometimes	10.28	2.82		5>2*
	4.Frequently	10.75	2.67		
	5.Usually	10.93	3.00		
Team Efficacy	1.Rarely	21.72	6.18	11.20***	3>1*, 4>1***
	2.Occasionally	22.73	5.28		5>1***, 5>2**
	3.Sometimes	22.97	5.40		5>3**
	4.Frequently	23.88	4.98		
	5.Usually	24.48	5.14		
Self-Efficacy	1.Rarely	22.13	5.22	11.89***	4>1***, 5>1***
	2.Occasionally	22.96	4.83		5>2***, 5>3***
	3.Sometimes	23.08	4.67		
	4.Frequently	23.88	4.20		
	5.Usually	24.66	4.62		
Academic Anxiety	1.Rarely	9.62	3.46	5.50***	2>1*, 4>1*
	2.Occasionally	10.38	3.13		5>1**
	3.Sometimes	10.18	3.22		
	4.Frequently	10.58	2.90		
	5.Usually	10.75	3.56		
Social Anxiety	1.Rarely	15.21	5.25	4.00**	5>1**
	2.Occasionally	16.03	4.98		
	3.Sometimes	16.06	4.93		
	4.Frequently	15.93	4.92		
	5.Usually	16.90	5.64		
Total	1.Rarely	110.41	22.07	22.45***	2>1**, 3>1***
	2.Occasionally	116.26	20.47		4>1***, 4>2***
	3.Sometimes	117.98	19.28		5>1***, 5>2***
	4.Frequently	121.15	17.54		5>3***
	5.Usually	125.14	19.71		

Table 4 F-test Results Comparing Different Frequency Groups in terms of Motivation

Achievers' Differences

In this study, we collected respondents' academic performance scores and used k-means clustering to divide the students into three groups, namely low achievers (mean score = 10.95, N = 312), medium achievers (mean score = 18.75, N = 636), and high achievers (mean score = 26.57, N = 991). Table 5 presents the means, standard deviations, and F-test results of the frequency groups. Analyses revealed that the differences between the groups for the factors of negatively valuing, self-efficacy, academic anxiety, and total motivation were significant. However, no significant differences were observed between the groups for the factors of positively valuing, team efficacy, or social anxiety. Post hoc comparisons using Scheffe's method revealed the following results:

1. The mean score of negatively valuing in the high-achiever group was significantly higher than those in the medium- and low-achiever groups.
2. The mean score of self-efficacy in the high-achiever group was significantly higher than those in the medium- and low-achiever groups.
3. The mean score of academic anxiety in the high-achiever group was significantly higher than those in the medium- and low-achiever groups, and that in the medium-achiever group was significantly higher than that in the low-achiever group.
4. The mean score of total motivation in the high-achiever group was significantly higher than that in the low-achiever group.

Factor	Achiever	M	SD	F	Post Hoc
Positively Valuing	Low	34.78	7.79	.07	
	Medium	34.89	7.33		
	High	34.95	7.05		
Negatively Valuing	Low	9.73	3.05	6.26**	3>1*, 2>1**
	Medium	10.44	2.95		
	High	10.21	2.85		
Team Efficacy	Low	22.55	6.07	1.46	
	Medium	23.02	5.42		
	High	23.16	5.34		
Self-Efficacy	Low	22.38	4.97	8.64***	3>2*, 3>1**
	Medium	23.00	4.91		
	High	23.60	4.64		
Academic Anxiety	Low	9.52	3.44	13.02***	3>2*, 3>1*** 2>1*
	Medium	10.11	3.25		
	High	10.56	3.19		
Social Anxiety	Low	15.95	5.48	.76	
	Medium	16.18	5.00		
	High	15.86	5.08		
Total	Low	114.89	20.54	3.43*	3>1*
	Medium	117.66	20.05		
	High	118.34	20.46		

Table 5 F-test Results Comparing Different Achievement Groups in terms of Motivation

In summary, the results demonstrated that academic achievement might affect motivation. Although research findings have revealed that students working in small groups learned significantly more effectively than when using other instructional methods (Johnson, Johnson, & Stanne, 2000), Ahmad (2010) determined that high achievers obtained superior results through small-group learning. Topping (1987) reported that tutors tended to gain more of a benefit than did tutees in paired tutoring formats. Khatoon and Akhter (2010) claimed that students learn most effectively when they are actively involved in the process of learning and opportunities exist for interaction with other students. According to this view, higher achievers obtain more opportunities to participate in group work and interact with other students and thus, exhibit higher levels of motivation toward small-group learning.

Implications and Recommendations

The results of this study provide some valuable insights for educators and administrators who aspire to develop effective small-group teaching. First, the MSGL scale has favorable construct validity, strong internal reliability, and high test–retest reliability. Its potential uses included facilitating the evaluation of small-group learning programs by assessing changes in students' motivation, and it is a valuable tool for assessing the effectiveness of the collaborative approach. The scale also can be used as a diagnostic measure to identify areas in which students have positive and negative motivation.

Second, this study revealed that Taiwanese students have a moderate to high level of motivation for small-group learning, but the frequency of using group work in Taiwanese classrooms remains low. Because of the positive association between the frequency of and motivation toward group work, students tend to participate in small-group learning if their teachers effectively design lessons. This offers a solid basis for more widespread implementation of small-group learning. Making the effort to prepare students for 21st century skills is worthwhile.

Finally, future research should investigate why boys exhibit higher academic anxiety than girls in small-group learning. Additionally, the moderating role of quality in the relationship between frequency and motivation of small-group learning should be thoroughly investigated.

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