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Exploring the influence of homogeneous versus heterogeneous grouping on students' text-based discussions and comprehension☆

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ABSTRACT

Small-group, text-based discussions are a prominent and effective instructional practice, but the literature on the effects of different group composition methods (i.e., homogeneous vs. heterogeneous ability grouping) has been inconclusive with few direct comparisons of the two grouping methods. A yearlong classroom-based intervention was conducted to examine the ways in which group composition influenced students' discourse and comprehension. Fourth- and fifth-grade students (N = 62) were randomly assigned to either a homogeneous or heterogeneous ability small-group discussion. All students engaged in Quality Talk, a theoretically- and empirically-supported intervention using small-group discussion to promote high-level comprehension. Multilevel modeling revealed that, on average, students displayed positive, statistically and practically significant gains in both basic and high-level comprehension performance over the course of Quality Talk. Further, our findings indicated heterogeneous ability grouping was more beneficial than homogeneous ability grouping for high-level comprehension, on average, with low-ability students struggling more in homogeneous grouping. With respect to student discourse, additional quantitative and qualitative analyses revealed group composition differences in terms of the frequency, duration, and quality of student questions and responses, as well as the types of discourse low-ability students enacted in homogeneous groups. This study expands upon the extant literature and informs future research and practice on group composition methods.

1. Introduction

Small-group activities and discussions are pervasive instructional practices in contemporary classrooms (Johnson, Johnson, & Stanne, 2000). Indeed, the prevailing instructional perspective seems to be that small-group activities and discussions promote enhanced learning, social engagement, and accountability (Slavin, 1991, 2011). For example, homogeneously grouping students by relative ability[1] or prior achievement allows teachers to adapt their instructional pace to accommodate the aptitudes or needs of particular groups (e.g., differentiated instruction; Coldiron, Braddock, & McPartland, 1987). This type of homogeneous ability grouping is particularly prominent in tiered literacy interventions (Torgesen et al., 2006). By comparison, arranging students into heterogeneous ability groups, as is common in text-based discussions, allows teachers to take advantage of student diversity and encourage collaboration among peers to enhance student learning and interdependence (Wilkinson, Soter, & Murphy, 2010).

The challenge, however, is that the functioning, productivity, and learning outcomes of small-group classroom discussions seem to vary by the group composition (e.g., homogeneous versus heterogeneous ability), goals (e.g., affective), and social and intellectual facilitation (e.g., teacher or peer) of the group (Azmitia, 1988; Lou et al., 1996; Saleh, Lazonder, & De Jong, 2005). Further, although predominant approaches to small-group, text-based discussions exclusively encourage the use of heterogeneous ability groups, little is known regarding how group composition affects small-group discussions or learning from text (Murphy, Wilkinson, Soter, Hennessey, & Alexander, 2009). As such, the purpose of the present study was to examine the

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[1] The term "ability" is often used in the grouping and discussion literatures, therefore we have used it in this article as well. However, "ability" in this sense does not mean a static or trait-like characteristic, rather it refers to measured ability at a particular point in time, which can and does change as a result of student and teacher effort.

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ways in which group composition influences students' text-based discussions and comprehension over time.

1.1. Ability grouping versus whole-class instruction

Research findings have firmly established the benefits of small-group instruction as compared to whole-class instruction. In fact, a number of meta-analyses have been conducted to examine the effects of within-class grouping on achievement (Kulik, 1992; Lou et al., 1996; Slavin, 1987), all of which have overwhelmingly illustrated that grouped instruction was superior to whole-class or non-grouped instruction in promoting student learning. For example, Slavin (1987) reported a moderate advantage of within-class grouping over no grouping in upper elementary mathematics classes, especially when the number of groups was small (median $ES = +0.34$). Similarly, Kulik (1992) reviewed eleven studies of within-class grouping from second to eighth grades and reported higher overall achievement levels in mathematics and reading for students grouped within classes, compared to their counterparts without grouping (mean $ES = +0.25$).

A more comprehensive meta-analysis conducted by Lou et al. (1996) examined the results from 51 studies comparing the effects of grouping versus no grouping on achievement from first grade to college levels. The results revealed that within-class grouping positively influenced student learning in all content areas (mean $ES = +0.17$) and that the grouping effect was statistically significantly greater in math and science (mean $ES = +0.20$) than in reading, language arts, or other subject areas (mean $ES = +0.13$). The results also showed that students of varying ability levels (i.e., low, average, and high) all benefited from being assigned to small groups (mean $ES = +0.37$, $+0.19$, and $+0.28$, respectively). Although low-, average-, and high-ability students differed in how much they benefitted from being assigned to small groups, the results showed that low-ability students gained statistically significantly more than average-ability students. Importantly, Lou et al. also explored the findings by examining the features of individual studies and found that differentiated instruction was more effective when provided in small groups (mean $ES = +0.25$) than when the same instruction was provided as whole-class instruction (mean $ES = +0.02$). Group size was also found to be linked to the grouping effect. Specifically, the effect size for small groups with three to four members (mean $ES = +0.22$) was statistically significantly higher than for groups with five to seven members (mean $ES = -0.02$).

1.2. Homogeneous versus heterogeneous grouping

While the superiority of within-class ability grouping is undergirded by a wealth of research, there appears to be no single best evidence-based practice for creating small groups, particularly when the goal is to enhance text-based discussion and comprehension. The notable exception is that individual differences in students' domain-general ability (e.g., intelligence) or domain-specific ability (e.g., reading competence) are almost always taken into consideration in group creation within classrooms. Indeed, the most controversial issue underlying group composition is whether small groups should be comprised of students who are of similar (i.e., homogeneous) or dissimilar (i.e., heterogeneous) ability levels. In the meta-analysis by Lou et al. (1996), 12 of the reviewed studies compared the effects of homogeneous grouping to heterogeneous grouping on student achievement and suggested a result favoring homogeneous grouping ($ES = +0.12$, $p < 0.05$). However, the advantage of homogeneous grouping was not uniform across students of different ability levels. Specifically, low-ability students were found to learn more in heterogeneous groups ($ES = -0.60, p < 0.05$), average-ability students gained more in homogeneous groups ($ES = +0.51, p < 0.05$), and high-ability students performed equally well in either group, regardless of ability composition ($ES = +0.09$, stat ns). Lou et al. also found that subject area was a statistically significant moderator of the effects of group composition on student achievement. Among the findings summarized in the meta-analysis, only four compared the effects of group composition in reading and these findings revealed a medium effect size favoring homogeneous grouping ($ES = +0.36, p < 0.05$). By contrast, the effect of group composition was not statistically significantly different from zero in math and science.

The findings reported in Lou et al. (1996) are also supported by a number of individual studies not included in the research synthesis (e.g., Azmitia, 1988; Saleh et al., 2005; Webb, 1980, 1991). Among them, Saleh et al. (2005) examined how group composition influenced students' achievement, social interaction, and motivation in a biology course. A total of 104 fourth-grade students were identified as being of relatively low, average, or high ability based on their scores on a standardized science test and then randomly assigned to one of 13 homogeneous groups (i.e., four low-, five average-, and four high-ability groups) or 13 heterogeneous groups, each with four students (i.e., one low-, two average-, and one high-ability student). All groups received the same instruction over the course of 16 plant biology lessons, which included brief whole-class instruction at the beginning followed by collaborative learning tasks. The results showed that low-ability students in heterogeneous groups performed better on the individual posttest and were more motivated to learn compared to their low-ability peers in homogeneous groups. Average-ability students seemed to benefit more from learning in homogeneous groups, as compared to heterogeneous groups, and high-ability students exhibited equally strong learning outcomes regardless of their membership in either homogeneous or heterogeneous groups.

Importantly, Saleh et al. (2005) also examined the social interaction in both grouping conditions and discovered that heterogeneous grouping elicited higher proportions of individual elaborations (i.e., elaborations made by a single student), whereas homogeneous grouping triggered more co-construction of elaborations (i.e., elaborations constructed across multiple students). Indeed, group composition not only affects students' academic attainment but also exerts influence on students' social interactions. These social interactions may be an important mediator of the effect of group composition on small-group learning (Saleh et al., 2005; Webb & Palincsar, 1996). This finding aligns with both Piaget's and Vygotsky's theories on learning and development. According to Piaget (1932), interacting with peers forces students to recognize the gaps or contradictions in their understanding, helps them to repair misconceptions, and develops their more advanced cognitive architecture. Thus, working with more competent peers is likely to stimulate more cognitive conflict than working with similar-ability peers. According to Vygotsky (1978), social interaction is optimal for children's cognitive development when collaborating with someone of higher ability. With the assistance provided by a more capable peer, children gradually internalize the skills above their current developmental level so that they can perform the tasks independently. Hence, small groups provide students with opportunities to engage in social interaction with peers, which has an important influence on their achievement and social participation (Rosenbaum, 1980; Wilkinson & Fung, 2002).

Additionally, these theoretical notions provide insights into the differential effects of group composition on student learning. In particular, these theoretical premises suggest why low-ability students benefit more by learning in heterogeneous groups with higher-ability peers than in homogeneous groups with only low-ability peers. Indeed, research on group processes has found that low-ability students tend to exhibit more help-seeking behaviors and thus receive more