



# Short Collaboration Tasks in Higher Education: Is Putting Yourself in Another's Shoes Essential for Joint Knowledge Building?

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**Abstract.** In Higher Education, students are often grouped together for short collaborative assignments. The question is how to optimally group students in order to achieve the potential rewards of such collaboration. In this study, the relation between the ability to take each other's perspective, familiarity, experienced relatedness, and quality of collaboration was investigated. Thirty-three dyads of undergraduate students collaborated on a short genetics assignment. They first read information individually and then had to combine their knowledge to solve the task. By means of questionnaires, participants' prior knowledge, perspective taking ability, familiarity, and relatedness to collaborative partner were measured. Only dyads' average prior knowledge predicted the score on the group assignment. Implications for dyad grouping and further research are discussed.

**Keywords:** Collaborative learning · Perspective taking · Higher education

## 1 Introduction

### 1.1 Short Collaborative Assignments in Higher Education

In Higher Education, it is common practice to group students together for short collaborative assignments. There is a well-documented body of literature that demonstrates the positive relationship between collaborative learning and student achievement, persistence, and motivation (see Johnson and Johnson 2009; Slavin 1990; Kyndt et al. 2013 for reviews). However, just putting people together in groups does not necessarily guarantee the development of a shared understanding, better learning, nor motivation, especially when students are limited by the time period allocated to collaborate (Khosa and Volet 2013). Due to a range of individual differences (e.g., disciplinary/cultural backgrounds, socio-emotional intelligence, interests, skills) that members bring to a group, the so called web of intra-group dynamics becomes

more complex (Halverson and Tirmizi 2008). Group processes play an important role in determining how individual differences mesh together or compete for effective expression. If the arising differences and similarities are not properly managed or articulated, students might not be able to engage in high-level collaboration processes, and ultimately lose the potential learning effect of collaborating. Particularly important in this sense is the occurrence of transactive discourse—building on each other’s reasoning to co-construct (new) knowledge (Roschelle and Teasley 1995).

Therefore, group formation is an important choice teachers have to make in Higher Education to establish a high-performing group—a group that capitalizes on its diversity rather than being constrained by it (Cruz and Isotani 2014). Among many factors influencing the effectiveness of collaboration covered by decades of research on group work, previous studies emphasized the importance of group members’ ability to understand each other’s viewpoints, which we hypothesize is related to the ability to connect emotionally with one another (Järvelä and Häkkinen 2002). The ability called perspective taking is defined as “the cognitive capacity to consider the world from another individual’s viewpoint” (Galinsky et al. 2008, p. 378). From a cognitive perspective on collaborative learning (King 1997), gaining a new way to think about a particular topic/subject can lead to improved learning outcomes. For example, in a recent study, Kulkarni et al. (2015) found that high geographically diverse MOOC discussion groups demonstrated higher learning gains than low-diversity groups. Students were asked to reflect on lecture content by relating it to their local context and discussing it with their peers in an online forum. Differences in opinions between collaborative partners are considered valuable, whereas easily compromising, agreeing too quickly, or not making the effort to understand the point of view of others reduces the value of the discussion (Kulkarni et al. 2015).

Because learning is a social act, the willingness and ability to understand each other’s viewpoints is hypothesized to be dependent on the ability to connect socio-emotionally with collaborative partners (Järvelä and Häkkinen 2002). The social-emotional connection can benefit collaboration especially in the first stages of group development (Kreijns et al. 2003). For example, how well students know each other prior to their collaboration (familiarity) may be an important factor that moderates the effectiveness of collaboration. Previous research found that familiar group members more efficiently regulate their task-related activities, but a clear relation between familiarity and group performance has not yet been demonstrated (Janssen et al. 2009). Another characterization of socio-emotional connection is the amount of social relatedness students experience (Deci and Ryan 2008). The basic psychological need to experience relatedness could be a prerequisite for being willing and able to take the other’s perspective (Deci and Ryan 2008) and subsequently, for effective collaboration to occur.

## 1.2 The Present Study

To summarize, previous studies provide insights into the influence of perspective taking and socio-emotional factors that facilitate collaborative learning, but it often concerns studies in which students collaborate over longer periods of time. However, it remains unclear how these factors play out in short term collaborative assignments

within one lecture or meeting, which are common in Higher Education. The question is how to group students in such a way that their background and their relation to each other is set-up to facilitate collaboration as effectively as possible. Therefore, in the present study, we explore the role of students' ability to take each other's perspective, as well as the role of familiarity and social relatedness in the effectiveness of collaboration. Teachers and educational designers can take into account these factors to enable more effective and enjoyable collaboration experiences for students. The study is performed in the context of a short collaborative assignment in the Biology domain in Higher Education. The following research question was posed: *what is the relation between university students' ability to take their collaborative partner's perspective, familiarity between group members, students' experienced relatedness, and group performance in the context of a short term collaborative assignment?*

## 2 Method

### 2.1 Design

We report on a correlational study in which the relation between familiarity, relatedness, perspective taking, and group assignment score was examined in the context of a collaborative assignment on genetics. The data collection was part of a quasi-experimental study, in which the effect of an intervention to stimulate relatedness was examined. As the intervention had no effect on any of the main variables in the present study (perspective taking and group assignment score), nor on the intended variables (relatedness), we treated the two groups as one dataset.

### 2.2 Participants

The sample of participants consisted of 66 undergraduate students from a large University in the Netherlands. Their mean age was 25.5 ( $SD = 5.8$ ). Thirteen students were male. After filling in background questionnaires and the pretest (see Sect. 2.3), students were randomly divided into 33 dyads. Seven dyads consisted of one male and one female, three dyads consisted of two males, and the remaining 23 dyads consisted of two females.

### 2.3 Procedure

The procedure of the study is depicted in Table 1. Participants first filled in questionnaires concerning their age and sex, as well as about their ability to take other's perspective, followed by the pretest. Then, the participants were randomly divided into dyads. The experimental condition performed the 5-min activity aimed at stimulating relatedness (for which no effects were found). The members of each dyad were each handed 4 pages of information about genetics. The first part contained identical basic knowledge for both students, but the second part differed and offered each group member more in-depth knowledge on one of two types of genetic inheritance. After 15 min, the individual information was handed in and the dyads collaborated on an

**Table 1.** Procedure

1	2	3	4	5
Fill in questionnaires/pre-test (15 min)	Randomly divide into dyads. (5 min)	Read information individually. (15 min)	Collaborative assignment. (20 min)	Fill in questionnaires. (10 min)
Demographics, Perspective taking, Pretest	Experimental condition performs activity aimed at relatedness (5 min)		9 dyads are audiotaped	Relatedness, Familiarity

assignment that required them to integrate their knowledge. They had 20 min to collaboratively finish the assignment and then handed in their answers. The discussions of nine randomly selected dyads were audiotaped. Finally, the participants individually filled in questionnaires about experienced relatedness to their group member, and about how well they knew their group member prior to the collaboration (familiarity).

## 2.4 Materials

### 2.4.1 Questionnaire Perspective Taking

The ability to take other people's perspective was measured by means of the perspective taking scale by Davis (1980). The scale consisted of 7 items, which were judged on a 5-point scale ranging from 1 (do not agree at all) to 5 (completely agree). Example items are "I believe there are two sides to every issue, and I try to look at both" and "I try to understand my friends better by imagining what things look like from their perspective". Reliability of the scale in terms of Cronbach's  $\alpha$  was .73. Following Galinsky et al. (2008), the score for perspective taking for each dyad was calculated by taking the average of the two group members.

### 2.4.2 Questionnaire Familiarity

Familiarity between group members was measured by asking participants how well they knew their collaborative partner prior to the collaboration. Following Janssen, Erkens, Kirschner, and Gellöf (2009), familiarity was measured on a 4-point scale, ranging from 0 (did not know him/her at all) to 3 (knew him/her very well). To prompt participants about how well they knew their collaborating partner, the item was preceded by four yes/no questions such as "I have collaborated with my group member before". The 4-point scale question was used for the familiarity score of a dyad, which was calculated by taking the average of the two group members.

### 2.4.3 Questionnaire Relatedness

Feelings of relatedness between group members were measured using the relatedness scale by Broeck et al. (2010). The scale consists of 6 items, which were judged on a

5-point scale ranging from 1 (do not agree at all) to 5 (completely agree). Example items are “I felt part of the group” and “I got along well with my group member”. Reliability of the scale in terms of Cronbach’s  $\alpha$  was 60. The score for relatedness for each dyad was calculated by taking the average of the two group members.

#### 2.4.4 Pretest

The pretest consisted of 6 multiple choice questions concerning genetics, each with 4 answer options. An example question is “How many X-chromosomes do males have?” Each correct answer was scored as 1 point, leading to a possible total of 6 points. In the analyses, the dyads’ average pretest score was used.

#### 2.4.5 Collaborative Assignment

Students collaborated in dyads on a genetics assignment. An inheritance tree was depicted, and the assignments were to determine which type of inheritance was the case (X-chromosomal versus mitochondrial inheritance), and to determine each person’s genotype within the tree. To solve the assignment, information from both collaborating partners (which they read in the individual phase) was needed, thereby creating resource interdependence (Johnson and Johnson 2009). The group assignment was scored, with a maximum of 6 points.

### 2.5 Results

Table 2 shows the descriptive values for all included variables. Dyads scored relatively high on relatedness as well as perspective taking. Familiarity showed a low average but high standard deviation, which is probably a result of the random allocation of students within dyads. Stepwise regression analysis was performed with relatedness, perspective taking and familiarity (at dyad average level) as predictors and group assignment score as dependent variable (Table 3). A significant model was found ( $F(1,31) = 5.97$ ,  $p = .02$ ,  $R^2 = 0.16$ ). Only the average pretest score within a dyad was a significant predictor of group assignment score ( $B = 0.59$ ).

**Table 2.** Descriptive values of included variables

$N = 33$	Pretest (0–6)	Relatedness (1–5)	Perspective taking (1–5)	Familiarity (0–3)	Group assignment score (0–6)
Dyad average	2.99	4.37	3.67	0.64	4.02
SD	0.99	0.30	0.34	0.84	1.44
Min	1.50	3.67	3.00	0.0	1.70
Max	5.00	4.83	4.29	3.0	6.00

**Table 3.** Correlation matrix

	Relatedness	Perspective taking	Pretest	Familiarity	Group assignment
Relatedness	1				
Perspective taking	0.019	1			
Pretest	0.26	0.16	1		
Familiarity	0.21	0.13	0.23	1	
Group assignment	0.28	-0.05	0.40	0.06	1

### 3 Conclusion

The findings of the present study showed that only average pretest scores were predictive of group performance, and that none of the socio-emotional factors we examined influenced group performance. Previous studies *did* show influence of socio-emotional factors in studies where students collaborated over longer periods of time. Our results could mean that in short term collaboration, perspective taking ability and socio-emotional connection do not play a large role for the collaboration outcome. It might be explained also by the nature of tasks that students were taking, that was directly connected to the biological content not to emotional or social aspects of genetics. One of the practical implications for both educators and instructional designers is to form groups based on students' prior knowledge rather than on group members' familiarity or students' perspective-taking abilities. Further research should examine these variables by looking at a variety of different time spans for group work, paying specific attention to how the period of time allocated for collaboration affects group process and outcomes. Furthermore, the explained variance of the regression model we found was rather low, indicating that indeed other factors than socio-emotional ones influenced the group assignment score.

There is a need to examine this relation also in other domains and collaborative task structures. The genetics assignment used for this study, which is in the science domain, had clear-cut wrong and correct answers. Other domains such as social sciences often have more ill-defined problems, in which the investigated variables might play a larger role. For example, the ability to take each other's perspective might be more important when it concerns societal controversial issues, such as nuclear energy or animal cloning.

In subsequent analyses, our aim is to examine the audiotapes from the subsample of 9 dyads whose discussions were recorded to see whether this explanation is observable in terms of a primarily cognitive (task-related) focus in the discussions. Additional qualitative analysis of the audiotapes could also shed light on how and to what extent the ability to take the other's perspective is demonstrated in collaborative discussions.

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