

# Social Skills as Predictors of Satisfaction and Performance in a Project-based Learning CSCL Environment: An Empirical Study

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**Abstract:** The study looks for empirical answers to the following question: To what degree are self-rated individual social skills and the distribution of social skills within learning groups predictive for group member's satisfaction with performance and quality of collaboration? Data collection took place in a project-based learning curriculum of pre-service teachers. Two questionnaires were used, one at the beginning and one at the end of the learning cycle which lasted one semester. The investigation of 60 learning groups ( $N = 155$ ) revealed the following results: Self-rated social skills are for the most part non-significant predictors for the satisfaction with group performance and the quality of collaboration. A different picture emerged on the group level: Members from groups which show a high and/or amongst themselves homogeneous distribution of specific social skills (e.g. exchange orientation, leadership) are more satisfied and collaborated better than groups with a high and heterogeneous distribution of skills.

## Introduction

Common sense dictates that social skills are relevant ingredients for successful collaborative learning. However, hardly any studies can be found that tried to identify empirically and systematically the social skills most predictive of group performance (van Gennip, Segers, Tillema 2009) and collaboration. Furthermore, those few studies have relied almost exclusively on individuals, neglecting that group success and collaboration is as much dependent on individual skills as on the skill configuration within the whole group. In our own study, we have chosen a project-based (PBL) learning curriculum as a context to analyze collaborative learning processes. It is expected that students practice and refine these skills during the collaboration process (Peterson, 1997). In the project, lasting for three months, students collaborated in self-organized face to face meetings but also used computer-mediated communication channels like email, chat or voice over IP.

## Social Skills in PBL

We use the term 'skill' to refer to the ability to perform a certain class of behavior (e.g. the behavior 'being able to organize things' as an expression of leadership skill). Following Rubin et al. (1995) and Rose-Krasnor (1997) a person has a high level of social skills when she acts effectively in social interactions. That means one is able to satisfy one's own goals and personal needs while maintaining positive relationships with others in specific contexts. As such, this definition does not tell us which social skills lead to an effective coordination of needs in a particular social setting, for example in collaborative project-based learning.

Peterson (1997) for example names five interpersonal skills particularly relevant for collaborative learning: consensus capacity, discussion skills, skills concerning evaluation and feedback formulation, conflict resolution skills and leadership ability. Heuermann and Krütz kamp (2003) mention the importance of empathy, team building and sustaining skills, the capacity to formulate feedback, to mediate conflicts and to argue about common group goals and norms. At the moment, the suggestions of Petersons (1997) and Heuermann et al. (2003) remain prescriptive and empirically untested.

## Empirical Approach / Method

The present study was conducted with 155 pre-service teachers in two cohorts (2009 and 2010) at the Pädagogische Hochschule Bern (University of Teacher Education). The students participated in a mandatory media education course and as a course requirement had to work on a media project during three months. They were free to select their group mates. Group size was two to three students.

## Research Design

Research questions:

1. Which individual social skills are associated with group process variables (i.e. satisfaction with performance and quality of collaboration) in a collaborative project-based learning setting?
2. What configurations of social skills within learning groups (i.e. heterogeneous vs. homogeneous distribution and low vs. high expression of a skill) are associated with differences in group process variables?

At the start of the PBL curriculum teacher students (92 female, 63 male, average age: 24.27; SD = 3.48) completed a questionnaire (t1) self-assessing various social skills. The skills were alike to the interpersonal skills proposed by Peterson (1997) and Heuermann and Krützkamp (2003). At the end of the project, students were given a second questionnaire (t2) tapping their satisfaction with the progress of the project and their judgement about the quality of collaboration (process variables). No differences concerning the response behavior of the two cohorts (2009 and 2010) could be detected: t-test;  $-1.3 < t < 1.0$ ;  $133 < df < 144$ ;  $0.19 < p \text{ (two sided)} < .991$

### Self-assessment of Individual Social Skills (t1)

The questionnaire based on several standardized instruments by Gresham & Elliott, (1990, Social Skill Rating System), Walker & McConnell, (1988, Walker-McConnell Scale of Social Competence), Ladd & Profilet, (1996, Child Behavior Scale) and Vitaro, Glagnon, Piche et al., (1992) contained 16 self-referential statements which students rated on a four-point scale (totally agree – do not agree at all). The 16 statements were reduced to five factors using principal component analysis.

### Group Process Variables (t2)

Students rated six process variables (i.e. satisfaction with performance, efficiency of collaboration, clear division of responsibilities, centrality of leadership, mutual support, group harmony and ability to bring in one's ideas) on a four-point scale (totally agree – do not agree at all). The items were formulated specifically for this research.

### **Analyses**

In our research design individuals are nested within learning groups. As we were interested in the predictive power of individual (level 1) and group (level 2) level variables on satisfaction and quality of collaboration, a multilevel analysis approach was pursued using the hierarchical linear modelling software HLM 6.02 (Raudenbush, Bryk & Congdon, 2004). This was done for all outcome variables for which the intraclass correlation coefficient (ICC) demonstrated significant variance on level 2. Two outcome variables with non-significant ICCs (i.e. group harmony and ability to bring in one's ideas) were analysed with linear regression models. The basic regression equations were as follows:

$$\text{level 1: outcome} = \beta_0 + \beta_1 (\text{individual social skill}) + r$$

$$\text{level 2: } \beta_0 = \gamma_{00} + \gamma_{01} (\text{mean social skill}) + \gamma_{02} (\text{SD social skill}) + \gamma_{03} (\text{interaction mean} \times \text{SD}) + u_0$$

$$\beta_1 = \gamma_{10} + u_1$$

The distribution of a specific social skill within learning groups was modelled on level 2 using group members average skill level (mean), variability of skill level within groups (SD) and the interaction between mean and variability.

### **Results**

In order to reduce complexity the 16 items of the questionnaire (t1) were reduced to five factors using principal component analysis (equamax rotation). The five extracted factors explained 66.9% of the variance. Items were assigned to factors when their factor loadings were above .40.. All factor scales had satisfactory internal consistency (Cronbach's Alpha).

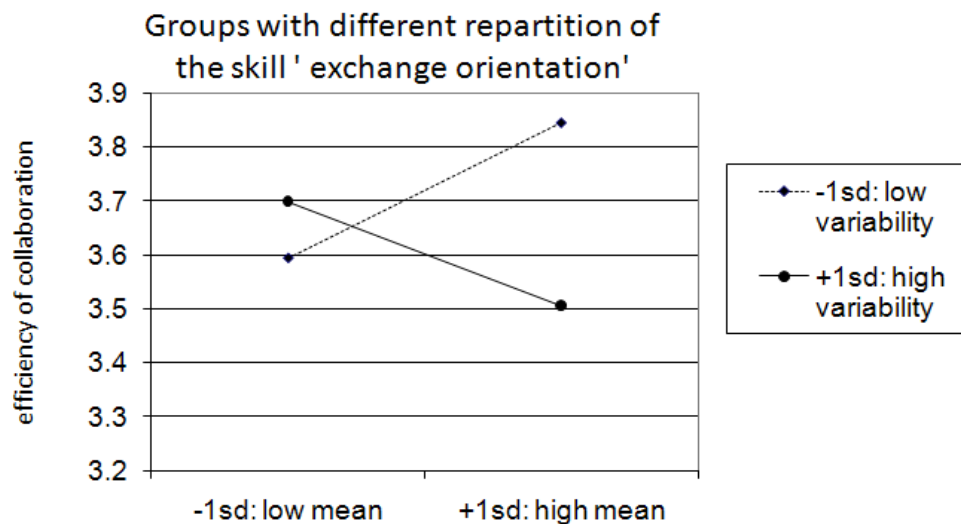
- **Exchange orientation:** e.g. getting along with other people, being able to collaborate, being able to compromise, being able to mediate in conflict situations (Cronbach's Alpha = .685).
- **Prosocial behavior/empathy:** e.g. openness to other people's opinions, being able to take someone else's perspective, being ready to help someone (Cronbach's Alpha = .600).
- **Social initiative:** e.g. initiating conversations, being able to make contact with other people easily (Cronbach's Alpha = .705).
- **Leadership:** e.g. being able to organize things, being good at taking on the leadership role (Cronbach's Alpha = .627).
- **Assertiveness:** e.g. setting clear limits to inappropriate demands, standing up for one's rights, feeling self-confident (Cronbach's Alpha = .652).

Of the five social skills (level 1) only two were predictive of the outcome of specific group process variables, i.e. students high in leadership skills regarded their group interactions as less mutually supportive (Beta = -.18,  $p = .065$ ) and students high in assertiveness thought they had been less capable of bringing their ideas into the project ( $B = -.31, p = .009$ ).

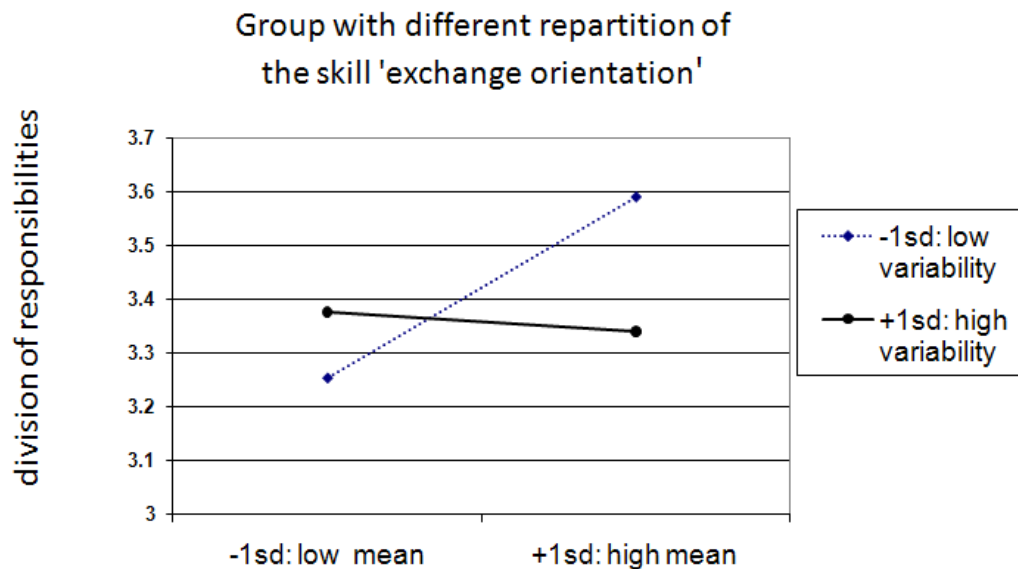
## Configuration of Social Skills within a Group as Predictors of Satisfaction and Quality of Collaboration (Level 2)

### Effects for Exchange Orientation

Members from groups in which the individual exchange orientation was high on average (mean) and at the same time homogeneously distributed (SD) reported more efficient collaboration (interaction mean x SD,  $B = -2.77$ ,  $p = .048$ ; see Figure 1) and a clearer division of responsibility (interaction mean x SD,  $B = -2.32$ ,  $p = .061$ ) than other groups. No effects could be found with respect to satisfaction with group work, centralized leadership, group harmony, mutual support and bringing in one's ideas.



**Figure 1.** Interaction effect between average exchange orientation (mean) and variability of exchange orientation within groups on the perceived efficiency of collaboration.



**Figure 2.** Interaction effect between average exchange orientation (mean) and variability of exchange orientation within groups on the division of responsibilities

### Effects for Prosocial Behavior / Empathy

Group members satisfaction with performance (interaction mean x SD,  $B = -2.04$ ,  $p = .098$ ) and with the efficiency of collaboration (interaction mean x SD,  $B = -2.02$ ,  $p = .033$ ) is lower when prosocial behavior within the group is high but heterogeneously distributed. The same groups show a clearer division of responsibility (interaction mean x SD,  $B = -2.86$ ,  $p = .030$ ). In addition, in groups with a homogeneous distribution of prosocial behavior members more often stated to have had a centralized leadership, i.e. someone who was in

charge (main effect SD,  $B = -1.03$ ,  $p = .068$ ). No effects could be found with respect to mutual support, group harmony and bringing in one's ideas.

### **Effects for Leadership**

Members from groups that were on average high in leadership skills reported more efficient collaboration (main effect mean,  $B = .55$ ,  $p = .008$ ) and a clearer division of responsibility (main effect mean,  $B = .35$ ,  $p = .090$ ). Furthermore, groups with a heterogeneous distribution of leadership skills more often had a centralized leadership (main effect SD,  $B = .85$ ,  $p = .007$ ). No effects could be found with respect to mutual support, group harmony and bringing in one's ideas.

### **Effects for Assertiveness**

Bringing in one's ideas into the project is perceived to be easier when the average assertiveness in the group is high (Beta = .23,  $p = .066$ ) or when heterogeneity of assertiveness within the group is low (Beta = -.20,  $p = .026$ ). No effects could be found with respect to satisfaction with group work, efficiency of collaboration, division of responsibility, mutual support and group harmony.

## **Conclusion**

### **Individual Social Skills as Predictors for Satisfaction and Quality of Collaboration**

On the individual level, only two social skill variables served as predictors for group process variables.

Students high in leadership skills tended to be unhappy with the mutual support given within the group. Arguably, as leaders, they are responsible for many important decisions and maybe also in charge of the most difficult tasks. This may contribute to a feeling of isolation and lack of support.

Students high in assertiveness found it hard to bring their ideas into the project. However, when all group members are assertive (i.e. the skill level in the group is high and homogeneous) contributing ideas becomes easier. Assertiveness (operationalized here as self-confidence and standing up for one's rights) might be misunderstood as egoistical tendencies by less assertive people which in turn could lead them to selectively ignore contributions made by assertive group members.

In sum, the finding of only two significant individual level predictors demonstrates that the social skill distribution within a project group is more important for satisfaction with performance and quality of collaboration than a person's individual skills. This is further evidence for the context-dependency of social skills (Rose-Krasnor, 1997), i.e. whether a specific social skill is positive for collaboration in project-based learning depends on the group one is placed in and on the social skills levels of one's group members. Future studies should take this into consideration.

### **Configuration of Social Skills within a Group**

Groups with a high and homogeneous exchange orientation (i.e. groups where members are cooperative, able to solve conflict, compromising and sociable etc.) collaborated more efficiently and divided responsibilities more clearly among group members. Following Dillenbourg and Jermann (2007) splitting tasks is detrimental to group learning as building a shared understanding is considered essential. On the face of it, therefore, it could be concluded that our groups with a high and even distribution of exchange orientation learn less than other groups. We think that such a conclusion would be premature. Division of responsibilities is conducive to the emergence of specific roles (not only leadership) which according to Strijbos (2007) lead to a higher degree of self-reported group efficiency. Following Tolmie et.al. (2010) the social benefits of collaborative learning are a separate outcome of group work, rather than being either a pre-condition for or a direct consequence of successful activity.

Groups which displayed a high and heterogeneous level of prosocial behaviour/empathy were reportedly collaborating less efficiently, divided responsibilities more clearly and were less satisfied with their performance. We assume heterogeneity to be the main factor responsible for these problems. For prosocial behavior reciprocity (or expressed in our group level terminology, homogeneity) is very important. Against the background of a lack of reciprocity, prosocial group members may decide to split tasks more often. Finally, groups with a high level of leadership collaborated more efficiently and divided responsibilities more clearly among its members. As could be expected, groups in which leadership skills are heterogeneously distributed, more often had a central leadership figure.

To sum up, high average levels of leadership skills and of exchange orientation within the group seem to be most beneficial to collaboration quality and satisfaction with performance.

## References

- Dillenbourg, P., & Jermann, P. (2007). Designing integrative scripts. In F. Fischer, I. Kollar, & H. Mandl (Eds). *Scripting computer supported collaborative learning. Cognitive, computational and educational perspectives. Volume 6 (IV)* (pp. 275-305). Springer, New York .
- Gennip, N. A.E. van, Segers, M. S. R., and Tillema, H.H.. (2009). Peer assessment for learning from a social perspective: The influence of interpersonal variables and structural features. *Educational Research Review* 4(1), 41-54. doi:10.1016/j.edurev.2008.11.002. <http://linkinghub.elsevier.com/retrieve/pii/S1747938X08000420> (1.17.11). Gresham, F. M., & Elliott, S. N. (1990). *The Social Skills rating system*. Circle Pines: American Guidance Services.
- Heuermann, A., & Krützkamp, M. (2003). *Selbst-, Methoden-, und Sozialkompetenz. Bausteine für die Sekundarstufe II*. Berlin: Cornelsen.
- Ladd, G. W., & Profilet, S. M. (1996). The Child Behavior Scale: A teacher-report measure of young children's aggressive, withdrawn, and prosocial behaviors. *Developmental Psychology*, 32, 1008 -1024.
- Peterson, M. (1997). *Skills to enhance problem-based learning*. <http://www.med-ed-online.org/f0000009.htm> (01.17.2011).
- Raudenbush, S.W., Bryk, A.S, & Congdon, R. (2004). *HLM 6 for Windows* [Computer software]. Lincolnwood, IL: Scientific Software International, Inc.
- Rose-Krasnor, L. (1997). The nature of social competence: A theoretical review. *Social Development*, 6, 111 – 135.
- Rubin, K.H., Booth, C., Rose-Krasnor, L., & Mills, R.S.L. (1995). Social relationships and social skills: A conceptual and empirical analysis. In S. Shulman (Ed.), *Close relationships and socioemotional development*. (Vol. 7, pp. 63 - 94). Westport, CT: Ablex Publishing.
- Strijbos, J., Martnes, R. L., Jochens, W. M.G., Broers, N. J. (2007). The effect of functional roles on perceived group efficiency during computer-supported collaborative learning: a matter of triangulation. *Computers in Human Behavior*, 23(1), 353-380.
- Tolmie, A. K., Topping, K. J., Christie, D., Donaldson, C., Howe, C., Jessiman, E., Livingston, K. and Thurston, A. (2010). Social effects of collaborative learning in primary schools. *Learning and Instruction* 20( 3), 177-191. doi:10.1016/j.learninstruc.2009.01.005. <http://linkinghub.elsevier.com/retrieve/pii/S0959475209000061> (01.17.2011).
- Walker, H. M., & McConnell, S. R. (1988). *Walker-McConnell Scale of Social Competence and School Adjustment*. Austin, TX: Pro-Ed.