Running head: DIFFERENTIAL IMPACT OF ROLES ON KNOWLEDGE CONSTRUCTION

Roles as a structuring tool in online discussion groups: The differential impact of different roles on social knowledge construction

Bram De Wever*

Ghent University & Postdoctoral research fellow of the Research Foundation Flanders (FWO)

Hilde Van Keer, Tammy Schellens, & Martin Valcke

Ghent University

* Correspondence can be sent to Bram de Wever, Ghent University, Faculty of Psychology and Educational Sciences, Department of Educational Studies, Henri Dunantlaan 2, B-9000 Gent, Belgium. Phone: ++32-9-2648665, Fax: ++32-9-2648688,E-mail: Bram.DeWever@UGent.be

Abstract

This study focuses on stimulating social knowledge construction in e-discussions and examines the introduction of five roles: starter, summariser, moderator, theoretician, and source searcher. Asynchronous discussion groups of 10 1st-year students Instructional Sciences were organised to foster students' processing of the learning content. Four successive authentic tasks of three weeks each were presented. Taking into account the moment of introduction of the role assignment (at the start of the discussions versus at the end), the differential impact of the roles on knowledge construction is studied through quantitative content analysis based on the interaction analysis model of Gunawardena, Lowe, and Anderson (1997). The results show a positive effect of role assignment on students' social knowledge construction at the start of the discussions. This implies that roles should be introduced at the start of the discussions and can be faded out towards the end. With respect to the differential impact of the roles, the results show that messages from moderators, theoreticians, and summarisers reflect higher levels of knowledge construction at the start of the discussions. Even students without a role in role-supported groups benefit from the role introduction.

Keywords: roles, computer-supported collaborative learning, collaborative learning, computer-mediated communication, collaboration, distance education

Roles as structuring tool in online discussion groups: The differential impact of different roles on social knowledge construction

The present study fits in with a series of studies (De Wever, Van Keer, Schellens, & Valcke, 2007; De Wever, Schellens, Van Keer, & Valcke, 2008; De Wever, Van Keer, Schellens, & Valcke, 2009) searching for instructional approaches to stimulate knowledge construction through social negotiation in online asynchronous discussions. These studies are situated in the context of a 1st-year university course Instructional Sciences, where asynchronous discussion groups of 10 students are organised to foster students' processing of the learning content. In order to promote knowledge construction through social negotiation, roles are assigned to students. The main goal of this study is to explore the impact of the introduction of roles on students' level of knowledge construction in asynchronous discussion groups. Roles can be considered a specific type of scripting that is used to structure and improve collaborative discourse. The present study focuses in particular on the differential impact of different roles (starter, summariser, moderator, theoretician, and source searcher) on the level of social knowledge construction reflected in students' messages.

Theoretical Background

The implementation of asynchronous discussion groups is based on the notion that social dialogue is important to trigger knowledge construction. The importance of dialogue is in turn founded on principles of the social constructivist theory. Social constructivists consider individual learning as socially mediated. As such, learning is collaborative in nature and group settings can foster learning via questioning, criticising, and evaluative discourse (Schrire, 2004). The basic assumption of social constructivism is that knowledge is not transferred, but co-constructed by individuals who interact within an authentic and social context. This construction of knowledge is especially triggered by dialogue (Pena-Shaff & Nicholls, 2004).

There are a number of advantages related to the asynchronous nature of online discussions. First, asynchronous discussion groups are independent of time and location, and therefore increase accessibility, opportunities for interaction, and educational flexibility (Bernard & Lundgren-Cayrol, 2001; Hew & Cheung, 2003). Furthermore, they provide students with extra time to reflect, think, and search for additional information before contributing to the discussion (De Wever, Schellens, Valcke, & Van Keer, 2006; Pena-Shaff & Nicholls, 2004). Last but not least, they leave a footprint of the discussions, in the sense that all exchanges of information between students are stored in the discussion transcripts (Cecez-Kecmanovic & Webb, 2000; De Wever et al., 2006; Mason, 1992; Weinberger, Reiserer, Ertl, Fischer, & Mandl, 2005). Asynchronous discussion groups are furthermore seen as ideal tools to support the co-construction of learning (Gilbert & Dabbagh, 2005). In these learning environments, students can work together, achieve shared understanding, and solve problems collaboratively (Cecez-Kecmanovic & Webb, 2000). Discussing online is an excellent activity for co-constructing knowledge, since explaining, elaborating, and defending one's position to others "forces learners to integrate and elaborate knowledge in ways that facilitate higher-order learning" (Rourke & Anderson, 2002, p. 3).

However, grouping students in asynchronous discussions does not necessarily lead to effective interaction and the co-construction of knowledge (Dillenbourg, 2002; Vonderwell, 2003; Weinberger et al., 2005). Collaborative knowledge construction in asynchronous discussion groups may need additional support (Weinberger et al., 2005). Therefore, they are often equipped with a certain amount of structure. Discussions can be structured by means of introducing specific goals, task types, task prescripts, or forms of scripting. Structuring or scripting learning environments is found to improve collaboration (Pfister & Mühlpfordt, 2002) and can be seen as a form of scaffolding for students to get started in authentic activities (Weinberger, Stegmann, & Fischer, this issue). The interest in using scripts to

specify, sequence, and assign collaborative learning activities (Kollar, Fischer, & Hesse, 2003) is growing in view of improving the design of CSCL-environments (Weinberger et al., 2005).

In the present research one specific type of structuring is studied: the assignment of roles to support the process of social knowledge construction. Instructional approaches to collaborative learning focus on assigning roles in order to support coordination and promote effective interaction patterns. A number of positive effects are attributed to roles. Groups where roles are assigned can work efficiently, smoothly, and productively (Cohen, 1994) and "the practical matter of having critical roles filled in meetings has direct implications for improving task performance and satisfaction" (Zigurs & Kozar, 1994, p. 277). Furthermore, the use of roles can alleviate problems of non-participation or domination of the interaction by one group member (Cohen, 1994; Strijbos & De Laat, this issue) and is an important factor in determining the quality of knowledge construction in a community (Aviv, Erlich, & Ravid, 2003).

However, Cohen (1994) also argues that students are not always performing the assigned roles. Therefore, in a previous study (De Wever et al., 2008), we verified to what extent students adopt and perform the roles assigned to them. The question whether the freshmen involved in our setting actually act up to the roles, merits attention before studying the impact of roles on the knowledge construction processes in discussion groups. In this respect, our previous study focused on whether the intervention of role assignment was successful, i.e. did students perform the roles they were assigned? And if so, did they exclusively stick to these roles, or did they engage in other discussion activities as well? The results of the previous study showed that students perform the roles they were assigned. We refer to the method section of the present study for an overview of the different roles and we refer to De Wever et al. (2008) for more in depth information about the role adoption.

Since this previous study showed that all students perform the assigned roles and thus confirmed that the assignment of roles is a useful structuring approach, a second preceding study (De Wever et al., 2009) focused on the effect of role support. More specifically, it focused on determining whether role assignment has an impact on the knowledge construction processes in the discussion groups and whether the moment of introduction of the role assignment is an important factor. The results of this second preceding study showed that the moment of the role introduction has an important impact on the knowledge construction processes. Groups in which roles were introduced at the start and faded out towards the end, reflected significantly higher levels of knowledge construction in two out of four discussion themes.

Taking into account that students enact the roles they are assigned and that the moment of introducing roles can be important, the aim of the present study is to shed a light on the differential impact of the different roles on the level of social knowledge construction reflected in students' messages.

Method

Participants and procedure

The impact of the introduction of roles on knowledge construction is studied in a higher education setting, situated in the knowledge domain of educational sciences. In a 1st-year course in Instructional Sciences, groups of 10 freshmen participated in four consecutive discussion themes, discussing theoretical concepts dealt with in the course. All 1st-year students enrolled (N = 273) participated in the discussion groups and the four themes corresponded to four chapters of the course manual, namely behaviourism, cognitivism, constructivism, and evaluation. Each theme was organised during a three-week period (see also Table 1). During the course of this period, students collaborated independent of time and

location. Participation in the discussions was obligatory and represented 25% of the final score. Students were required to contribute at least four times per discussion theme.

Roles

Five different roles were introduced in order to promote high-level interaction, enhanced collaboration, and consequently knowledge construction through social negotiation: starter, summariser, moderator, theoretician, and source searcher. These roles can be considered as a specific type of scripting that is used to structure and improve collaborative discourse. The *starter* was required to start off the discussion, to add new points for other students to build upon, and to give new impulses when discussions slacked off. The role of the *moderator* consisted of monitoring the discussion, asking critical questions, and probing others' opinion. Students in the role of *theoretician* were required to introduce theoretical information and to ensure that all relevant theoretical concepts were used in the discussion. The role of the *source searcher* comprised of seeking external information about the discussion topics in order to stimulate other students to go beyond the scope of the available handbook. The *summariser* was expected to post interim summaries during the discussion and a final synopsis at the end, focusing on identifying dissonance and harmony between the messages and drawing conclusions. In general, all students were allowed to perform all these activities. However, students with a specific role were asked to pay explicit attention to the activities related to their role on a very regular basis. Full details on the role descriptions can be found in Appendix A.

Data

Students' postings of 80 discussions were selected for this study. These are the postings of the entire 12 week discussion period (four themes of three weeks) of 20 discussion groups. This resulted in the analysis of 4816 messages.

Quantitative content analysis

In order to go beyond analyses based on only counting the number of messages and to reveal information that is not situated at the surface of the transcripts, quantitative content analysis was applied. Neuendorf (2002) defines content analysis as "a summarizing, quantitative analysis of messages that relies on the scientific method and is not limited as to the types of variables that may be measured or the context in which the messages are created or presented" (p. 10).

In order to determine the level of knowledge construction through social negotiation, quantitative content was applied based on the interaction analysis model of Gunawardena, Lowe, and Anderson (1997). This model examines the social construction of knowledge in computer conferencing and distinguishes five different levels of knowledge construction activities: (1) sharing and comparing information, (2) identifying areas of disagreement, (3) negotiating meaning and co-construction of knowledge, (4) evaluation and modification of new schemas that result from co-construction, and (5) reaching and stating agreement and application of co-constructed knowledge. A detailed discussion of this model can be found in De Wever et al. (2006).

This specific analysis scheme was selected considering its social constructivist theoretical base and the fact that it is one of the few content analysis models that has been applied in a number of empirical studies (Marra, Moore, & Klimczak, 2004; De Wever et al., 2006; Schellens & Valcke, 2005; Schellens, Van Keer, & Valcke, 2005). As suggested by Rourke, Anderson, Garrison, and Archer (2001), messages were selected as units of analysis.

Five independent coders were trained during approximately seven hours to carry out the coding activity. After working with coding examples for each level of knowledge construction in the analysis model (Gunawardena et al., 1997), they coded some transcripts together in order to discuss and elaborate on the coding process. Next, the transcripts were coded independently. In appendix B, a sample of discussion postings and their codes can be

found. A number of transcripts were randomly selected for calculating interrater reliability coefficients. The Krippendorff's alpha interrater reliability coefficient (α = .52, n = 198) was situated between .40 and .80, which corresponds to 'fair to good agreement beyond chance' (Neuendorf, 2002; Banerjee, Capozzoli, McSweeney, & Sinha, 1999).

Design

The design of the present study followed a cross-over design (see also De Wever et al., 2009) As illustrated in Table 1, the differential impact of the roles was studied in two research conditions. In condition 1, students started discussing without role assignment in theme 1 and 2, and role assignment was introduced when discussing theme 3 and 4. In condition 2, roles were assigned right from the start in theme 1 and 2 but no longer during theme 3 and 4. The specific cross-over design was helpful to study whether or not the timing of role assignment is an important mediating factor influencing students' knowledge construction through social negotiation. It also allows for checking the differential impact of the different roles at two times, namely during theme 1 and 2 and during theme 3 and 4. In this respect, the design resembles a 2×2 factorial design: time of measurement (start versus end) by role assignment (no roles versus roles assigned).

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Insert Table 1 about here

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Analyses

Taking into account the hierarchical nesting of students in discussion groups and the fact that the four themes are discussed successively, repeated-measures multilevel modelling was applied in order to answer the research questions. Multilevel models are developed to analyse data that have a hierarchical or clustered structure (Hox, 1998). In the hierarchical structure of the present study, each student belongs to one and only one group, implying that we can

assume that the variance within groups is smaller that the variance between groups. Multilevel models take the intra-group correlation into account. Moreover, these models are especially useful to analyse repeated measures (Snijders & Bosker, 1999). In the present study, measurement occasions (the four discussion themes) are nested within subjects (Hox, 1998). We refer to De Wever et al. (2007) for an in-depth discussion on the value of this technique to analyse content analysis data of students working together online.

The statistical package R 1.8.1 (http://www.r-project.org/) was used for the calculation of the interrater reliability. MLwiN 2.02 (http://www.cmm.bristol.ac.uk/MLwiN/) was used to perform the multilevel analysis. The multilevel models were estimated with the iterative generalised least squares (IGLS) procedure. All analyses assume a 95% confidence interval.

Results

Table 2 presents the distribution of messages in percentages over the different levels of knowledge construction (Gunawardena et al., 1997) for students in groups with and without roles for both the first two themes and the last two discussion themes. It appears that during the first two themes, messages from students in the role condition reflect more knowledge construction at level 2 and 3 (respectively 22.8% and 9.3%) than messages from students in the no-role condition (respectively 14.5% and 3.6%). During the last two themes, messages from students in the no-role condition reach level 3 more often (15.6% compared to 6.7% in the role condition). Moreover, messages from students in the no-role condition reach level 4 (5.4%) and level 5 (2.3%) as well.

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Insert Table 2 about here

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In order to study the differential impact of the roles and the impact of the moment of the role introduction on the level of social knowledge construction reflected in students'

messages, a four-level model was estimated, with messages (level 1) hierarchically nested within measurement occasions (level 2) that are clustered within students (level 3) who are in turn assigned to groups (level 4). The dependent variable was the level of knowledge construction reflected in a message. First, a random intercept null model was estimated. Next, we contrasted the discussions at the end (theme 3 and 4) to the discussions at the start of the discussion period (theme 1 and 2). Further, we focussed on the interaction between the time of measurement and the conditions. Last, we focused on the differential impact of the role types. The construction of the model is presented in Table 3.

The random part of the four-level null model (model 0) for Level of Knowledge Construction (LKC) shows that the variances on group, theme, and messages level are significantly different from zero: 4.89% of the total variance in LKC in students' messages is situated at the group level ($\chi^2 = 8.13$, $df = 1$, $p = .004$), 5.76% is situated at the theme level (measurements occasions) ($\chi^2 = 29.50$, $df = 1$, $p < .001$), and 89.35% of the variance arises from differences between messages within measurement occasions ($\chi^2 = 2060.96$, $df = 1$, $p < .001$).

Model 1 furthermore shows that the overall level of knowledge construction is significantly higher at the end of the discussion period (themes 3 and 4) compared to the start of the discussion period (themes 1 and 2 as reference category).

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Insert Table 3 about here

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In a next step (see model 2 in Table 3), we added the variable role assignment (no roles assigned as reference category) and the interaction effect between role assignment and time of measurement (End*Roles). This model reaches a significantly better fit ($\chi^2 = 33.01$, $df = 2$, $p < .001$). Model 2 provides the mean levels of knowledge construction for groups (a)

without roles at the start (reference category, $M = 1.219$), (b) with roles at the start ($M = 1.219 + 0.201 = 1.420$), (c) without roles at the end ($M = 1.219 + 0.515 = 1.734$), and (d) groups with roles at the end ($M = 1.219 + 0.201 + 0.515 - 0.640 = 1.295$). At the start, the mean of the group with roles is significantly higher ($\chi^2 = 7.51$, $df = 1$, $p = .006$) while at the end, the mean of the group without roles is significantly higher ($\chi^2 = 37.46$, $df = 1$, $p < .001$).

In order to study the differential effects of the specific roles, in a final step of the analyses (see model 3 in Table 3) we added interaction effects between the time of measurement and the different role types. Groups without roles serve as the reference category for role type throughout these analyses. For the time of measurement, discussion groups at the start (theme 1 and 2) serve as reference category. Therefore, the parameters of the role types in model 3 (e.g., Moderator) indicate the difference in LKC of messages from students with that specific role and messages from students in discussion groups without roles at the start. The difference in LKC between messages from students with a specific role and messages from students in discussion groups without roles at the end is indicated in the parameters of the interaction effects (e.g., Moderator*End).

The intercept of 1.218 in model 3 is now to be considered as the overall LKC during themes 1 and 2 across all students in groups without role assignment, as in model 2. In addition, the slope estimate (End) indicating the difference in LKC during themes 3 and 4 reveals that students in groups without role assignment reach a LKC that is 0.516 higher during themes 3 and 4, leading to a mean LKC of 1.734. Since these means concern groups without roles, they are equal to the estimates in the second model.

The estimates of the dummies representing the different roles and the students without roles in a group where roles were assigned, are differential parameters with regard to the students in groups without role assignment. These parameters indicate how different the LKC of messages from students with a specific role are from the LKC in messages from students

in discussion groups without roles during theme 1 and 2. In this respect, the results in Table 3 reveal that, compared to the contributions of students in groups without role assignment, the contributions of moderators, theoreticians, and summarisers reflect significantly higher levels of knowledge construction in themes 1 and 2. Furthermore, it can be noticed that contributions of students without roles in a group where roles were assigned also reflect significantly higher levels of knowledge construction in the first two themes.

The estimates of the interaction effects between time of measurement and the different roles are differential slopes, relative to the slope (End) of students in groups without role assignment and the parameters of the different role types. In this respect, all these parameters need to be taken into account. For example, the mean LKC for moderators in theme 3 and 4 is 1.430 (M = 1.218 + 0.216 + 0.516 - 0.520 = 1.430). Figure 1 presents an overview of the different mean LKC for the two conditions at both the start (theme 1 and 2) and the end (theme 3 and 4). When roles were assigned, the means for each role type are presented (based on model 3 in Table 3). As discussed previously, during themes 1 and 2 the contributions of moderators, theoreticians, summarisers, and students without roles in role-supported groups reflect significantly higher levels of knowledge construction, whereas no significant differences are found regarding the starter and the source searcher. However, Figure 1 shows the opposite in theme 3 and 4. The analysis indicates that in theme 3 and 4, the LKC of students' messages in groups with roles is significantly lower than the LKC of students' messages in groups without roles. This is the case for all role types (starter: χ^2 = 21.07, df = 1, p < .001, moderator: χ^2 = 6.80, df = 1, p = .009, theoretician: χ^2 = 14.40, df = 1, p < .001, source searcher: χ^2 = 26.30, df = 1, p < .001), including students without a role in a role-supported group (χ^2 = 35.03, df = 1, p < .001), except for the summariser (the difference is only marginally significant for the summariser: χ^2 = 3.72, df = 1, p = .054). It is important to

keep in mind that, due to the cross-over design, students in a group without role-support in theme 3 and 4 already had role-support during theme 1 and 2.

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Insert Figure 1 about here

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Discussion

If we only focus on the first two themes, we notice that students in groups with roles reach significantly higher levels of knowledge construction, except for starters and source searchers, whose level of knowledge construction is not significantly different from the students in groups without roles. This could be due to the fact that the role of moderators, theoreticians, and summarisers requires a stronger focus on building upon others' contributions whereas starting up topics and giving new discussion impulses, or providing extra sources require less building upon previous messages.

The findings furthermore show that the summariser role has the largest positive effect on the level of knowledge construction. This is in line with the study of Schellens et al. (2005) who studied the impact of different roles on knowledge construction and reported a significant difference in knowledge construction for one specific role only, namely the summariser.

In addition, it is striking that there is also a significant difference in knowledge construction between students without roles in groups with and without role assignment. Participating in a discussion group with roles seems to elicit messages reflecting higher levels of knowledge construction from students without roles in a role-supported group. There can be several reasons to account for this finding. First, it is not unlikely that students without roles are directly influenced by the roles assigned to their fellow students. Since they are well aware of the nature and the function of the roles, they may also adopt certain components of

the role behaviour. Second, students may also be influenced by the roles in an indirect way. Contributions of students with a role may simply stimulate other students to contribute to the knowledge construction processes. Third, roles increase students' awareness of active collaboration (Strijbos, Martens, Jochems, & Broers, 2004) and this may enhance knowledge construction. It can be concluded that all individuals – and not only the students assigned a particular role – can take advantage of role assignment in the discussion groups.

However, with regard to the last two discussion themes, we notice the opposite: students in the no-role supported groups generally reach higher levels of knowledge construction than students in role-supported groups. However, in interpreting these results, the cross-over design of the present study has to be taken into account. This design more specifically implies that students without role support in the last two discussions were already engaged in two discussion themes with role assignment. Considering this, the finding that the LKC gap with students in the condition where roles were introduced later on endured in the last two discussion themes confirm earlier research (De Wever et al., 2009) that pointed out that the moment of the introduction of role assignment is a critical factor and that the impact of role assignment remains even when the structuring was no longer implemented. It appears that once students have experienced role support they take advantage of it, which might point at the fact that students interiorise the role-related activities. In this respect, Weinberger et al. (2005) argue that "fading of the cooperation script could improve internalization processes" (p. 34). This means that the introduction of roles can be seen as a way of scaffolding that eventually can be faded out (Brown, Collins, & Duguid, 1989).

Due to limitations associated with the cross-over design in the present study, the opportunities or surplus value of fading out the role assignment could not be studied directly by comparing both conditions in this study with a condition where students receive role-support throughout all four discussion themes. In this respect, future research including a

condition in which roles are assigned through all themes is necessary to test the hypothesis regarding the possibility of fading out role assignment. An additional limitation of the design of the present study in an authentic educational context has to do with the fact that due to ethical grounds we could not prevent students completely from role support. In this respect, no real 'control condition' in which no roles were assigned during the four themes could be included. Further research including such a control condition could be useful to compare the impact of role versus no-role assignment in a more experimental design. In addition, the inclusion of more discussion themes or more extended discussion periods could reveal long-term and retention effects of structuring e-discussions by means of assigning roles and inform us about the impact of role assignment in the long run and on the time students need to benefit from the role assignment and to internalise the role-related activities.

Conclusion

The findings in the present study lead us towards the conclusion that the assignment of roles is a crucial structuring tool to enhance the knowledge construction processes in asynchronous discussion groups when roles are introduced right at the start of the discussions. Not only are messages from students with the role of moderator, theoretician, and summariser reflecting higher levels of knowledge construction, even students without a role in a role-supported group are benefiting from the introduction of roles. However, it appears that the moment of the introduction of role assignment is important. Roles are especially valuable during the initial discussions and can be faded out towards the end. The finding that groups with initial role assignment outperform other groups even after their role support was cut back might support the hypothesis that students interiorised the role-related activities. Considering the differential impact of the roles, especially the summariser role should be mentioned as the most efficient role in terms of achieving higher levels of knowledge construction.

Appendix A

This appendix presents the five role descriptions (translated from Dutch) as they appeared on the informative website for the students.

Starter

Start up the discussion. More specifically, you are expected to post one or more initial messages to activate the discussion. Make sure that other students can build further on your contributions and that they stimulate others to participate. Give new impulses every time the discussions slack off or become one-sided.

Moderator

Monitor the discussions and relate students' contributions. More specifically, you are expected to point at similarities and differences, to pose critical questions and inquire for opinions, and to stimulate the other group members to participate actively to the discussion.

Theoretician

Make sure that all the appropriate theory is brought into the discussion. More specifically, you are expected to relate all relevant theoretical concepts of the course reader and the face-to-face sessions to the ongoing discussion. Explicitly link your theoretical input and the discussion topic. Indicate which theoretical frameworks might be lacking. Ask your fellow students for feedback on the theoretical concepts you try to relate to the discussion.

Source searcher

Look for additional information and relate it to the discussion. More specifically, you are expected to look up external sources and go beyond the scope of the course reader. Give a short overview of the content of your source and argue why the source fits in with the discussion theme. Try to make a clear link with the discussion and the theory. Next to websites, you are encouraged to look for courses, books, movies, or practical examples. Ask

your fellow students to comment on your sources from a theoretical or empirical viewpoint or based on prior experiences.

Summariser

Post interim summaries and a final summary. More specifically, you are expected to give an overview of the discussions, summarise premature solutions, indicate the different points of view, and make provisional conclusions. Avoid just summing up the different topics, but try to notice the contradictions. Formulate a final summary at the end of the discussion period. Ask your fellow students to edit your summaries.

Appendix B

This appendix presents an excerpt of a discussion group on evaluation (theme 4). The discussion assignment consisted amongst other things of discussing to what extent peer assessment could be "an interesting supplement to the current assessment procedures of the online discussion assignments" (translated from assignment). The translation of a number of discussion postings illustrates how the students discussed and how this was coded by the independent coders. The first two messages (10.2 and 10.2.1) were coded as level 1 (sharing and comparing information). The following message (10.2.1.1) was coded as level 2 (the discovery and exploration of dissonance or inconsistency among ideas, concepts or statements). Message 10.2.1.1.1 was coded as level 3 (negotiation of meaning / co-construction of knowledge) whereas message 10.2.1.1.2 was coded as level 4 (testing and modification of proposed synthesis or co-construction).

► **Ellen** (Message 10.2)

Addition peer-assessment

Advantages:

- You have a say, you are a part of the whole, in other words: you are participating.
- You get insight in your own communicative skills. You learn to formulate what you think. In my opinion, peer assessment has a surplus value with respect to 'learning to assess', which is a learning activity an sich in my opinion.

Disadvantages

- There is no context at all! In my opinion, this is the largest disadvantage.
- You have to interpret everything that is said or just not said. In my opinion, this is a disadvantage because in this way objectivity can not always be guaranteed.

[…]

►► **Dieter** (Message 10.2.1)

context

The context that is missing. What do you mean by this?

►►► **Charlotte** (Message 10.2.1.1)

There is context

Ellen, it is also not clear to me which context you are referring to. Because of the fact that everybody is situated in the same *'context'* of the discussion groups, I think it is the surplus value is that we can put forward the same learning goals (as I said earlier).

We perfectly know which contributions to our discussion are interesting, superfluous, unfocused, a surplus value, … In this way, we can provide relevant critique with relation to the *content*, the way of putting it, … which I really see as an advantage.

►►►► **Ellen** (Message 10.2.1.1.1)

context

The context I am rather referring to is the personal background of everyone. I think that this may also fall under the denominator "context". Maybe everybody has a personal reason why he/she posts a lot of contributions or otherwise. You can not say or write this (for example within these discussion groups) en thus nobody is taking this into account, which is rather logical.

Sorry for the lack of clarity

►►►► **Aileen** (Message 10.2.1.1.2)

reaction to charlotte

I think it is dangerous to think that we know "perfectly" what is interesting and superfluous in our discussion. Do not forget that we work on this as an individual. What one believes to be interesting can be superfluous for somebody else. In my opinion, peer group assessment looks like a too subjective way of assessment. You can never guarantee that the assessment in a peer group is fair and honest.

I thus agree with Ellen that we should take our ‘own’ context into account. Every one of us has had a preliminary training and we all went through different experiences. It is thus naïve to think that we are assessing all reactions in the same way. I think peer group assessment that only takes place in the discussion groups is insufficient as assessment means.

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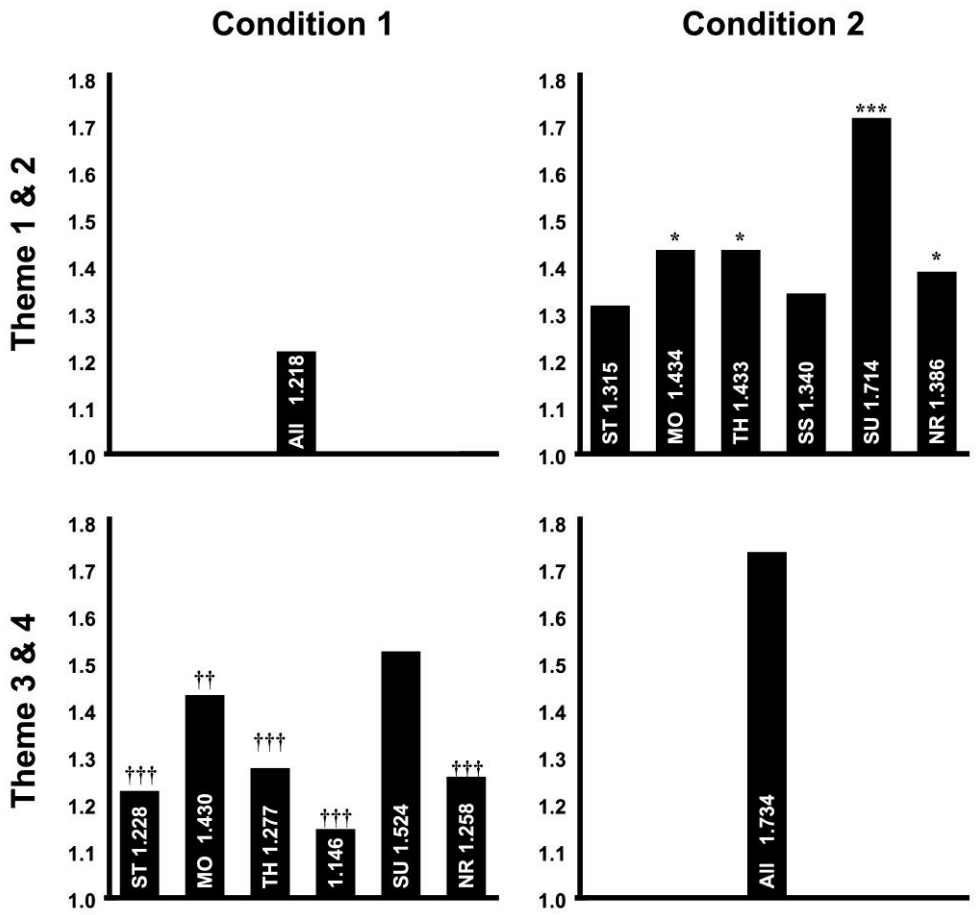
Figure caption

Figure 1. Mean level of knowledge construction for the two conditions in the first two and last two themes.

Figure 1



Note. “All” refers to all students in a no-role supported group, “ST” refers to the starters, “MO” refers to the moderators, “TH” refers to the theoreticians, “SS” refers to the source searchers, “SU” refers to the summarisers, “NR” refers to students without a role in a role supported group.

* $p < .05$, ** $p < .01$, and *** $p < .001$ refers to significant differences compared to condition 1 in theme 1 and 2.

† $p < .05$,†† $p < .01$, and ††† $p < .001$ refers to significant differences compared to condition 2 in theme 3 and 4.

Table 1. Overview of the discussion themes and the research conditions.

Theme	Condition 1	Condition 2
Theme 1: Behaviourism (week 1-3)	No Roles	Roles
Theme 2: Cognitivism (week 4-6)	No Roles	Roles
Theme 3: Constructivism (week 7-9)	Roles	No Roles
Theme 4: Evaluation (week 10-12)	Roles	No Roles

Table 2. Percentages of messages at each level of knowledge construction.

	Level of knowledge construction				
Role type	Level 1	Level 2	Level 3	Level 4	Level 5
	Theme 1 and 2				
Starter	73.1	21.1	5.7	0.0	0.0
Moderator	67.8	21.9	9.3	1.1	0.0
Theoretician	64.9	25.4	9.8	0.0	0.0
Source searcher	69.0	24.9	6.1	0.0	0.0
Summariser	48.7	34.0	17.3	0.0	0.0
No role in role group	71.7	19.0	8.9	0.3	0.1
Role group (average condition 2)	67.6	22.8	9.3	0.2	0.1
No role group (condition 1)	81.3	14.5	3.6	0.3	0.2
	Theme 3 and 4				
Starter	83.3	9.8	6.9	0.0	0.0
Moderator	68.2	18.2	13.6	0.0	0.0
Theoretician	80.5	13.0	6.5	0.0	0.0
Source searcher	89.1	8.7	0.0	0.0	2.2
Summariser	56.0	34.5	8.6	0.0	0.9
No role in role group	79.7	13.7	6.1	0.0	0.6
Role group (average condition 1)	76.7	16.0	6.7	0.0	0.6
No role group (condition 2)	60.0	16.6	15.6	5.4	2.3

Table 3. Model estimates for the four-level analyses of levels of knowledge construction.

Parameter	Model 0	Model 1	Model 2	Model 3
Fixed				
Intercept	1.479 (0.044)	1.356 (0.047)	1.219 (0.062)	1.218 (0.062)
End (theme 3&4)		0.243*** (0.026)	0.515*** (0.073)	0.516*** (0.074)
Roles			0.201** (0.073)	
End*Roles			-0.640*** (0.133)	
Starter				0.097 (0.096)
Moderator				0.216* (0.096)
Theoretician				0.215* (0.094)
Source searcher				0.122 (0.095)
Summariser				0.496*** (0.096)
No role in role-supported group				0.168* (0.078)
Starter*End				-0.603*** (0.170)
Moderator*End				-0.520*** (0.174)
Theoretician*End				-0.672*** (0.175)
Source searcher*End				-0.710*** (0.172)
Summariser*End				-0.706*** (0.169)
No role in RS group*End				-0.644*** (0.141)
Random				
Level 4 – group				
$\sigma^2 f0$	0.034** (0.012)	0.037** (0.013)	0.015** (0.006)	0.016** (0.006)
Level 3 – student				
$\sigma^2 v0$	–	–	–	–
Level 2 – theme				
$\sigma^2 u0$	0.040*** (0.007)	0.026*** (0.006)	0.024** (0.006)	0.019** (0.006)
Level 1 – message				
$\sigma^2 e0$	0.621*** (0.014)	0.620*** (0.014)	0.619*** (0.014)	0.618*** (0.014)
Model fit				
Deviance	11536.05	11456.71	11423.70	11385.92
χ^2		79.34	33.01	70.79
df		1	2	12
p		< .001	< .001	< .001
Reference		Model 0	Model 1	Model 1
R^2 message level		0.017	0.058	0.060

Values between brackets are standard errors

*p < .05 **p < .01 ***p < .001

Note. Reference category time of measurement = start (theme 1&2); reference category role assignment = no roles; reference category role type = no role supported groups)