Analysis of Feedback Processes in Online Group Interaction: a Methodological Model

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Abstract

The aim of this article is to present a methodological model to analyze students' group interaction to improve their essays in online learning environments**,** based on asynchronous and written communication. In these environments teacher and student scaffolds for discussion are essential to promote interaction. One of these scaffolds can be the feedback. Research on feedback processes has predominantly focused on feedback design rather than on how students utilize feedback to improve learning. This methodological model fills this gap contributing to analyse the implementation of the feedback processes while students discuss collaboratively in a specific case of writing assignments. A review of different methodological models was carried out to define a framework adjusted to the analysis of the relationship of written and asynchronous group interaction, and students' activity and changes incorporated into the final text. The model proposed includes the following dimensions: 1) student participation 2) nature of student learning and 3) quality of student learning. The main contribution of this article is to present the methodological model and also to ascertain the model's operativity regarding how students incorporate such feedback into their essays.

Keywords

Writing process; Feedback; Feedback implementation; Online interaction; Online learning environment.

I. Feedback processes in online group interaction

Teaching and learning processes in an online environment are based on the asynchronous interaction around the learning content between teacher and student/s as well as students among themselves. In such environments the interaction, understood as the communicative exchange between teacher and students, and students among themselves, is needed to promote knowledge construction (i.e. Harasim, 1993; Haythornthwaite, 2002; Veldhuis-Diermanse, 2002). This communicative exchange occurs in a written way, given that the agents of the learning process, i.e. teacher and students, do not coincide in time or place. To this effect written communication becomes essential since it is the only means to show and ascertain the learning process.

In an online environment, scaffolding is necessary so as to ensure that the students concerned progressively assimilate the learning content. According to McLoughling and Marshall (2000), scaffolding is a kind of support provided to a learner by an expert or a more capable teacher or peer, which helps the learners perform and improve a task that would normally not be possible to accomplish if they were working independently. In order to promote scaffolded learning, one of the issues to take into account is feedback, which as these authors suggest, should be regular, prompt and constructive (McLoughling & Marshall, 2000).

Research on feedback processes has predominantly focused on the conditions that the feedback should meet to improve learning. In other words, research on feedback has focused more on feedback design than on how students utilize it (Hattie & Gan, 2011). To measure how students utilize feedback in the specific context of academic writing assignments, Nelson and Schunn (2008) use the *feedback implementation* concept. According to them, *while writing quality is very important, there is likely to be an intermediate step that leads to writing quality changes: feedback implementation (pp. 377).* Following these authors, we understand feedback implementation as a measure of students' performance to identify the changes introduced in the text, after considering the feedback received from the teacher or peers.

From Dysthe's and her colleagues' point of view (Dysthe, Lillejord, Vines & Wasson, 2010), productive feedback processes should be based on the communication between the writer and the reader (dialogic approach of feedback processes). In this paper, feedback is conceptualised as part of a dialogic process which is carried out in an asynchronous written environment. Feedback is also understood as formative feedback (Shute, 2008) because it helps the students to progressively assume learning objectives with the purpose of improving learning.

II. Feedback processes and writing

In an online environment, due to asynchrony and distance between different agents of educational activity, writing becomes a relevant tool to ascertain the learning. These environments based on written communication allows the difficulties posed by face to face environments for the collaborative construction of a text usually overcome. This circumstance can be exploited by the teachers and students collaborating in the writing.

We understand writing as a learning tool that promotes language development and knowledge construction (i.e. Galbraith, 1999; Lindblom-Ylänne, & Pihlajamäki, 2003; Tynjälä, Mason, & Lonka, 2001), which contributes to the student becoming an independent critical thinker (Dysthe, Lillejord, Vines, & Wasson, 2010). That is, it has an epistemic function (Bereiter & Scardamalia, 1987) which can contribute to thinking about and elaborating on one's own ideas, and which requires individual

work. Moreover, there have been a number of recent research efforts on collaborative learning and interaction highlighting the relevance of the essentials of epistemic writing for learning (i.e., Erkens, Prangsma, & Jaspers, 2006; Puntambekar, Erkens & Hmelo-Silver, 2011). Collaborative writing integrating individual and collaborative work is seen as having potential to facilitate and stimulate learning.

Within the research on writing competence in a university context and scaffolds as feedback to contribute to writing quality, a previous study carried out by the authors, concluded that epistemic feedback, requiring critical explanations and clarifications, is the type which best promotes collaborative writing performance in online learning environments (Guasch, Espasa, Alvarez, & Kirschner, submitted). However, there is not much evidence on how teacher feedback and peer feedback affect the collaborative writing process in technology-enhanced environments for asynchronous and written communication. That is, how students utilize the feedback received and which kind of changes they make to the essays that they write collaboratively. The research requires a holistic approach to analyse multiple processes such as interaction between students, feedback implementation, writing process and writing performance. However, analysing these processes is cumbersome (Weinberger & Fischer, 2006). In order to overcome this difficulty a review of different methodological models was carried out to define a methodological framework adjusted to the analysis of the relationship of written and asynchronous group interaction, student behaviour and changes incorporated into the final text.

A methodological model of how to analyse group interaction based on feedback implementation in online learning environments is presented in this paper.

III. Methodological models review for the analysis of online group interaction

In spite of the large body of research about the analysis of online discussion, there is a lack of studies that share similar criteria to analyse the whole process of interaction as there is in the feedback process. The feedback process includes giving feedback, processing it and implementing it.

In order to overcome this gap, a review of different methodological models was carried out to define a methodological framework adjusted to the analysis of the relationship of written and asynchronous group interaction, student activity and changes incorporated into the final text.

The review included fourteen studies focused on content analysis to comprehend interaction and online discussion (i.e. Arvaja, Salovaara, Häkkinen, & Jarvela, 2007; Beers, Boshuizen, Kirschner, & Gijselaers, 2007; De Laat & Lally, 2003; De Wever et al., 2006; Erkens & Janssen, 2008; Gunawardena et al., 1997; Hara, Bonk, & Angeli, 2000; Hmelo-Silver, 2003; Hmelo-Silver & Bromme, 2007; Strijbos & Stahl, 2007; Veldhuis-Diermanse, 2002; Veldhuis-Diermanse et al., 2006; Weinbenger & Fischer, 2006). The criteria followed to select these studies were the relevance of the articles (peer-reviewed indexed journals) and their contribution to content analysis of online interaction.

It is worth mentioning that this review includes De Wever et al.'s (2006) study, which presents a detailed review of different content analysis instruments. According to De Wever et al.'s study, some limitations are identified:

- Diversity of frameworks; different dimensions of analysis (i.e. some do not take into account social/affective cues); and, different units of analysis.
- Limitation of studies focused on the analysis of interaction (i.e. most of them are focused on the process of co-construction of knowledge).
- High number of instruments focused on online discussions (that is, structured debates) not in students' group interaction.
- Scarce examples showing the categorisation process (the application of the model), which makes difficult its application in other studies.

Taking these limitations into account, this paper presents a methodological model that integrates a diversity of proposals to investigate the whole process of interaction based on feedback implementation in online environments. This decision was taken following Rourke and Anderson's (2003) suggestion that "instead of developing new coding schemes, researchers should use schemes that have been developed and used in previous research" (cited in De Wever et al. 2006, p.6).

IV. The methodological model

The methodological model comprises three dimensions shown in figure 1. These dimensions appear intertwined –although with different level of contribution into the model- in order to provide a whole picture of learners' interaction.

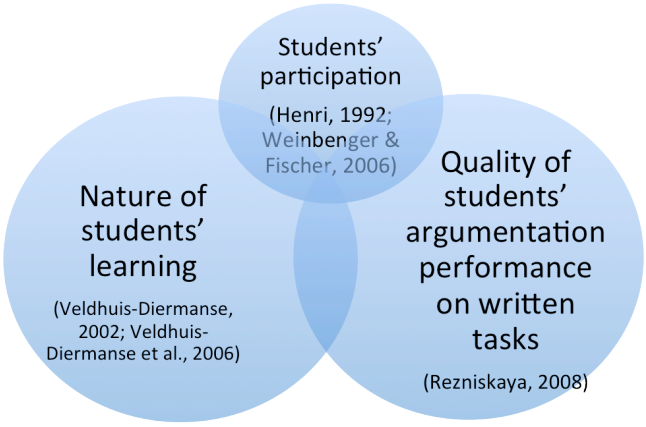

Figure 1. Proposal of methodological model to analyse written and asynchronous group interaction

As shown in Figure 1, the model comprises three dimensions: students' participation, nature of students' learning and quality of students' knowledge. The correlation between the three dimensions forms the basis of this model; however, we understand that the three dimensions do not carry the same weight within the model. This is the reason which explains the small balloon of students' participation dimension. Each of the three dimensions is explained below.

a. Students' participation

The dimension of students' participation is taken from Weinbenger and Fischer, 2006. It includes quantity of participation –number of contributions made to the group discussion- and heterogeneity/homogeneity of students' participation in the group (Henri, 1992; Weinbenger & Fischer, 2006) (see table 1). As for the quantity of participation and in the specific case of online teaching and learning processes, this is measured by simply adding up all the contributions made by one participant. When discussing "heterogeneity/homogeneity of students' participation", Weingbenger & Fisher, (2006) refer to collaborative learning in the sense of whether all learners within a group participate equally or not.

Following Naranjo, Onrubia and Segués (2012), "a high level of participation is no guarantee of high quality learning among students, but it is a necessary condition, and hence it would seem important to encourage participation" (pp291). Based on this result, in this model this dimension is regarded as complementary to the other two, given that it provides objective information about the interaction – an interesting issue to consider when researching teaching and learning in online environments – but it cannot explain the teaching and learning processes on its own.

b. Nature of students' learning

The second dimension of the methodological model -nature of students' learning- is explained by the analysis of students' interaction. This students' interaction includes the messages (emails) exchanged by students' group from the moment they receive teacher feedback or teacher + peer feedback until the moment they submit the final document (5 days discussion). To analyse this students' interaction, an instrument has been designed and validated taking into account several proposals from Veldhuis-Diermanse (2002), De Laat and Lally (2003) and Weinberger and Fischer (2006). Finally the following sub-dimensions were identified: cognitive learning activities, affective learning activities and metacognitive learning activities. The procedure followed to validate this instrument will be detailed later in this section. Below are further explanation about each of these sub-dimensions.

Cognitive learning activities: This sub-dimension is related to the content of the task students are carrying out. Within it three issues are analysed: *debating* which refers to the process of knowledge construction and negotiation; *using external information and experiences*, like articles, web resources, etc, and *linking or repeating internal information* which refers to some information previously introduced by other students.

Concerning the debate, Veldhuis-Diermanse (2002) gathers the specificities of student's contributions. In this sense, she differentiates when a problem, solution or idea is presented and an illustration, elaboration or argumentation follows this contribution or no. In addition she centres the attention on the expression of agreement or disagreement between students and if this agreement or disagreement is followed by an argument, refutation or restriction. A summary of these categories is presented in table 1.

Dimension: Nature of students' learning		
Cognitive learning activities	*Code*	*Description*
	Debating	
	CDPF	A problem, solution or idea is presented. An illustration, elaboration or argumentation follows this contribution.
	CDPNF	A problem, solution or idea is presented. An illustration, elaboration or argumentation does not follow this contribution.
	CDAF	A student does or does not agree with the opinion or idea contributed by another student or author. A backup argument, refutation or restriction follows this viewpoint.
	CDANF	A student does or does not agree with the opinion or idea contributed by another student or author. A backup argument, refutation or restriction does not follow this viewpoint.
	CDAQ	Asking a content-related question.
	Using external information and experiences	
	CREI	Referring to information found in sources (which may or may not be mentioned) other than the discourse.
	CCEI	Contributing new information found in sources (which may or may not be mentioned) other than the discourse.
	CSEI	Summarizing or evaluating the information found in sources (which may or may not be mentioned) other than the discourse.
	CREE	Referring to earlier experiences (scholastic or daily)/ Referring to outcomes of running a model.
	Linking or repeating internal information	
	CIL	Linking facts, ideas or remarks presented in the discourse/ Referring explicitly to a contribution in the discourse.
	CIR	Repeating information without drawing a conclusion or interpreting that information.

Table 1: Sub-dimension: Cognitive Learning Activities & categories. Taken from Veldhuis-Diermanse et al. (2006)

Affective learning activities: This sub-dimension is related to students' feelings about the task. It is defined following Veldhuis-Diermanse et al. (2006) and Weinberger & Fischer (2006). Veldhuis-Diermanse et al. highlighted that there are not always positive feelings when students work collaboratively. Sometimes, these feelings can be negative because it is not easy to work together with other students in an online environment. Initially, this sub-dimension was made up by two categories: a) *asking for a feedback* and b) *chatting or social talk* taken from Veldhuis-Diemanse et al. However, after the validation of the categories, it was necessary to add two more categories in this sub-dimension in order to reach a consensus between judges: c) *quick consensus* and d) *conflicted consensus.* These categories were taken from Weinberger & Fischer (2006). Quick consensus refers to the agreement between students about a decision; conflicted consensus gathers the disagreement or different approaches concerning a decision. The following table (table 2) presents a summary of theses categories.

Dimension: Nature of students' learning		
Affective learning activities	*Code*	*Description*
	AG	Affective general: reacting emotionally to notes of fellow-students, without directly reacting to the content of those notes. This reaction can be positive, negative or neutral. Expression of feelings / greetings/ Closure/jokes
	AA	Asking for (general) feedback, responses or opinions from fellow students.
	AC	'Chatting' or 'social talks'; contributions that are not relevant to solve the case/task.
	AQ	Quick consensus: accepting the contributions of the learning patterns in order to move on with the task
	AC	Conflicted consensus: disagreeing, modifying or replacing the perspectives of the learning partners

Table 2: Sub-dimension: Affective Learning Activities & categories. Adapted from Veldhuis-Diermanse et al. (2006) and Weinberger & Fischer (2006).

Metacognitive learning activities: This sub-dimension is related to the process of organizing and monitoring the task. It is based on Veldhuis-Diermanse et al's. (2006) proposal who define it as a process of negotiating the approach to solve the task. In this sense, three issues are analysed in relation to metacognitive learning activities: a) *the planning*, which refers to the approach or procedure they are going to use to solve the task. The authors differentiate among presenting an approach, asking for an approach or explaining/summarizing the approach already adopted; b) *the clarity*, and the authors propose three categories in order to preserve it: structuring the contributions in the database, asking for an explanation, clarification or illustration as a reaction to a certain note and finally explaining unclear information in notes and answering a question asked by another participant; c) *the monitoring*, which focuses on carrying out the decisions about how to solve the task. Following Veldhuis-Diermanse et al. (2006), monitoring in metacognitive learning activities includes two separate issues: monitoring the original planning, aim or time schedule, and reflecting on one's own actions or on certain contributions to the database. After the validation of the categories of this sub-dimension a change was also proposed. External judges considered that the difference between both issues was not explicit enough on the groups analysed and it was agreed to group them in one general topic about monitoring. A summary of these categories is presented in the following table (see table 3).

Dimension: Nature of students' learning		
Metacognitive learning activities	*Code*	*Description*
	Planning	
	MPA	Presenting an approach or procedure to carry out the task.
	MAA	Asking for an approach or procedure to carry out the task.
	MPE	Explaining or summarizing the approach already adopted.
	Preserving clarity	
	MSC	Structuring the contributions in the database.
	MAC	Asking for an explanation, clarification or illustration as a reaction to a certain note.
	MGE	Explaining unclear information in notes; answering a question asked by another participant.
	Monitoring	
	MM	Monitoring the original planning, aim or time schedule. Reflecting on one's own actions or on certain contributions to the database.

Table 3: Sub-dimension: Metacognitive Learning Activities & categories. Adapted from Veldhuis-Diermanse et al. (2006)

The instrument designed to analyse the nature of students' learning (second dimension) was validated. The interaction, i.e. messages exchanged between teacher and students were analysed. The unit of analysis considered in the interaction process was the unit of meaning in a message (cf. De Laat & Lally, 2003; Henri, 1992; Veldhuis-Diermanse, 2002). For their identification, the procedure pointed out by De Laat and Lally (2003) was followed: "to segment messages into units of meaning by using semantic features such as ideas, argument chains, topics of discussion (for further details of this approach to the definition of units of meaning see Chi, 1997; Ericsson & Simon, 1984) or by regulative activities such as making a plan or explaining unclear information. Thus, the content of the messages had to be read for meaning to determine segment boundaries. Although it may be considerably easier to use syntactic boundaries to segment messages (such as sentences), we followed the semantic boundary approach to attempt to obtain a more finely grained analysis that more closely reflected the meaning of the phrase or paragraph" (p.17).

To establish the reliability of the coding system, from the 16 groups (321 messages exchanged in total), four groups were selected at random and coded by two external judges. The judges received training in the coding system and the identification of units of analysis (two hours training). Each of the judges categorised independently. In this process, each coding discrepancy was solved through discussion, some categories were improved, and others were added, as previously mentioned. The judges concurred on the final codification of 133 units of analysis (total units of analysis: 640). Cohen's Kappa was calculated to determine the inter-reliability for the segmentation and for the categorisation. For the segmentation the result was 0.81 and for the categorisation it was 0.92.

c. Quality of students' learning on writing activities

The categories for the third dimension were taken from the model proposed by Reznitskaya, Kuo, Glina and Anderson (2008). Reznitskaya et al.'s model was created to assess the quality of jointly constructed arguments on written tasks. Specifically, attention was paid to the support of ideas underpinning the relevant arguments which differentiates four modalities, namely *textual* (i.e., ideas extracted more or less literally from readings); *hypothetical* (i.e., statements referring to probable actions); *abstract* (i.e., generalisations about cause and/or effect of given performances), and *contextualised* (i.e., statements which reconstruct the situation, paying attention to context, audience, etc.). The categories were validated in previous studies (Alvarez, Espasa, & Guasch, 2012; Guasch, Espasa, Alvarez, & Kirschner, submitted). For this study, the quality of texts written by the students was measured by the argumentation on written tasks, concretely through the changes incorporated into the final draft compared to the first draft students submitted before obtaining feedback.

This third dimension -*quality of students' learning*- is relevant because it allows us to transfer this model to other types of learning activities besides collaborative writing tasks; for example, problem-based learning, case studies, etc. Such tasks should all be based on joint construction of knowledge. To conclude the methodological model's presentation, a summary of the dimensions and sub dimensions with its description is presented in table 4.

Dimensions	Sub-dimensions	Definition
I) Students' participation (Henri, 1992; Weinberger & Fischer, 2006)	Quantity of participation	Number of contributions made to the group discussion
	Heterogeneity of participation	Heterogeneity in students' participation in the group vs. homogeneous participation
II) Nature of students' learning processes (Veldhuis-Diermanse, 2002; Veldhuis-Diermanse et al., 2006)	Cognitive learning activities	"(…) the activities students use to process the learning content and to attain the learning goals (Steinbusch, 1998; Vermunt, 1998)" in Veldhuis-Diermanse et al.(2006) p. 44
	Affective learning activities	"(…) students' feelings expressed in their notes while working in the networked learning environment which make it possible to interpret the nature of the social interactions between students" (op. cit. p. 45).
	Metacognitive learning activities	"(…) learners' awareness of objectives, ability to plan and evaluate learning strategies and capacity to monitor progress and adjust learning behaviours to accommodate needs" (op. cit. p. 45)
III) Quality of students' argumentation performance on written tasks (Reznitskaya, 2008). It will be measured through the changes incorporated into the final document.	Textual	Ideas extracted more or less literally from previous readings.
	Hypothetical	Statements referring to probable actions
	Abstract	Generalisations about cause and/or effect of given performances
	Contextualised	Statement which reconstructs the situation, paying attention to context, audience, etc.

Table 4. Summary of the dimensions of analysis

V. Exploratory study

In order to apply the methodological model, an exploratory study was carried out. The aim of this study is to analyse student's group interaction to explain how students utilize the feedback they obtain on an essay that they write collaboratively, and how they incorporate the feedback into their texts (feedback implementation). Applying the model will allow the researchers to analyze how students utilize feedback; that is, what happens from the point the group receives feedback until the moment they complete and submit the assignment.

a. Context

Briefly, the context of this study, which is part of a broader research project, is the virtual campus of the Open University of Catalonia (UOC). UOC's pedagogical model is based on asynchronous and written communication through forums and group spaces (see www.uoc.edu).
The environment used is the UOC Virtual Campus (VC) in which students have access to virtual classes; the learning spaces where they find teacher, peers, content, activities and communicative tools to study and learn. The student is accompanied, all throughout, by teacher whose main functions are guidance, orientation, support and facilitation of the educational process. Feedback given by teachers or students takes the form of a message (e-mail) that can also include the assignment with the feedback embedded into the text.

b. Design

The research took place in a 15-week, 6 European Credits module in the Psychology Bachelor's degree programme. For the intervention, 77 students were randomly assigned to 4 experimental conditions which varied with respect to the type of feedback (corrective, epistemic, suggestive, and epistemic + suggestive).

Corrective feedback refers to comments about the assignment requirements and the adequacy of the content (e.g., This is not what is requested; This concept is not correct; The correct answer is…). Epistemic feedback refers to requests for explanations and/or clarifications in a critical way (e.g., Do you think that this idea reflects what the author really highlights in his/her study? Why do you think that A is an example of what the author posits?). Suggestive feedback includes advice on how to proceed or progress and invites exploration, expansion or improvement of an idea (e.g., Giving an example at the end of this argument the paragraph would make your point much clearer.). Epistemic + suggestive feedback is the combination of epistemic feedback and suggestive feedback (e.g., Do you think that this sentence is convincing enough? You should reread the article and identify the similarities and differences between the theories presented. It can help you to carry out the task in a more adequate way) (see Guasch, Espasa, Alvarez, Kirschner, submitted).

The participants were 16 groups of four-five students each. During 5 days discussion members of the groups exchanged on average 20.7 messages (range= 16-33).

c. Writing task

The methodological model presented in this article is centered in a prototypical activity at university level: a writing essay. Writing is indeed as relevant in learning processes in online environments because it is basically the way of showing students' understanding of the learning content.

In this research the writing tasks took the form of essays, which were part of the module. Students were asked to write a collaborative essay that had to contain between 2000-2500 words about a specific educational methodology to improve learning in primary and secondary education. The expected structure was an introduction, followed by argument development, and ending with conclusions. The teacher provided students with the materials and resources needed to achieve the task: specific references, a pedagogical guide with orientations about how to approach the topic, and learning materials for the task.

d. Exploratory results

The application of this methodological model allows the researchers to obtain some preliminary results concerning the interaction patterns. Similarly to Badia, Barberà, Guasch & Espasa (2011), an interaction pattern is defined as chains of actions that teacher and students undertake when communicative online. In the case of this study, patters of interaction are the chains of actions that students undertake once they receive the feedback. Following, two examples of how to apply the model (see Figure 2 and Figure 3) are presented. The first example is focused on a case study of corrective feedback and the other is focused on a case study of suggestive feedback.

In both cases, a graphic representation (see Figure 2 and Figure 3) is showed in order to explain how the model has been applied. The information presented in the figure is:

- Identification of the student that sent the message (S_1, S_2, S_3, S_4 or S_5).
- Number of messages written by each participant.
- Number of messages written by the whole group.
- Coding of the units of analysis identified -following the categories presented in section 4-. Each line corresponds to a message, which is integrated by different units of analysis (2 to 3 in the first example and from 2 to 6, in the second one).
- For the categories which are coded with "+" this means that it has a document attached to this message.

Example 1: Corrective feedback

Focusing the analysis on the group which gives and receives corrective feedback, Figure 2 shows that participation was heterogeneous because all the students made contributions to the work group. The analysis of interactions allows identifying chains of actions that students carry out once they received the feedback. In this case study, patterns show that there were no group interaction about the learning content; that is, no cognitive learning activities. Focusing the attention on Figure 2, in the first message sent by S_4, the student explained the approach already adopted (MPE+), then he/she presented an approach or procedure to carry out the task (MPA) and the student monitored the procedure or approach proposed (MM). Following students (S_1 and S_5) were also discussing about planning and monitoring. From the fourth message sent by S_2 the interaction was focused basically on quick consensus among students –actions related to metacognitive and affective learning activities. These were the patterns of interaction within the group which gives and receives corrective feedback.

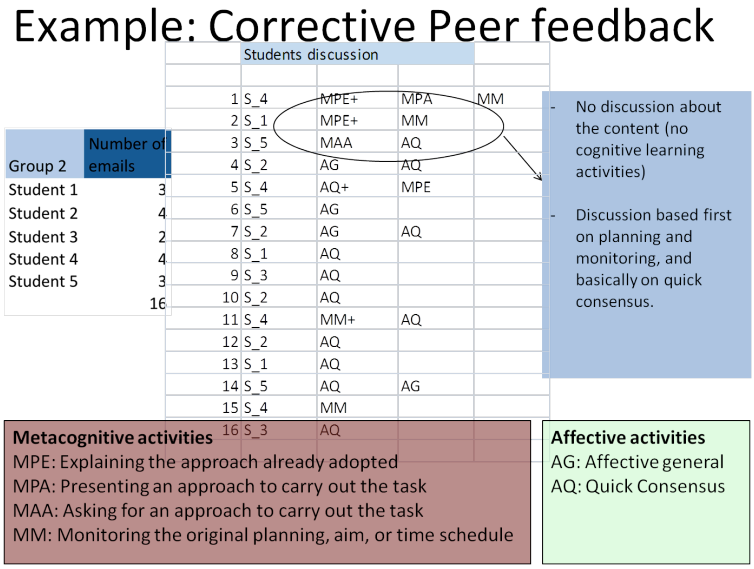

Figure 2: Pattern of interaction in a group with corrective condition

Exemple 2: Suggestive feedback

Another example of pattern of interaction is the case study shown in Figure 3 for the group which received and gave suggestive peer feedback. In this specific group, participation was also heterogeneous. Taking into account the nature of students' learning, in the case of suggestive feedback, patterns of interaction showed that first, students exchanged messages explaining the approach already adopted (MPE+ is the category predominant at the beginning of the interaction process). Afterwards, students S_4 and S_3 (message 7 and 8) were discussing the learning content expressing agreement or disagreement with the opinion or idea contributed by another student. In this case, there was evidence of discussion among students about the learning content (i.e. students present a problem or an idea with an argumentation; students make comments referring to earlier experiences), together with affective and metacognitive activities.

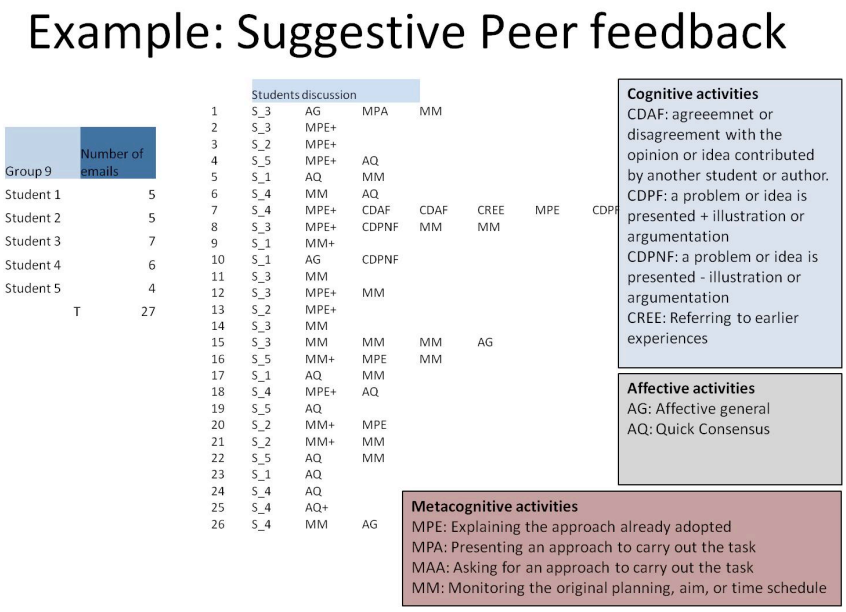

Figure 3. Pattern of interaction in a group with suggestive peer feedback condition

Besides the implications of this analysis from a research point of view, obtaining the interaction patterns taking place in each of the groups allows the teacher to gain a global view of the group's functioning so that he/she may adjust the support he/she offers depending on the needs of each group so as to promote their learning.

The preliminary analysis of the two case studies exemplifies an application of the model and contributes to obtain first exploratory results. Furthermore, the methodological model presented, allow researchers to set up some relationships among the dimensions of the model. Based on Vrasidas & McIsaac (1999) who conclude that feedback influences on the kind of interaction produced in an online course, the relationship to be contrasted would be among the type of feedback (corrective, epistemic, suggestive or epistemic+suggestive) and the nature of students' learning. Result obtained should be correlated with the quality of students' learning. This correlation among the dimensions of the model would allow to know, for example, if the groups that receive epistemic feedback would concentrate higher percentage of cognitive activities in their group discussion and consequently, if this performance would affect and improve the quality of students' argumentation performance on written task.

VI. Contributions and final comments

The contributions of this paper are mainly three. Firstly, a methodological holistic model to analyse written and asynchronous group interaction. Following Hattie and Gan's (2011) suggestion about the need to answer research questions such as how students receive, understand and use feedback in their learning, this proposal strives to provide a model that will enable researchers to answer these questions. Three dimensions make up this model: 1) students' participation; 2) nature of students' learning and 3) quality of the students' learning.

The preliminary analysis of the two examples offered, exemplifies an application of the model and contributes to obtaining the first exploratory results. The next step will be the analysis of the other types of feedback i.e. suggestive feedback and the epistemic + suggestive feedback in order to obtain patterns of interaction to learn how students harness feedback in these cases.

The second contribution of the article is the instrument which has been designed to study the second dimension of the model: the nature of students' learning. Categories and the process of validation of this instrument are presented. This instrument by itself enables us to characterise the feedback processes in an online environment

From the teaching practise point of view, the article contributes to improving the online teaching and learning process. Concretely it means planning learning activities that enable teachers to have evidence that students implement feedback into their texts.

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References

Alvarez, I., Espasa, A. & Guasch, T. (2011). The value of feedback in improving collaborative writing assignments in an online learning environment. *Studies in Higher Education, 37-4,* 387-400

Arvaja, M.; Salovaara, H.; Häkkinen, P. & Jarvela, S. (2007). Combining individual and group-level perspectives for studying collaborative knowledge construction in context. *Learning and Instruction 17*, 448-459.

Badia, A., Barberà, E., Guasch, T., Espasa, A. (2011). Technology educational affordance: Bridging the gap between patterns of interaction and technology usage. In: *Digital Education Review, 19*, 20-35. [Accessed: 08/03/2013] http://greav.ub.edu/der

Beers, P. J., Boshuizen, H. P. A., Kirschner, P. A., & Gijselaers, W. H. (2007). The analysis of negotiation of common ground in CSCL. *Learning & Instruction, 17(*4), 427-435.

Bereiter, C., & Scardamalia, M. (1987). *The psychology of written composition.* Hillsdale, NJ: Lawrence Erlbaum Associates.

De Laat, M. & Lall, V. (2003) Complexity, theory and praxis: Researching collaborative learning and tutoring processes in a networked learning community. *Instructional Science, 31*, 7–39.

De Wever, B., Schellens, T., Valcke, M., & Van Keer, H. (2006). Content analysis schemes to analyze transcripts of online asynchronous discussion groups: a review. *Computers & Education, 46*, 6-28.

Chi, M.T.H. (1997). Quantifying qualitative analyses of verbal data: A practical guide. *Journal of the Learning Sciences 6*: 271–313.

Dysthe, O., Lillejord, S., Vines, A., Wasson, B. (2010) Productive E-feedback in higher education – Some critical issues. S. Ludvigsen, A. Lund, I. Rasmussen & R. Säljö). *Learning across sites: New tools, infrastructures and practices.* Oxford, UK: Pergamon Press.

Erkens, G. & Janssen, J. (2008). Automatic coding of dialogue acts in collaboration protocol. *International journal of computer-supported collaborative learning.* 3- 4, 447-470, DOI: 10.1007/s11412-008-9052-6http://www.springer.com/openaccess/.

Ericsson, K.A. & Simon, H.A. (1984). *Protocol Analyses: Verbal Reports as Data.* Cambridge MA: The MIT Press.

Galbraith, D. (1999). Writing as a knowledge-constituting process. In M.Torrance & D. Galbraith (Eds.), Knowing what to write. Conceptual process in text production. *Studies in Writing vol. 4.* (pp. 139-160.). Amsterdam: University Press.

Guasch, T., Espasa, A., Alvarez, I. & Kirschner, P. (submitted). Effects of Teacher and Peer Feedback on Collaborative Writing in an Online Learning Environment. *Distance Education.*

Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research, 17,* 397–431.

Hara, N., Bonk, C. & Angeli, C. (2000). Content analysis of online discussion in an applied *Educational Psychology. Instructional Science,28*(2), 115-152.

Hattie, J. & Gan, M. (2011). Instruction based on feedback. In Mayer, R.E. & Alexander, P. (eds). *Handbook of research on learning and instruction.* NewYork: Routledge. Taylor and Francis Group. pp 249-271.

Harasim, L. (1993). Collaborating in cyberspace: Using computer conferences as a group learning environment. *Interactive Learning Environments, 3*(2), 119–130

Haythornthwaite, C. (2002). Building social networks via computer networks. Creating and sustaining distributed learning communities. In A.K. Renninger & W. Shumar (Eds.), *Building learning communities. Learning and change in cyberspace*. Cambridge: Cambridge University Press.

Henri, F. (1992). Computer conferencing and content analysis. In A.R. Kaye, ed., *Collaborative Learning Through Computer Conferencing: The Najaden Papers*, pp. 115–136. New York: Springer.

Hmelo-Silver, C. E. (2003). Analyzing collaborative knowledge construction: multiple methods for integrated understanding. *Computers & Education, 41*, 397- 420.

Hmelo-Silver, C. E., & Bromme, R. (2007). Coding discussions and discussing coding: research on collaborative learning in computer-supported environments. *Learning & Instruction, 17*(4), 460-464.

Lindblom-Ylänne, S., & Pihlajamäki, H. (2003). Can a collaborative network environment enhance essay-writing processes? *British Journal of Educational Technology, 34 (1),* 17-30.

McLoughlin, C. and Marshall, L. (2000). Scaffolding: A model for learner support in an online teaching environment. In A. Herrmann and M.M. Kulski (Eds), *Flexible Futures in Tertiary Teaching.* Proceedings of the 9th Annual Teaching Learning Forum, 2-4 February 2000. Perth: Curtin University of Technology. http://cleo.murdoch.edu.au/confs/tlf/tlf2000/mcloughlin2.html

Naranjo, M., Onrubia, J. & Segués, T. (2012). Participation and cognitive quality profiles in an online discussion forum. *British Journal of Educational Technology, 43*-2, 282-294.

Nelson, M. & Schunn, C. (2008). The nature of feedback: how different types of peer feedback affect writing performance. *Instructional Science, 37*, 375-401. DOI 10.1007/s11251-008-9053-x

Puntambekar, S., Erkens, G., & Hmelo-Silver, C. (Eds). (2011). Analyzing interactions in CSCL: Methods, approaches, and issues. New York: Springer.

Reznitskaya, A., Kuo, L.-J., Glina, M., & Anderson, R. (2008). Measuring argumentative reasoning: What's behind the numbers? *Learning and Individual Differences, 19* (2), 219-224.

Shute, V.J. (2008). Focus on formative feedback. *Review of Educational Research, 78*, (1), 153-189.

Strijbos, J. W., & Stahl, G. (2007). Methodological issues in developing a multi-dimensional coding procedure for small group chat communication. *Learning & Instruction, 17*(4), 394-404.

Tynjälä, P.; Mason, L., & Lonka, K. (Eds) (2001). Writing as a Learning Tool: Integrating theory and practice. *Studies in Writing, Vol. 7*. Dordrecth, NL: Kluwer Academic Publishers Books.

Veldhuis-Diermanse, A.E.; Biemans, H. J. A:; Mulder, M. & Mahdizadeha, H. (2006). Analysing Learning Processes and Quality of Knowledge Construction in Networked Learning. *The Journal of Agricultural Education and Extension, 12:* 1, 41-57.

Veldhuis-Diermanse, A.E. (2002). CSCLearning? Participation, learning activities and knowledge construction in computer-supported collaborative learning in higher education (Summary PhD dissertation) (2002).

Vrasidas, Ch. & McIsaac, M.C. (1999). Factors influencing interaction in an online course. *The American Journal of Distance Education, 13*-3, 22-36.

Weinberger, A. & Fischer, F. (2006). A framework to analyze argumentative knowledge construction in computer-supported collaborative learning. *Computers & Education, 46,* 71–95.

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