How do Students Use Socio-Emotional Markers for Self-Reflection on their Group Work in CSCL Settings?
A Study with Visu: a Synchronous and Delayed Reflection Tool

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Abstract: This paper describes an exploratory study on the use of reflective markers set during synchronous collaborative learning sessions (reflection in action) for later construction of self-reflection reports upon the collaboration that occurred (reflection on action). During 2 sessions, students used the Visu tool for interaction and marker setting (positive, negative, free) and then report building on the interaction (using markers or not). A quantitative descriptive analysis has been conducted on the markers used and on the reflective categories of the sentences in the reports. Results show that students (1) paid more attention in repairing their relationship than reflecting on learning and task goals; (2) used mainly positive markers to both reflect in and on action; (3) used more their partner's markers in the second reports; (4) reflected more on themselves in the second reports to justify successes and failures, and to express satisfaction.

Introduction

In this paper, an exploratory study is reported in which students in Psychology were asked to use the Visu reflection tool in both synchronous and asynchronous Computer-Supported Collaborative Learning (CSCL) situations. Visu is a web videoconferencing platform (Bétrancourt et al., 2011) that allows participants to report their individual reflections in the form of markers (named here as reflective markers) at any time during remote synchronous collaboration. In this study, students could use two types of reflective markers: socio-emotional markers to express negative or positive feelings about the way they collaborate; and free markers to provide any other comments on the on-going activity.

It is now recognized that CSCL situations are socially and emotionally challenging, and that collaborative learning processes are influenced and shaped by emotions (Järvelä & Järvenoja, 2011). We thus consider important to provide co-learners with the opportunity to reflect on the socio-emotional aspect of collaborative action through the use of socio-emotional markers. Visu also provides students with the possibility to later review the traces of their group's work (audio/video recordings of the interactions as well as self and partner's markers). Such review can lead to – as in this study – the production of self-reflective reports.

This study is part of research investigating regulatory processes in CSCL settings. We still know little on how individuals reflect-in and on their own activities, their collaborative partners' activities as well as their group activities in joint learning tasks, although there is a growing body of research that focuses on socially shared metacognition and regulation of emotions (Järvelä & Järvenoja, 2011). Moreover, awareness information about the collaborative partners (e.g., their knowledge and emotions) is limited in CSCL settings, and one may expect that such limitation would dramatically affect the use of self- and co-regulated learning strategies. To our knowledge, there are still little awareness systems designed to support self- and shared reflection on the joint learning experience, and in particular on its social and emotional aspects in CSCL settings (Phielix et al., 2010).

This paper aims at investigating students' reflections about their collaborative learning experience after synchronous CSCL sessions. We are particularly interested in the way they used the Visu tool to individually reflect upon their collaboration after it had taken place. In this study, students were involved in two consecutive CSCL synchronous sessions, and were asked to produce a self-reflection report after each session. Our main focus is on reflection in collaborative action and on reflection on collaborative action with the help of socio-emotional markers. More specifically, our questioning is related to the use of "*reflection-in-action*" markers – that is, socio-emotional markers students and their collaborative partner did set during interaction – for later individual "*reflection-on-action*" (Schön, 1987). Students were instructed to organize their reports in 2 parts, a *retrospective* part in which they had to report their perceptions on the interaction they just had with their partner and a *prospective* part in which they had to propose ways of improving their group processes. The originality of the present study is to use Zimmerman's (2002) self-regulated learning (SRL) model as a framework to analyze student's reflection reports on their joint learning experience. Indeed, the three phases described in this SRL

model fit well with the different uses of the Visu tool: use of reflective markers during the online interaction (*performance* phase) and use of interaction traces (videos and markers) in the retrospection room (*self-reflection* and *forethought* phases). In this paper, we concentrate on the use of markers for self-reflection and forethought. According to Zimmerman, in the self-reflection phase, students evaluate performance and make causal attributions for successes or failures (*judgment*). They are also supposed to react to the learning situation in different ways, by expressing different levels of satisfaction (*affective reactions*), protecting their feelings of competence (*defensive reactions*) or proposing adjustments and changes in behavior necessary to succeed (*adaptive reactions*). In the forethought phase, the aim is to define the subsequent goals and to plan the strategies to achieve them; the focus is on the task analysis, which is based on students' prior knowledge and beliefs about learning such as self-efficacy and task value beliefs (*motivation*). Our precise questioning is thus twofold: what kinds of *retrospective* (judgments, reactions) and *prospective* (task analysis, motivation) reflection processes were related to the use of socio-emotional reflective markers? To what extent do these reflection processes evolved over the two CSCL sessions in relation with the use of markers?

Visu for Synchronous and Delayed Reflection

Visu (result of ITHACA project; Bétrancourt et al., 2011) is a technology system dedicated to both synchronous and delayed reflection in computer-mediated collaboration settings. It is a web videoconferencing platform consisting of an interaction room and a retrospection room. In the interaction room (Figure 1, left), apart from other functionalities, users can leave markers on a horizontal timeline to annotate what is happening during the interaction, be it their feelings or any other types of information. To do so, they can either put a free marker by defining its content (textual form) and then hitting return (button "Poser un marqueur") or use buttons linked to predefined feeling markers: positive (green button) or negative (red button), which are empty by default (a). Text can be associated with feeling markers by using the textual form before clicking on the positive or negative button. The markers set by users are not visible by their partners during the course of collaboration (as it was thought this would affect the quality of interaction by focusing too much users' attention on their partners' markers). In Figure 1, free markers appear in black color while positive (resp. negative) markers are in green (resp. red). In the remainder of this article, we will use the terms "black", "green" and "red" markers (b).
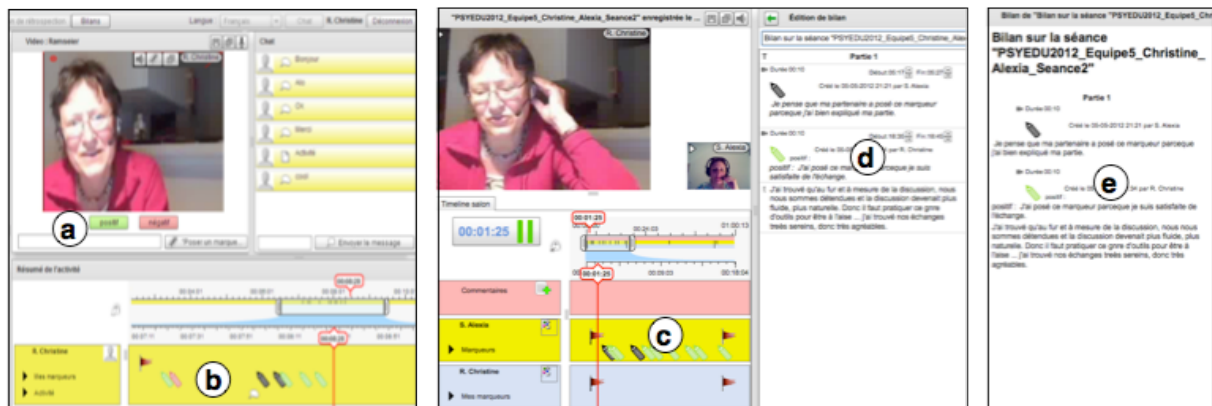

Figure 1. From left to right, the interaction room, the retrospection room and the report window in Visu.

After the interaction, users can access the retrospection room (Figure 1, middle) in their own time and review the traces of the synchronous session (videos and markers). The markers left during the interaction appear on the horizontal timeline (c) and now all the markers (the self and partner's markers) are visible for users who participated in the interaction. When reviewing the interaction, users can individually build a reflective report on the collaboration process, by using any of the markers that were set during the interaction. For this, they can either drag and drop markers in the editing space of the retrospection room and modify the text as they wish or create text blocks from scratch (d). Reports are composed of several sentences and can be visualized on a dedicated interface (Figure 1, right) that also can also present the colored markers that may have been used (e).

Study

Context, Participants and Procedure

The study took place in an ecological context, namely during the educational psychology course of the Bachelor of Science in Psychology at the Distance Learning University Switzerland. Twelve students (11 women and 1 man; students with very different professional backgrounds; mean age 33 years) participated in this course in the 2011-2012 academic year. The study was carried out during a three-week online classroom period dedicated

to the constructivism/socio-constructivism topic. In this period, students were asked to work in dyads (5 same-gender dyads and 1 mixed gender dyad) and used the Visu platform during two synchronous CSCL sessions; the 1st session was held during the 1st week of Period 4, the 2nd session during the 2nd week. During these CSCL sessions, students were invited to discuss and share their understanding about four introductory texts on Piaget's and Vygotsky's theories of learning (two "Piaget" texts and two "Vygotsky" texts). A CSCL script, inspired from a Jigsaw (macro) script, was used to organize both CSCL sessions. This script was designed so that each member of the dyad was invited to individually read a complementary text in preparation for both sessions: student 1 read the "Piaget" Text 1 (for Session 1) and the "Vygotsky" Text 2 (for Session 2); student 2 read the "Piaget" Text 2 (for Session 2) and the "Vygotsky" Text 1 (for Session 1). Each student had to explain his/her text to his/her partner during each synchronous session. Both students then had to (orally) answer together comprehension questions. After each CSCL session, students were asked to use Visu (including the markers) to build individual reflective reports on the interaction with their peer. The report had to be composed of two parts, a *retrospective* part and a *prospective* part. For this task, students were provided with the following instructions: "In the retrospective part, we ask you to express your personal perception on how your partner and yourself have collaborated. This part should concern your own activity, your partner' activity as well as the work of your team. In the prospective part, you have to think about how to improve your team's work, in particular, your collaborative strategies and the quality of the relationship with your partner".

Research Questions

As already said, we decided to use an exploratory approach as we still know little about the use of "reflection-in-action" markers (markers set by learning partners during interaction) for reflection-on-action (reflection after the collaboration session) in CSCL settings. In line with the objectives previously described in the introduction, we will answer the following questions: Q1: What kinds of reflection processes were involved when reviewing the interaction with the learning partner? Q2: What kinds of personal and partner's markers (socio-emotional markers – negative/red and positive/green markers – and free/black markers) did the students use in their reflective reports? Q3: What kinds of reflection processes were related to the use of reflective markers? Q4: How did reflection processes in relation with the use of markers evolve over the two CSCL sessions? Towards whom (themselves, their partner or their group) were reflection processes oriented in both reflective reports?

Analysis Methodology

To answer these questions, we conducted a quantitative descriptive analysis given that the number of dyads was relatively small (N = 6) due to the fact that the study took place in an ecological context (a distance learning course). The analysis was performed on the following measures:

1. The number and type of reflective markers (red/negative, green/positive and black/free) set during both synchronous CSCL sessions (Sessions 1 and 2).

2. The number of reflective markers used in both reflective reports (Report 1 after Session 1, Report 2 after Session 2) depending on (a) their author (personal/self markers and partner's markers), (b) their type (red, green and black) and (c) the reflection category to which they were related. These categories were defined based on Zimmermann's (2002) model. We distinguished between two main categories. The first one refers to the *reflection* phase: evaluation, causal attribution (judgment categories), satisfaction/affect, and adaptive/defensive (reaction categories). The other one refers to the *forethought* phase: goal setting, strategic planning (task analysis categories), efficacy, outcome expectations, intrinsic value, and learning goal orientation (motivation).

Results and Discussion

With respect to Question 1, we were able to classify quite all the sentences in both reports according to the categories of Zimmerman's (2002) SRL model. These sentences mainly referred to the reflection phase (69%), with a higher percentage for the judgment categories (47%) than for the reaction categories (22%). Only 18% of the sentences referred to the forethought phase, with an equal proportion (9%) for the task analysis categories and the motivation categories. Fifteen percent of the sentences were classified as "other", and mainly described technical problems that occurred during the CSCL sessions. It is noteworthy that almost half of the sentences in both reports (45%) were associated with a marker. Linked-marker sentences were mainly dedicated to reflection (88% against 2% to forethought), mainly to express evaluation (38%), causal attribution (25%) and satisfaction (25%). These results suggest that the students' reflection process took a conservative rather than progressive direction. Reflection seemed to be a "looking-backward" process by which students used reflective markers to mainly react upon what was right or wrong in their interaction with their partner. The lack of looking forward led them to pay less attention in reflecting on the subsequent goals and how to achieve them.

With respect to Question 2, results showed that the majority of markers used in both reports was found to be socio-emotional (85% of 151 markers); that was also the case during interaction sessions (71% of 129 markers in Session 1; 66% of 74 markers in Session 2). The highest percentage of linked-marker sentences in both reports was related to positive (green) markers (53%) followed by free (black) markers (32%), the lowest

being for negative (red) markers (15%). This result is quite similar to what was observed for interaction sessions (55% of positive markers in Session 1; 56% in Session 2). Finally, we found that students used more frequently their own markers (68%) than their partner's markers (32%) in the reports, the highest percentage being for self-positive markers and the lowest for partner-negative markers. These results suggest that students preferentially used socio-emotional markers (in particular positive markers) for reflection in- and on action. They also preferred using their own reflective markers to express positive feelings on the collaborative experience.

Regarding Question 3, as already said, markers used in both reflective reports were linked to sentences that focused mainly on reflection on the past experience. Self-reflection sentences that were associated with markers referred more to judgment processes (evaluation: 38% and causal attribution: 25%) than to reaction processes (27%). Moreover, students used mainly positive markers to make evaluation (24%) as well as to react and express their satisfaction (18%). Evaluation was accomplished through the use of mainly self-positive markers (21%), whereas self-positive markers (9%) and partner-positive markers (9%) were used equally to express satisfaction. Causal attribution sentences were associated with mainly free markers (12%), with a nearly equal percentage of self-free makers (7%) and partner-free (5%) markers. Therefore, results suggest that students preferentially used socio-emotional markers –in particular positive markers– to evaluate and react to the past collaborative learning situation. They preferred using "non-emotional" markers to make causal attributions for successes and failures. Moreover, they used mainly their own markers to give positive evaluation, whereas they used their partner's markers when expressing satisfaction or causal attributions.

With respect to Question 4, results related to the collaboration sessions showed a decrease in the use of negative markers (-5.8%) and an increase in the use of free markers (+5.2%) between the two sessions. We suppose that after the construction of their first reflective report, students were more conscious of the fact that their partner could see (and also use) their markers, and might have not want to hurt them. Concerning the reflection processes, there was a shift from partner- and group-focus to self-focus between both reflective reports. In fact, the highest percentage of linked-marker sentences in Report 1 was focused on the group (25%) followed by an equal percentage of self- and partner-focused sentences (19%). In Report 2, the highest percentage was for self-focused sentences (34%) followed by an equal percentage of sentences focused on the partner and the group (21%). Partner- and group-focused sentences mainly consisted of "evaluation" sentences in both Reports 1 and 2. Concerning self-focused sentences, the highest percentage was for "causal attribution" sentences in Report 1, and for both "causal attribution" (+7%) and "satisfaction" (+5%) sentences in Report 2. Meanwhile, the sentences in Report 2 were more linked to the partner's markers (+18%) and less to one's own (-10%). This suggests that the students integrated more their partner in their own reflection-on-action, especially to justify their successes and failures and to express their satisfaction.

As a conclusion, we presented Visu, an innovative tool dedicated to both synchronous and delayed reflection in CSCL settings. To our knowledge this tool is quite unique, as there are little awareness systems that support both reflection in collaborative action and reflection on collaborative action. That is why we adopted an exploratory approach to study the use of markers set by learning partners during interaction to reflect after the collaboration session. To sum up the main results, it appears that the students (1) paid more attention in repairing their relationship than reflecting on the learning and task goals; (2) used mainly positive markers both to reflect in- and on collaborative action; (3) used more their partners' positive markers in their second reflective report; (4) reflected more on themselves in the second report to justify themselves and to express their satisfaction. The relatively small sample size is a limitation of this study; we however consider this study an innovative contribution to the line of CSCL research that we will complete with a qualitative description of detailed processes. More precisely, the last two results of the study appear very interesting, letting us think that a kind of dialog is being set up between the two partners in the second reflective report. We can suppose that a socially shared regulation process did emerge in the second self-reflective report, since the students seem to have self-reflected on collaborative action using the markers put in action by their learning partner. Future work will focus on this assumption, by analyzing in more details the contents of the markers in relation to the contents of the sentences, and by focusing on the behavior of the students within each dyad.

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