Collaborative Work and Interactions in a Closed Discussion Forum. Case of the Tunisian Engineering Students

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***Abstract*—This new mode of teaching includes the need to take into account interactions between different actors in the system and provides the "chat", the "mail" and "discussion forums" as alternatives that could "replace" interactions in a classic classroom.**

But what is it really? And how to make these tools efficient and guarantying good leanings ?

The empirical research that we will present and which affected 52 students called to set up a working group drawn from a discussion forum that we followed. The results shows that interactions between learners are responsible for sharing , collaboration and co-construction of knowledge.

E-learning, interaction, collaboration, construction, discussion forum

I. INTRODUCTION

The aim of this paper addresses questions related to the integration of new technologies in education and particularly the contribution of discussion forums to learning for learners. We are particularly interested in online interactions via a closed educational forum and their dimensions that may influence patterns of access to knowledge and its co-construction.

Online collaboration is a vector of shares that would offer more opportunities for students to connect and interact virtually and produce work with better quality.

II. CLASSROOM INTERACTIONS

Postic (1977) studied classical education by defining interactions as actions and reactions of students and teachers. These interactions have highly linguistic dimension and a gestural one in a lesser extent in the classroom. They are carry meanings recognized and shared. Communication in the classroom is a meaningful mentioned act. It take place mainly between the teacher “speaking, transmitting” and the learner “hearing and receiving”.(1994) emphasis on the importance attached to *finalized pedagogical dialogue* on the basis of an implicit contract: the teacher knows, the students learn. These interactions also take place among peers in the case of a work group.

For their part, teachers are *interpreters* of what happens in the classroom. But this interpretive activity is not limited to written or spoken discourse. Teachers must constantly "read and interpret" the classroom, student movements, their reactions, their progress and their motivation (Tochon, 1993). They also impose meaning, they conduct pedagogical communication and thereby contribute to guide the program of action being based on their preferred meanings. Indeed, as a process of assessment, the pedagogical communication works equally well in terms of forms and codes of the communication of its contents and its standards (Bourdieu, 1982).

Learners try to interpret the messages of the teacher and to make distinction between what he wants and what he wants to say. The interaction they develop between them in a learning situation is not valorized. It impedes the progress of the course and stops the teaching time. What happens for an online course ? Can’t the peer interactions advance the process of teaching / learning ?

III. INTERACTIONS IN AN EDUCATION DISCUSSION FORUM

We define the forum as an easy tool to use and to promote collaboration. Hert (1999) speaks about discussions and quasi-synchronous oral exchanges of these writings with interposed screens. It is a simple virtual space where the writer does not need to handle complex software to develop interpersonal communication situations of different types. We will, however, make the difference between forums called "free" when the discussions are freewheeling and spontaneous, with no target set in advance and forums called "closed" that are limited in time and that hold objectives.

The educational forum is an open space to a small group of learners on an online platform and where they are called upon to communicate, to make contributions to a subject, to respond to messages posted by other participants and to share knowledge.

The educational forums provides time flexibility (Mangenot, 2004) that learners like. In fact, their “learning time” is usually lagging behind the teaching one. It allows the writing to be permanently visible on the platform, allowing it to be visited at any time by students who can share and take ownership.

Groups can form spontaneously to lead a collective work and have fun communicating in a friendly atmosphere where social, emotional and cognitive combine and where the information is listed and posted to be accessible to all at all times. The forum replaces the classroom interactions by virtual ones that have, essentially, a linguistic written dimension and a temporal flexibility that goes beyond the traditional classroom. The interactions are also through signs and encodings that may be common to all groups or specific to one or more groups.

IV. PROBLEMATIC

In this work, we study the interactions involved in an educational forum. This is to see how these interactions, between students, can be valued for working in groups. We want to know if in a class using new technologies, virtual interactions can replace those orchestrated by the teacher in a classic classroom.

We want to study the behavior of students, the roles they attribute to themselves and the organization they have to carry out collaborative work. Our inquiry will also examine the co-construction of knowledge in the absence of a tutor and make the assumption that students, forced to work in groups in a closed discussion forum, behave with reference to presential learning situations. They tend to adopt the same roles and to organize themselves spontaneously to move together and to co-construct their knowledge in the absence of the teacher.

V. METHODOLOGY

The methodology we adopted is based on the study of traces left in the closed discussion forums in the case of a collaborative activity. In this context, several indices can be constructed (Baron and Bruillard, 2003, Huberman *et al.* 1991) to observe the social, cognitive and metacognitiv processes implemented. In fact, variables such as the "volume of individual participation", the "frequency" and even "density" of interventions can be measured to reflect the situation we are studying. That is why we conducted a content analysis to characterize the interaction between virtual engineering students and try to answer some of the questions we posed.

A. Experimentation

We asked engineering students to develop a group work on the "Arab-Islamic science" as part of their course of history of science. This work should be done exclusively online using the closed forum that we created on the moodle platform. This group work has been conditioned by a two-week period, coinciding with the spring vacation, but also with the constitution of 13 working groups formed, each, by four students in engineers. We chose this period to force these students to collaborate exclusively online but also because beyond this period, the corpus collected will be very large and therefore difficult to analyze.

VI. THE FORMATION OF GROUPS

No intervention from the teacher was made to guide the formation of groups. The groups are formed spontaneously after different times.

A. The criteria for evaluation of work submitted

Indeed, we don't indicate to the students any criteria to the evaluation for the work requested. We assumed that students refer to the criteria they already know in a classic classroom: content relevance, coherence of ideas, writing and presentation. Analysis of messages shows that we have done well since the topic of assessment and the concern that results do not appear on a recurring basis.

B. The protocol for data collection

The protocol for data collection was limited to recordings by screenshots of the interface environment of the forum but also by the safeguard of the jobs posted by engineering students at the end of the second week.

C. Description of corpus

Our corpus consists of the 766 messages sent by students in their same group or to members of other groups. It also consists of 13 works posted with a volume of 1.7 GB

VII. CONTENT ANALYSIS

The research methodology we adopted for this research, concerning interaction through online discussion forums is the content analysis. It is defined as "a technique of research for describing objective, systematic and quantitative content of communication (Charaudeau & Maingueneau, 2002), which presupposes "two fundamental operations," "pre-thematic categorization of textual data and their quantitative treatment, usually computerized" *(ibid.)*. The message (input) constitute the unit for the analysis of interactions between engineering students on the forum. The whole discussion has been collected and then divided into meaning units to perform some quantitative but also qualitative measures.

VIII. SEARCH RESULTS

The discussion forum is a process that could present cognitive, social, but also emotional aspects. Thus, in discussing a particular content, students can coordinate their actions, collaborate and motivate their pairs. They also express their emotions.

A. The formation of groups

The formation of groups is not obvious. Collaborate with three others for the establishment of a work requires making choices. Share the same goals that others have do not come naturally. In our experience, the teacher left the students themselves choose the people with whom they want to work.

The first groups were formed of students who have worked together on behalf of other disciplines in the context of a classical classroom. They are consistent, from the beginnings, on the tasks that everyone must do as well as on their respective roles. Intuitively and quickly, they put in place a system of signs and codes that allow them to communicate quickly and more easily.

The other groups are struggling to form as they begin negotiations and exchanges which can, sometimes, be conflicting and time consuming for the job. These groups are slow to establish but there is no indication that they will be not well functioning and producing quality work.

B. A strong student activity

This result is confirmed by the different durations of connections of the engineering students who exceed the 28 hours. It is also proved by the number of messages posted on the forum whish number is 766. These messages show that, in addition to connections on the forum, the students make a personal home work which does not happen in a classical classroom.

C. Evolution of the Groups

The point that we bring to all groups is that they change over time in two phases (Figure 1). A first in which they discuss the problem and take ownership and a second that they try to solve it. These two periods are shorter or longer depending on the groups and social and cognitive affinities that give them their strength. We also noticed that all groups start the "time of the forum" by the time they seek

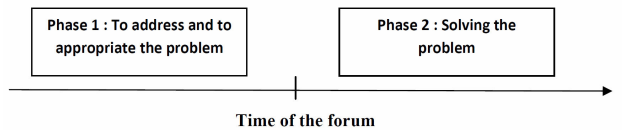

Figure 1. Evaluation of the groups

to establish a harmony between their members and one final moment where they stop any form of discussion following the selection of a final solution. The intermediate time is devoted to conflicts, confrontations and compromises.

D. Behavioral profiles of students in groups

Reading Robert Pléty (1998), we managed to find the same patterns of behavior among engineering students working in groups on an educational forum. We find these results using the volume of each intervention of each student, the type of its intervention and his reactions to others (what interventions result) as variables. Thus, the facilitator, the auditor, the collector and the Independent are almost always present in all groups showing that the characteristics of classical groups are found for those working virtually (Table I).

These profiles induce behavioral relationships between learners who are moving in the "time of the forum." Indeed, from the simple internal "question-answer" we have seen situations where engineering students provide help to others who do not belong to their workgroup (Figure 2).

Towards the end of the period of work, engineering students are moving towards the adoption of an organization in which some individuals are more central in terms of participation. They are positioning themselves as a link between groups and contribute to the construction of knowledge in the virtual classroom. The position of a participant in the figure is calculated based on the number of posts and number of messages read by the participant.

The working group using the discussion forum allows teams to differentiate themselves from others. Indeed, the analysis of the messages shows that everyone chooses to follow a route that is not necessarily that of others. We are no longer in a classic class where everyone has the same tasks and the same things to do. Here, the groups found a freedom that allows them to be inventive and creative. They conduct research, send files to each other, discuss them and debate the relevance of the knowledge they have acquiredThey transmit the knowledge they learn together.

IX. THE DIMENSIONS OF THE INTERACTION

The analysis of the messages we've saved and recorded shows that these can be classified as follows:

- Messages that have the intent to initiate interaction and to initiate a discussion topic
- Messages that asks for information and where we wait for a response from the others
- Messages where you answer the requests of others, where we answer the questions and the queries of the other
- Previous messages that clarify or elaborate on a current topic of discussion

Ultimately, the analysis we've done shows the following distribution: 48.7% of interventions devoted to content, 28% devoted to the management of the conversation

TABLE I.
BEHAVIORAL PROFILES IN GROUPS

Profile	Volume response	intervention	Reactions driven
Animator	Important	Query/Proposal	Followed by positive reactions
Auditor	Somewhat important	Reaction, response and evaluation	Followed by little reactions
Mendicant	Unimportant	Very doubtful (questions)	His questions are well accepted
Independent	Low	Little or no proposal or evaluation	His interventions remain unresolved

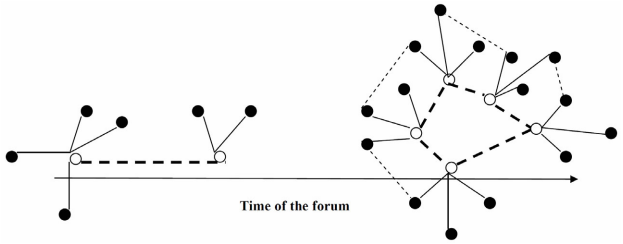

Figure 2. behavioral relationships between learners

and finally 23.3% devoted to the relational aspects. Ces messages présentent trois facettes. These messages have three facets. Indeed, they may have social, cognitive and even emotional dimensions.

A. The Social Dimension

This dimension is closely related to communication between the engineering students and at the way in which they cooperate and collaborate. This dimension includes all statements where we find greetings, forms of address as well as elements of creating and managing the group.

B. The Cognitive Dimension

This dimension is closely related to operations in the group related to the acquisition of some knowledge. This dimension includes all statements where we find words such as understand, analyze, discuss and show that before appropriating knowledge, engineering students treat it critically and collectively.

C. The Emotional Dimension

This dimension is closely related to emotional aspects that engineering students develop during a discussion. These elements of the messages that show an awareness, taking into account and consideration for others' emotions, a control and a more or less motivated to perform a task.

D. Interaction and Learning

We report in the Table II a set of information related to the total length of messages in a group, the number of posts within the same group, the number of files sent, the number of messages sent to learners of other groups and the note given to the group work done.

Reading this table provides very important information that induce an association between different variables, here are a few of them:

- The number of interactions tend to be proportional to the total duration of these interactions.
- Whenever the number of interactions in a group becomes high, the notes of work tend to be better.
- Groups with a minimum number of interactions tend to have the lowest scores.

TABLE II.

	Duration of messages	Number of messages	Uploads	External messages to the group	Note work
Group 1	1h 23min	42	03	04	12
Group 2	1h 43mn	46	03	05	12,5
Group 3	54 min	23	03	0	11
Group 4	**2h 23 min**	**54**	05	14	15
Group 5	**3h 42 min**	**46**	**07**	**21**	**17**
Group 6	2h 11 min	49	05	11	14,5
Group 7	3h 23 min	65	08	25	16,5
Group 8	1h 54 min	47	04	**30**	15,5
Group 9	34 min	17	01	03	08
Group 10	2 h 12 min	39	04	15	15
Group 11	43 min	21	2	07	9,5
Group 12	**4h 11 min**	**82**	**11**	**24**	**18**
Group 13	2h 44 min	61	06	15	15,5

The experiment shows that the error is of vital importance in learning in discussion forums. The pedagogy of the error, and through the communication problems between peers, allow to learners to build a common understanding and representations. Thus the difficulty of understanding lead learners to develop explanations and justifications that they will share and improve to reach a common consensus. These difficulties are seen as elements initiating the construction of knowledge. We hypothesize that the situations where exchanges take place should be sufficiently complex to engage learners and providing opportunities to restore (repair) comprehension problems faced by the students in engineers.

Collaborative learning is based on the socio-constructivist model where social development and acquisition of cognitive skills are closely linked as Vygotsky, 1962 says : "What a child can do today by collaborating with others, he can do it alone tomorrow." It's the notion of "cognitive conflict" that can explain the difficulties of understanding that arise when interacting in a forum of discussion and which may also conduct students to in-depth learning. The differences between the points of view and the misunderstandings which appear become the first conditions for the establishment of a dialogue. Learning on the forums would be so conditioned by social and cognitive incongruities between learners.

However, we can't confirm the generalization of these results because the previous table shows some "anomalies" that we present in the following paragraph:

- Although the duration of connections for group 5 exceeds that of Group 4, they (Group 4) have posted a larger number of messages.
- Although the duration of connections of group 8 is low, they had a good note for their group work. This group received 30 messages from members of other groups that may have influenced the group work. Indeed, more detailed analysis of these messages shows that other members outside the group participated implicitly through their ideas, questions and sent files. They are interested in group discussions because they have good relations with some of its members.

X. REVIEWS

Interactions in the forums are not automatic and not, usually, source of developments in learning. They are conditioned by a good self-confidence, a low level of anxiety but also by a good level of reading and writing. In addition, writing a message on a forum is not necessarily synonymous with interaction.

These interactions can produce nothing if they take place in confusion and if there is no group cohesion. The difficulties of speech turn, the difficulties of convergence of ideas as well as those of perception of the group are factors that negatively affect the process of discussion. Asynchronous writings can present the risk that contributions are added together without a dialogue rise (Henry, 1992).

XI. CONCLUSION

The work we have asked engineers students is to produce a document on the Arab-Islamic science through a closed educational discussion forum shows how this kind of technological support can be useful for learning. Indeed, we showed that online communication via this forum promotes the formation of groups, the creation of social and emotional ties between students and the possibility to co-construct knowledge. The frequency of interactions, their nature and their times may be the cause of a fruitful collaboration synonymous with quality work. The forum becomes a place of collaboration and cooperation that virtual interactions could replace "partially" the presence of the teacher. Reading and rereading the posts still visible on the interface allows the learner to return whenever he wants. The writing becomes a teaching tool more effective than oral, which in traditional classroom situation, has the characteristic of being volatile.

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