THE INITIAL DESIGN OF A LEARNING ANALYTIC TO IMPROVE COLLABORATIVE PROCESS IN A DIGITAL FORUM

S. Niño, J. C. Castellanos-Ramirez, K. Parra
Autonomous University of Baja California (MEXICO)

Abstract

In the field of higher education, the educational proposals involving the use of digital forums have taken a leading role. The potential of these forums to maintain a multidirectional communication based on written texts that do not require spatial or temporal coincidence for participation are especially suitable for promote collaborative learning processes. However, the results of multiple investigations show that, often, the conversations in forums acquire a superficial nature and participants are incapable of engaging in effective learning processes. In an attempt to optimize the learning process in forums, there have been several lines of research that put emphasis on providing information to participants about the activities performed in order to help them improve collaborative processes and learning outcomes.

In this paper, from the concept of distributed educational influence and the model developed for its analysis, the relationship between two different types of information and the degree of usefulness for students to guide their participation and improve their collaborative processes in an online forum is explored. Specifically, the two different types of information are based on two different types of indicators: indicators derived from the structural analysis of students’ activity in the forum, and indicators derived from the content analysis of their contributions.

A study with 24 undergraduate students was conducted; the students participated in 5 forums developing a report of the core themes as a final product of their activity in the online forums. In order to help them to improve their activity, a particular type of information about the activity developed by the students on previous forum was provided before the beginning of the next forum.

In order to value the usefulness that participants gave to the information provided to improve their collaborative processes and guide their own participation in the forums, a questionnaire was administered after each forum. The results show that majority of participants who received information derived from the content analysis of their contributions, assessed it as much more useful than participants who received information derived from structural analysis. The contrasting results between the two types of information suggest that indicators based on qualitative aspects of students’ activity are most useful to help them engage in more effective collaboration processes. From above, we reinforce our interest in further analysis of the relationship between the collaborative processes performed and the learning outcomes with the use of information and its usefulness to promote collaborative learning processes.

Keywords: computer-supported collaborative learning, online forum, higher education, analytic tools, educational influence.

1 INTRODUCTION

The field of research and design known as learning analytics defined as “the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs” [1] has become an emerging area in psychoeducational research.

Other similar proposals, such as interaction analysis tools [2], group awareness [3] or educational data mining [4], share the interest in designing tools to provide information to participants in real time about their activity developed in online platforms to help them improve the collaboration processes. Basically, these lines of research seek the development of methods to exploit the huge amount of data about the activity logs automatically register by the online educational platforms, in order to optimize the teaching and learning processes.
Although the information provided to teachers and students is intended to guide and improve their actions -their teaching and learning experiences online-, some authors [5, 6] point out that the development of an analytical tool that contributes to improve online collaborative learning must have a theoretical basis of learning that guides, firstly, the data that must be collected or processed and, secondly, the presentation and visualization formats.

Considering the above, this work is an effort to enrich the current proposals, since it is a pilot proposal of a learning analytic tool based on a set of indicators related to the distributed educational influence model (DEI) that have been developed from the field of educational psychology [7, 8]. Therefore, the objective of this paper is to analyze the effect of providing information based on the DEI indicators on the collaborative processes of the participants in a digital Blackboard platform.

1.1 The Distributed Educational Influence Model (DEI)

The concept of educational influence [9, 10, 11] refers to the interpsychological processes developed by that teachers, or other educational agents, to help students with the purpose of building deep, complex and valid meanings about learning contents.

However, from this theoretical notion, an effective educational influence must be contingent and varied -in quantity and intensity- and must be keeping to the advances and setbacks that students present throughout the learning process [12].

In situations of guided construction of knowledge, the teacher is the one who exercises the educational influence, but in the processes of collaborative construction of knowledge all the participants are potential sources of educational help for the rest [13, 14, 15].

Thus, the concept of distributed educational influence (DEI) emphasizes that in online collaborative learning processes, the exercise of EI is distributed among all the participants. For that, according to the DEI model [16], the participants must, first, access to the digital environment, make contributions, read the contributions of the group and establish reciprocal relationships; then, participants must manage the three essential dimensions for the development of the teaching and learning processes: the management of social participation (establishment and monitoring of participation rules), of the academic task (follow-up of compliance with the characteristics of the task) and of the meanings of the task (development of teaching and learning content).

Consistent with the previous precepts, the DEI model [8] considers a set of indicators that inform about the collaborative and individual activity of the participants. A first type of indicators has structural nature and is related to the number of accesses to the environment, number of contributions, number of readings and number of established relationships. The second type of indicators is based on the content of the participants’ contributions and is related to the three dimensions of DEI management.

Both the theoretical approach and the set of indicators that the DEI model contemplates for its methodological analysis constitute a solid basis for designing an analytical tool capable of providing information to participants in collaborative learning situations about their own activity.

2 METHODOLOGY

2.1 Context and participants

The work carried out corresponds to a case study in a natural situation [17]. Participants were 24 undergraduate students (20 women and four men) from the Autonomous University of Baja California who were enrolled in a compulsory subject; the contents of teaching and learning were display throughout sixteen face-to-face sessions.

The study includes the parallel activities that the students developed in an online forum. Specifically, the observation situations of the study correspond to the contents developed in five weeks: in the period between one face-to-face session and the next, the 24 students -organized into four small groups- should work collaboratively to write a report about the characteristics of the contents learned in the face-to-face session. Since the students had to collaborate asynchronously to make the report, they had an online forum on the Blackboard platform.
2.2 Design

In order to improve the collaborative processes of the students, at the beginning of each online forum the individual information about their activity developed in the previous forum was provided to them. So that, although there were five forums planned, the students received the information of the activity developed in four forums: the first information was provided when forum 1 was concluded with the purpose of improving the activity of forum 2, and in the same way it was done with the forums 3, 4 and 5.

Four different conditions were established: a first group of students -GA- received the information related to the structural analysis of their activity; the set of these indicators was calculated with the data collected directly from the Blackboard platform. A second group -GB- received the information related to the content analysis of the contributions written in the previous forum; in this case, the elaboration of the information was done by coding the contributions of the participants in terms of the three dimensions involved in the exercise of the DEI. A third group of students -GC- received the two types of information above. Finally, a fourth group -GD- received only general assessments about the fulfillment of the task.

2.3 Data collection and analysis

The corpus of data analysed corresponds to the activity logs of the participants automatically generated by Blackboard platform, as well as the contributions written by the students in online forums. The data was analysed using the set of indicators of the DEI model [8] according to the structural nature (access, contributions and reciprocal relations among the students). The above has allowed to establish activity profiles based on the number of indicators that each student presents: i) individual access index, ii) individual access pattern, iii) individual contribution index and iv) individual reciprocal relation index.

In order to value the usefulness that participants gave to the information provided to improve their collaborative processes and guide their own participation in the forums, a questionnaire was administered after each forum; in total, four questionnaires were administered. Ratings were made using a Likert scale, from 1, very little useful, to 4, very useful.

3 RESULTS

3.1 Activity profiles of the students

Table 1 presents the number of indicators that participants of each group (P1, P2, P3, P4, P5 and P6) achieve in the five forums (F1, F2, F3, F4 and F5). Shaded cells correspond to the forums in which a participant reaches the ideal profile for the exercise of EI.

<table>
<thead>
<tr>
<th>Group</th>
<th>Participant</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
<th>F5</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA</td>
<td>P1</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>2</td>
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<tr>
<td>(N=6)</td>
<td>P2</td>
<td>4</td>
<td>3</td>
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<td>P3</td>
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<td></td>
<td>P4</td>
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<td>4</td>
</tr>
<tr>
<td></td>
<td>P5</td>
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<td></td>
<td>P6</td>
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<td>4</td>
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<tr>
<td>(N=6)</td>
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</table>
According to the Table 1, the greatest differences about the number of indicators that the participants of the different groups achieve are mainly between the first forum, in which they do not receive any type of information, and the rest of the forums, where they do. Specifically, in F1 there are two participants in GA (P2 and P3) and GB (P5 and P6) that achieve the ideal profile of activity, that is, they achieve the ideal value of the four structural nature indicators; however, in GC and GD, there are no participants that present this characteristic.

Then, after the first information provided to the groups, in F2 the vast majority of participants present an ideal profile, it means, the participants achieve the ideal value of the four structural nature indicators; except in GD where only two participants (P1 and P2) presents this characteristic. Similarly, the number of participants with an ideal profile in the rest of the forums is always greater than in F1, except in GD that presents a forum (F4) in which again none of the participants achieve the ideal value of the four indicators.

3.2 Assessments about the usefulness of information

The questionnaires completed by the students explored two specific aspects: the degree of usefulness of the information received to improve the collaboration process and to improve the individual activity. Table 2 shows the total scores of the group members given to each of these aspects on a Likert scale where 1 point corresponded to very little useful and 4 to very useful. Shaded cells correspond to the assessment about the usefulness of the information to improve the collaborative process; the cells without shading correspond to the assessments about the usefulness of the information to improve the individual activity.

<table>
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<th>F2</th>
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</table>

In general terms, the three groups that received information related to DEI present a progressive decrease in the scores given by the participants to each of the items. As it is observed, the scores that the participants give to the usefulness of the information are higher when they receive it for the first time (at the beginning of F2) and in the following forums these scores tend to be lower. This pattern is observed both in the scores of the usefulness of the information to improve the collaborative process and the activity of the participants. In the case of GB and GC, the pattern presented by the scores awarded to the usefulness of the information to improve the individual activity (unshaded cells) is
striking, since even though these scores fall minimally in two subsequent forums to the first evaluation, in the remaining forums these scores are the same as the one presented by the first forum.

4 CONCLUSIONS

The results become a series of conclusions. On the one hand, it seems that the information associated with the theoretical model of DEI has a greater effect on collaborative processes than information per se, because of participants of GA, GB y GC achieved more easily and constantly the ideal activity profile. Although the effect is more noticeable in the three groups after the first delivery of information, this effect will gradually decrease.

On the other hand, the students’ assessments of the usefulness of the information to improve their activity are the first time higher and, throughout the forums, they decrease progressively. However, the scores that remain slightly more stable are those of the participants that received information derived from the content analysis of their contributions (GB and GC); the above note that the qualitative nature information is better assessed by the participants that quantitative or structural nature information. Furthermore, according to the same assessments, it seems that the information is much more useful to improve the individual activity than the group activity.

The results obtained in this exploratory work and the previous conclusions support the interest of the proposal, but also point out the need to expand and enrich the approach used in this work; to the future, a detailed analysis of the particular dynamics established by the participants within the group as a possible way to understand the effect of the information on them and their learning processes must be considered.

REFERENCES


