Effects of different tutoring modalities in online learning environments

Abstract
The results presented in this paper focus on the study of two dimensions related to tutoring: proactive tutoring versus reactive, human tutoring versus system tutoring. A total of 228 university students took part in the study. The results obtained in two different experimentations lead us to consider the preponderance of human tutoring over system tutoring with an important handicap however being the cost, particularly in the case if proactive tutoring, that may require up to four times more effort than reactive tutoring. In this paper, we also consider other observations important to emphasize concerning proactive tutoring.

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Introduction

This contribution is a result of a synthesis of works realized within the Technology Unit of Education (generally in collaboration with other research teams) on tutoring in online learning environments. The works that will be presented in this text deal more specifically with the study of two dimensions related to tutoring: proactive tutoring versus reactive, human tutoring versus system tutoring.

The works, from which some results are presented here, are founded on provoked experimental devices implemented in realistic learning contexts. To conceive of and realize these studies, we developed a distance training platform responding to the acronym ESPRIT (http://ute.umh.ac.be) which disposes of functionalities adapted to the different research programs we selected to conduct.

Forms of tutoring and their function

The notion of tutoring is central in distance training devices and more particularly in the area of online distance education where the richness and diversity of interactions engendered contribute toward giving it an even greater place.

We find in the literature a great number of studies focused on tutoring and on the functions it is called upon to take charge of:

- Cognitive support: The tutor must accompany the learner toward the mastery of subject-related and methodological competencies (Burge & al., 1991; Laurent & al., 1992; Henri & Kaye 1985; Denis, 2003).
- Socio-affective and relational support: The tutor must encourage and sustain the learner (Henri & Kaye, 1985; Burg& al., 1991; Pettigrew, 2001; Glikman, 1999; Gagné & al., 2001).
- Motivational support: The tutor must stimulate and maintain student motivation (Lebel, 1995; Carrier & Schofield, 1991).
- Metcognitive support: The tutor must help the learner plan her/his learning, organize her/his work and develop a reflective attitude with regard to her or his own learning processes (Henri & Kaye, 1985).
- Administrative and technical support: The tutor must help the learner with difficulties met in contacts with the institution at the administrative level as well as in the use of tools of communication placed at her/his disposal (Lebel, 1995; Denis, 2003).

Mason (1990) considers that the mere presence of technologies that facilitate communication is not sufficient to lead learners to interact. In order to stimulate interaction. activities must be proposed to the learner that will enable contact with the tutor, and if this does not happen in spite of the incitements proposed, it is up to the institution to take the initiative and adopt a proactive attitude with regard to the learner.

Glikman (1999) underlines several reasons which explain why the learner does not always take the initiative to ask the tutor for help:

- some learners organize themselves to find the information they need in the online resources placed at their disposal;
- some learners dare not solicit the tutor for fear of exposing their lack of understanding;
- some learners no longer solicit the tutor because of a lack of satisfaction during the first contact.

As authors such as Poser & al. (1992) and Dijkstra & al. (1998) have stressed, weakness in recourse to the tutor can also be explained because of an insufficient awareness on the part of learners of their real needs in learning support. However, as Glikman (1999) recalls, although they do no solicit him often, learners on the whole recognize the positive contribution of the tutor. The fact that he is available appears, in their eyes, more important than the fact that they call upon him regularly. This feeling among learners is equally stressed by Taplin & al. (2001). Moreover, these same authors notice that learners do no significantly ask for more help in keeping with their level of success. Karabenick & Knapp (1991) illustrate in their analyses that those who seek the most help are the more active learners who care more about completing assignments on time.

The works we just evoked underline the interest to delve more deeply into the modalities of intervention of a tutor in an online learning device and their effects on different variables such as academic performance, learning time or even investment in the area of tutoring.

Some research results in the area of tutoring

As we announced in the introduction, we shall focus ourselves more particularly on two dimensions related to tutoring. On the one hand, the proactive - reactive dimension in which proactive tutoring will be defined as that which implements the initiative interventions of the tutor and reactive tutoring as that in which the tutor limits himself to reacting to the solicitations of the learner. On the other hand, the human tutor – system tutor dimension which refers to a tutoring dimension that is taken in charge by a human tutor as opposed to tutoring entirely assured by a computerized system.

To analyze these two dimensions, we are basing ourselves on the results of two studies conducted with a public of university students. The first one was conducted with a sample of 120 subjects and the second with a sample of 108 subjects.

In the first study (De Lièvre & al. 2005: De Lièvre & al. 2006), we chose to cross the two dimensions that we just evoked. In conformity with our initial hypotheses, learners benefiting from proactive human tutoring obtain the highest results measured with regard to improvement made between a test passed beforehand (pretest) and an equivalent test proposed at the end of the learning period (posttest). Following proactive tutoring, we find reactive human tutoring and the reactive tutoring by computer (tutoring system) and lastly, the proactive tutoring by computer.

To explain in greater depth the tutoring modalities that we just evoked, we decided to resort to a more sensitive dependent variable constituted of an error score elaborated on the basis of errors committed by learners during the course of learning. On the basis of this variable, we were led to notice that the proactive group benefiting from human tutoring clearly commits less errors (an average of 7,3) followed by the reactive tutoring group and the proactive tutoring system (average close to 19) and lastly with the highest error score, the reactive tutoring system (with an average of 20,5).

These results illuminate interest in human tutoring in particular when it is proactive, meaning to say when it solicits the learner by asking her/him to formulate hypotheses and justify them in the framework of an exchange similar to a Socratic dialogue. However equivalent results obtained by the reactive human tutoring groups and the proactive tutoring system lead us to think that more than an intrinsic effect of human tutoring, its effectiveness could above all depend on the manner in which it is implemented. Hence, in the experiment being considered, the intervention of human tutoring reveals itself superior to the tutoring system only when the tutor takes the initiative; whereas in the reactive modality, the proactive tutoring system approach is just as effective.

The tutoring modality that turned out to be the most effective in this study is also the one that is most time consuming. As far as the tutor is concerned, a proactive tutor demands of the human tutor that he permanently follow the pupil's activity, forcing himself to understand the learning trajectory to intervene at the most opportune moment whereas a purely reactive tutor is only mobilized when demands are made of him by the learners he has under his tutorship. Hence, the time devoted to dialogue with the learner was on the average 67 min. 25 sec. for a proactive tutor compared with 15 min. 30 sec. for a reactive tutor which constitutes a considerable difference considering that these times do not account for the moments in which the tutor observes learner behavior without entering into explicit dialogue with her/him.

As for the learners, taking into consideration the time devoted to the task enables us to underline that it is significantly higher when tutoring is proactive (264 min. 57 sec. on the average for proactive tutoring and 236 min. 22 sec. for reactive). The price that must be paid to obtain superior results in a situation of proactivity must therefore be assessed both in terms of supplementary supervision demanded by the tutor but also supplemental time spent on the task by the learner.

This observation that leads us to underline the cost of a proactive approach must however be explained by the fact that the time spent by the tutor in inclined to decrease as the learner progresses which allows us to think that during

a sufficiently long learning period, the initial cost linked to the mastery of the first situations the learner will have to treat constitutes an investment that in the long run will enable the reduction of time spent on tutoring.

In the second study (Quintin, 2005), the time devoted by the three tutors involved was analyzed according to the proactive-reactive dimension. On this occasion, the observation according to which proactive tutoring would require more time was confirmed. Hence, the proactive modality required a supplement of 48 minutes of supervision with regard to the reactive modality. Let us note however, that for a given tutoring modality, the time allotted to supervision could vary greatly depending on the tutor. In the study being considered, a rapport of one to three between the most rapid tutor and the one having spent the most time tutoring was observed (10h. 17 min. for one and 29h. 17 min. for the other).

As for the efficacy of tutoring modalities, no significant difference was revealed. A difference of one point that benefited the proactive modality was nonetheless observed.

The presence of a tutor effect on results was equally tested without showing any meaningful difference. However, if we report the average scores obtained depending on the tutor in terms of the time spent on tutoring, we are led to observe that the tutor who spent the most time supervising students is the one whose learners had the lowest scores, 18,94 opposed to 19,18 and 19,46 respectively for the two other tutors (no meaningful differences).

If we confront these results with those registered for the proactive-reactive dimension, it would appear that the positive effect of proactive tutoring on learning results is linked more to the tutoring modality than to the time spent on tutoring. Just as in the first experiment reported in this study, the time spent on tutoring was much more important in the proactive modality compared to the reactive one (31 min. 10 sec. versus 13 min. 20 sec.).

We also dispose of certain data concerning the proactive tutoring modality compared to the reactive one as a result of opinion questionnaires submitted to students during the two experiments considered in this contribution.

Concerning the second experiment, the questionnaire was comprised of items pertaining to three aspects related to tutoring: consideration of the effectiveness of the device, perception of time invested and appreciation of the contribution of tutors.

With regard to the effectiveness of the device, no effect related to the tutoring modality was able to be underlined. On the contrary, for the two other aspects, certain differences are worthy of mention. Thus, students having benefited from proactive tutoring have a tendency to consider the time they invested in training as appropriate with the complexity of notions studied even though they spent three times more time on their training than students submitted to reactive tutoring. This result, at first glance, could appear paradoxical since it is the students who spent the most time in following the training who consider that the time invested is adapted to tutoring demands, and can be explained by the relative perception of time in accordance with the working context. In fact, as emphasized in other studies (De Lièvre & al., 2006) the richness of interactions engendered because of proactive tutoring modifies the learning context and the learner's perception of it very strongly.

It is relatively concerning the appreciation of the contribution of tutors that differences in opinion in tutoring modalities are most important. Hence, among students claiming to be dissatisfied with tutoring (25% of the whole student population) that they benefited from, two thirds of them had benefited from reactive tutoring.

The most favorable opinion expressed globally concerning proactive tutoring on the occasion of this second experiment is confirmed by the opinion data gathered in the framework of the first experiment. These results notably show that when asked if they feel that their knowledges improved in aspects such as course content or in work methods, it is the proactive group that benefited from human tutoring that gave the most favorable answers; next come the reactive group with a human tutor and lastly, the group that benefited solely from tutoring taken charge of by computers.

Synthesis and discussion

If we consider all the results reported heretofore, we are led to consider the preponderance of human tutoring over system tutoring with an important handicap however being the cost, particularly in the case if proactive tutoring, that may require up to four times more time than reactive tutoring. The pedagogical interest in the human tutor is not a

novelty since it was underlined by numerous authors who insist, notably, on the importance of its function of social accompaniment (Choi and Hannafin, 1995, Hardy, 1992; Power & al., 1994).

We consider other observations important to emphasize concerning proactive tutoring. If this type of tutoring globally appears more effective than reactive tutoring, it also mobilizes important resources when it is assumed by a human tutor. However, contrary to what we may think, its effectiveness does not seem to be linked to time spent by tutors in taking it on. Hence, the differences from one to three in time spent in taking charge of tutoring did not give rise to differences in terms of performance for the beneficiaries. We consider another element concerning the proactivity - reactivity dimension worthy to be signaled out because of its incidence on learner performance. In fact, the results of the first experiment led us to underline that proactive tutoring assumed by a computer could prove to be as effective as reactive tutoring taken in charge by a human tutor which enables the opening up of interesting perspectives concerning automated tutoring which certainly deserve further investigation.

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