Motivation self-report in ITS

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1 Introduction

Motivation diagnosis is a virtually unexplored issue in AI and Education research, and we have previously emphasized the need for research in this area [1]. In this paper we present an empirical study in which self-report was used as a way of communicating with the computer about participants’ motivation.

The self-report approach is probably one of the easiest to implement, and was suggested by [2] but, to our knowledge, has not been yet implemented in an ITS. To allow us to study students’ reaction to and usefulness of the self-report approach, we developed a prototype ITS called MOODS (MOtivation Diagnosis Study) and performed an empirical study which we describe and discuss in the following sections.

2 Description of MOODS

MOODS was developed as a prototype of a simple tutoring system with an added facility that lets students inform the system about their motivational state as the instruction takes place. MOODS consists of 10 lessons, with the aim of teaching Japanese numbers up to 100.

Five types of lessons were developed ranging from simple presentation of numbers to memorise to a Tetris-like game to perform number additions. For each of these types we developed 2 lessons, one dealing with numbers up to 20 and another dealing with numbers up to 100.

We created six instructional paths, each of them consisting of a different combination of lessons. We attempted to create each instructional path with a different teaching style that would influence differently students’ motivation. With this we hoped to see the reaction of students to the self-report method under a broad spectrum of affective situations.

As a central component of MOODS, we implemented a “motivation model” that is divided in two main categories: traits (‘permanent’ characteristics: independence, challenge, control, fantasy and expertise) and states (‘transient’ characteristics: effort, confidence, sensory interest, cognitive interest, relevance and satisfaction). This model is based primarily on two theories of motivation in education [3, 4] and on one of the very few motivational models implemented in an ITS to date [2].

Although the task of choosing between different factors is a difficult one, we believe that our model presents a useful set of the main important characteristics for student motivation, while doing it with a small number of variables which makes it feasible to use it as part of the self-report method.
Information about student’s traits characteristics is gathered prior to the interaction with the main MOODS interface through a small on-line questionnaire in which the student has to rate his ‘level’ for each of the five traits categories. Information about student’s motivational state is gathered throughout the interaction with MOODS via the manipulation by the student of six sliders, which represent the six ‘state’ categories of our motivation model.

3 Description of study and results

18 university students volunteered to participate in our study (3 students for each of the instructional paths). Their collaboration consisted of: a pre-questionnaire regarding the trait characteristics; interaction with MOODS system; and a post-questionnaire regarding mainly their opinions on the system and the usage of the motivational model.

The participants were asked to “use these sliders [representing the various motivational factors] as often as possible whenever you think there is a change in any of these factors, since it is necessary for the computer to understand your current situation in order to modify the instruction accordingly.” (emphasis in original instructions). Actually the instructional paths are fixed, but this together with the true purpose of the study was explained to the participants only after they had filled in the post-questionnaire.

The interactions with MOODS (which on average lasted about 14.5 minutes) were recorded thanks to the software TkReplay [5]. Some preliminary results of the analysis of these data are presented below.

On acceptance of the self-report method. Participants’ answers to the post-questionnaire seem to indicate that self-report could be an acceptable method for motivation diagnosis. The acceptance of the trait questionnaire was very high (an average answer of 4.21 in a range between 1 and 5). The acceptance of the motivational sliders (average answer was 4) was lower, although still very high given our expectations. Nonetheless, this acceptance may be artificially high due to the short length of the interaction with the system.

Which sliders were used more often? To inform future designs of self-report interfaces, it is important to understand which sliders were used more often, in order to give priority to these factors. The order in which the sliders were used was: confidence (with an average of 3.5 uses per participant), effort, satisfaction, sensory interest, cognitive interest and relevance (with an average of 1.33 uses per participant).

This is consistent with the answers to the post-questionnaire, in which participants were asked to comment on whether they found that any of the motivational model factors was particularly difficult to answer. Four people answered this, relevance being particularly difficult to answer for all four, independence by two of them, and each of control, confidence and cognitive interest by one of them.

Which values did the sliders take? From the point of view of designing a better self-report interface, it is also very important to know which values the sliders took during the interactions. It is also very important in order to understand the relations (if any) between different motivational factors.

Our hypothesis that some of the instructional paths would be more appealing than others seems to be confirmed for some of the factors (mainly cognitive interest and sensory interest, in which the value of these correlates to the number of instructional path), though not for others (mainly relevance and effort).
Also apparent is the positive relation between confidence and satisfaction. Our data only provides (on average) low levels of confidence, for which we would expect the observed positive relation. In future analysis we will analyse the data for individual lessons to see whether the relation between confidence and satisfaction is inverted, as expected, in those participants with a higher level of confidence.

4 Conclusion

In this paper we have presented a study of the possibility of use of self-report to detect motivation in an ITS. This is, to our knowledge, the first study of this type to date. As a result, we think that self-report is a viable option for motivation diagnosis. However, a number of issues have been raised and we intend to modify our approach for future implementations of MOODS.

As we suggested, the reaction of the system to the values of the motivational sliders may have a great impact on the willingness to continue using the self-report facilities. Therefore, care should be paid to make the reaction of the system to users updates of the sliders very obvious, in order to encourage the use of the self-report facilities.

As a continuation to this work, we will perform a study in which participants with tutoring experience will see previous interactions with MOODS replayed and will be asked to predict students' updates of the motivational model (see [6] for further details). That study will help us to find which variables from the interaction seem to be more important for the tutors in order to detect students' motivation. This could, in turn, help us modify the motivation model presented in section 2.

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References


