Learner tracking: which system?

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Abstract - **Currently, in an e-learning environment, the activity of following-up (tracking) of the learning process is confronting several problems. The tutor must do a multitude of tasks with insufficiency of tools allowing him to improve the performance of these tasks. Also, this insufficiency of the follow-up systems develops, for the learner, an isolation feeling and thus involves his defecting. Our research interest is to design and implement an effective system in order to support the tutor to be efficient in his double task: individual and group follow-up. Our contribution consists of determining the problems involved in the remote follow-up, defining information necessary to the tutor to carry out his tasks, identifying the indicators witch will be edited under a dashboard to appreciate not only quantitatively but also qualitatively the work of learning without exploring the detailed trace of training. These data allows us to define an architectural design for our proposed system. So, this system will be useful for the tutor, as source of information to follow each learner. In addition, the learner will constantly have access to history of its actions, the remarks of the tutor, and also to compare himself with the other members of the group.**

Index Terms – Dashboard, e-learning, group follow-up, individual follow-up, isolation feeling, learner, tracking indicators, tracking support, tutor.

INTRODUCTION

Several studies showed that the need for social relations is a factor which influences the evolution of distance formation learner.

The teachers in the distance formation establishments estimate that more this need is high for one learner more the risk of its abandonment is.

Indeed, learner can feel isolated in front of its machine and consequently to discourage themselves and release taken. With an aim of reducing the feeling of isolation and the demotivation of the learner, it is important to implement a real human mediation ensured by a tutor who can give assistance to learner throughout his learning [2]. This said, the presence of a tutor, key actor of a distance formation, for the accompaniment of the learner is the best guarantee for good formation progress and good result. But, the guidance is a complicated activity.

Indeed, the tutor is confronted with a whole of difficulties related to the absence of direct contact with the learner, like with the important number of learners to follow-up simultaneously [1].

Initially, the tutor must make a detailed analysis of the activities of each learner. For that, the he must identify indirectly how the learners arrive at the results that they obtain.

Another difficulty is that the tutor must notice any possible problem encountered by the learner and anticipate rectification actions before this problem does not constitute a blocking of the learning progress.

This implies that the tutor maintains a privileged relation with each learner while taking into account his personal characteristics: its profile, its motivation, its personal rate/rhythm of training, its capacity of autonomy, its participation and its interactivity with the system of training.

We thus note that the tutor needs a tool of analysis and synthesis to support him in his painful task of remote follow-up.

There are tools of remote follow-up support. However, for the majority of them, the tutor obtains only one first level of statistical data about the learner activities. The tutor must then synthesize these statistical results to exhibit the possible hidden problems.

Our research task is interested to produce a tool to support the tutor in his double task: individual and group follow-up.

Through this paper, we try to describe a specification and an outline of the tool architecture, object of our research.

Thus, we start by describing the principal missions which an accompaniment tutor must achieve. After which we review the various types of the tutor intervention at the time of a remote follow-up.

Then, we present a brief view on certain follow-up tools in order to extract information provided by these tools.

The next paragraph provides a specification of the system in term of actors and their needs.

Before concluding, we propose a global architecture of our system.

The conclusion traces the progress of our work as well as the perspectives to be reached.

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THE ACCOMPAGNEMENT GUIDANCE

Within a distance formation, the tutor occupies various functions. Thus, one speaks about reception guidance (informative and explanatory dimension), management guidance (relationship to the institution), transmission guidance, evaluation guidance and accompaniment guidance. What interests us here; it is the accompaniment guidance (i.e. of follow-up).

The accompaniment tutor plays a key part in the distance formation. The quality of the follow-up makes it possible to guarantee and maintain the learners motivation and in particular, to prevent that they give up their formation before finishing. Thus, to ensure a better quality of the follow-up, the tutor is charged to perform the following key functions and to be a:

- Motivational and relational Support: it is a human mediator to justify and stimulate the learner. It helps him to fit and take part in the interactions and activities of the group[3] .
- Regulator: He controls the learning by adapting the difficulties of the learning situations suggested for each learner according to the evaluation from its acquired knowledge and deficits [4].
- Intellectual catalyst: He raises up the learner thought, as well on the contents, as on the personal project and approach of learning and collaboration [5].
- Appraiser: He evaluates (formative and summative assessment) the knowledge and skills acquired by the learner during the formation [4]. He evaluates also the group working (climate, cohesion and productivity) in order to intervene effectively.
- Facilitator: He guides and directs the group in the good direction. Thus he helps to include/understand the contents, to develop the research spirit by providing the resources necessary. Also it suggests routings, explains the working methods and encourages the development of knowledge.
- Moderating: He develops and controls the interactions, For that: he organizes the group, suggests cognitive strategies for the cognitive search for information, presents the matter (structure and model of knowledge), installs rules for the interactions, follows these rules and intervenes to redirect the working group in a productive way.
- **Architect pedagogue**: it has sufficient degrees of freedom to set up and to dynamically adapt the learning situations to the needs and characteristic of the learners group and to the formation progress [6].

To assume these responsibilities and to fully perform these tasks, the tutor is brought to intervene, at the convenient period, either for one learner or for the group.

THE TUTOR INTERVENTIONS

The tutor interventions are of two kinds: reactive and proactive.

Reactive interventions: the tutor intervenes only in response to a learner explicit request. Thus, the tutor waits to be solicited by learner when this one needs additional information or encountered a given problem.

Proactive interventions: the tutor takes the initiative to intervene with one learner. In this case we distinguish two types of interventions:

Planned proactive interventions such as:

- **Establishment of the balance sheet of the work stage.**
- **The proposal for links towards complementary resources to the activities.**
- **Presentation of the activity.**
- **The launching of the activity.**
- **The launching of the discussions.**
- **The planning reminder.**

Contextual proactive interventions such as:

- **The support for the motivation.**
- **Messages to prevent the difficulties (for example: errors of comprehension of the instructions, situations conflict on the forum, identical productions).**
- **Messages to allow learner to change strategy.**

STUDY OF WHAT EXISTS

In order to locate our system among the tools and the platforms allowing the learners follow-up in e-learning, we did a brief study of some of these tools. This study, centered on the principal functionalities of these tools, enabled us to identify various information provided.

The studied tools are:

- **SIGFAD:** this tool provides to the tutor indicators on the advance of the activity of the group, the state of an activity realization (realized, in progress, late), times of learner connections and exchanged messages number.
- **REFLET:** Reflet is intended to visualize the progress report of a learner and a promotion of learner in a distance formation. When it is connected, the tutor can have a synthetic vision on the advance of promotion, and visualize the advance of one particular learner.
- **CROISIERE:** It is a device for learning the FFL, French like Foreign Language. The tutor has access to the actions of learner: messages, productions to be evaluated, the course envisaged and the progress report in each module.
- **DOKEOS:** Give the card of each learner and allows obtaining the data of its activity: a number of sessions, tests done, points obtained, opened documents, visited courses and modules. It provides also the list of the addresses email for the coaching.
- **MOODLE:** this tool provides information on connections, downloaded documents, learner activities progress …

According to the characteristics of these tools, we note that they provide quantitative values information. The tutor must analyze and interpret this information to be able to apprehend the individual progression and the group progression. From there, we identified some indicators necessary to the tutor at the time of his mission of follow-up.

Thus, it proves clearly that the task of follow-up remains particularly complicated and even with the use of these tools, there is always an extra work for the tutor. This extra work is dependent on the analysis and the interpretation of the quantitative information provided by these tools, for exhibit of possible problems and to objectively judge the learning process. A true automatic follow-up will have to be assisted by a data analysis intelligent system.

This system must provide to the tutor indicators of qualitative values so that it can apprehend directly the learning situation. Among the indicators which the tutor needs we cite the:

- **Learner assiduity.**
- **Learner participation:** the participation of learning in the various forums, the contribution to co-operative or collaborative work and the modifications brought in individual work can help the tutor to trace the conditions and the progression of training of one learner.
- **Learners which are in difficulties.**
- **Cohesion of the group:** it is expressed by interdependent behaviors and a regular participation of the members. Cohesion does not exist without a group made up. It is the resultant of the forces which act on the members to encourage them to remain together [7]. The attraction to belong to a group, the degree of proximity and the identification of the group members are forces of cohesion. It is thus important for a tutor to be able to appreciate the cohesion or the not-cohesion of a group. To be able to analyze this criterion we will have recourse to the social networks or other which are based on **the concept of graphs with N-click.**
- **Group productivity:** it refers to the feeling which the group members test when their interactions lead to a production which they consider satisfactory. Notes at the groups that cohesion and the feeling to be productive are indicators of maturity. A group passes typically by stages of growth and evolution which brings it until maturity. It reaches its maturity when its members become good collaborators: They know each other the ones well the others, can interact and develop a feeling of membership with the group.
- **Groups which are in difficulties.**

ACTORS OF THE SUGGESTED SYSTEM

In our system the principal actors are: the tutor, the learner, the group and the formation evaluator.

I. The tutor

The tutor will be able to use the system in order to:

Maintain a privileged relation with each learner by having the possibility to:

- **Follow remotely the learner progression.**
- **Support learner in the moments of difficulties.**
- **Evaluate individually each learner.**

Perceive the participation of each member of the group for:

- **Identify adhesion with the group and measure the state of motivation.**
- **Evaluate the contributions.**

Perceive the productivity of the group for:

- **Measure the contributions into the collective productions.**
- **Validate the productions.**

Perceive the dynamics of the group through the exchanges between the members for:

- **Detect the sleeping, absent and active members.**
- **Locate the conflicts within the group.**
- **Motivate the sleeping members and incite them to contribute.**
- **Inform the absent members.**
- **Detect the situations of blocking of the entire group.**
- **Intervene with the case of collective error.**
- **Clear up a concept badly included/understood by the entire group.**

Perceive his own activity of tracking by the consultation of the history of his interventions for:

- **Measure the effect of his interventions.**
- **Change or improve his strategy of the follow-up.**

II. The learner:

Each learner is characterized by his preliminary knowledge, his preferences, his objectives, his centers of interests, etc. In our approach we enumerate the needs for learner as follows:

- **To consult his personal way.**
- **To measure his progress report compared to the course envisaged.**
- **To compare himself with the other members who follow the same courses.**
- **To have suggestions to solve a problem.**
- **To consult messages of motivations, encouragements or warnings.**
- **To control himself his training.**

III. The working group

The group will be able to use the system to:

- **Compare itself with the other groups which follow the same formation.**
- **Consult if its project is validated or not**.

VI. The formation evaluator

The formation evaluator will be able to use the system to:

- **Measure the formation quality.**
- **Assess the tracking quality.**

THE ARCHITECTURE OF THE SUGGESTED SYSTEM

We define (see Figure 1) the context total of our system in term of: Inputs, outputs and constraint.

I. Context of the system:

I.1 Inputs: They are raw data containing the list of learners, the list of the groups, the data on the forum (messages exchanged between learners), the data on connections of each learner (the number of connection, connect time…), the documents downloaded and the data on each activity (validated, in progress, late…).
These data can come for example from a data base of an E-Learning platform. We will not present in this paper the format for their exploitation which can be for example XML.
I.2. Outputs:
I.2.1 A synthetic dashboard:
It will make possible to present essential information of tracking concerning the element to be followed-up. This element can be a learner, group or set of groups (a class).
The indicators presented by this *dashboard* are the:

- **Assiduity of learning.**
- **Participation of learning.**
- **Autonomy of learning.**
- **Respect of the times of the projects.**
- **Level of learning within the group.**
- **Cohesion of the group.**
- **Productivity of the group.**
- **Level of the group compared to the other groups.**
- **Situations of blocking.**

Thus, this dashboard will allow:

- **With the tutor to make the suitable decisions.**
- **With learning how to know its progress report and to be located in the group.**
- **With the group to be located compared to the other groups.**
- **With the appraiser of the formation to supervise the work of the tutors and to have an idea on the quality of the formation**.

I.2.2. A detailed dashboard:
This *dashboard* is used to present information such as the:

- **Detailed way traversed by each learner (dates of connection, duration spent to perform one activity, notes…).**
- **Interventions in forums.**
- **Percentage of progression in each module.**
- **Kinds of questions which frequently arise.**

I.2.3. Proposals for interventions:
For each learner or groups having difficulties in progression, productions, participations or other, the tutor will be brought to intervene. This intervention will depend on the learner situation. Thus the tutor achieves function like:

- **Motivational support to motivate the learner and to incite him to take part in the group if he does not take part enough.**
- **Moderator** to control the group's interactions.
- **Facilitator** to direct learner by proposing resources to be consulted or problems resolution methods. He can even give the solutions if the learner is in a situation of difficulty which risks involving him towards a blocking.

I.3.The constraint:

Our system deals with the follow-up concerning teaching sequence.

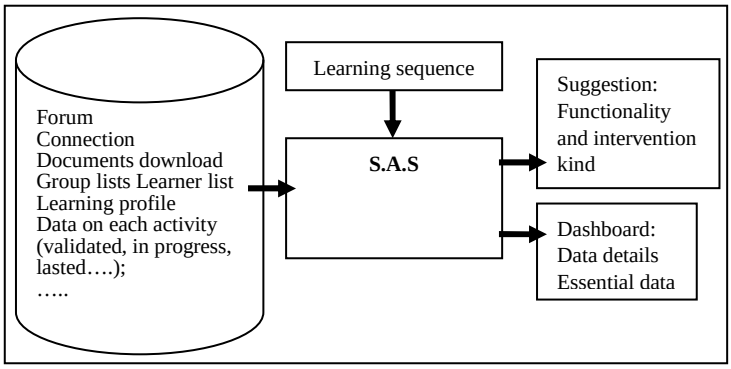

FIGURE 1
CONTEXT SYSTEM
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II. Architecture of the system

With an aim of allowing the use of our system like autonomous application or of integrating it in a platform, we conceived it and broken up into modules. The latter take in entry all information on learning following to produce dashboards and to suggest suitable interventions.
This architecture rests on four key components (see Figure 2):
A module of retrieval of the data:
This module will make it possible to extract the data to treat and present them under a well defined format.
This will allow the module of analysis data to treat data resulting from various data sources (relational data bases, XML files …).
A module of analysis of data:
Thanks to this module the system can provide indicators which help the tutor to appreciate not only quantitatively but especially qualitatively the work of learning without having to explore the detailed trace.
A module of presentation of the data:
It is a module to present the indicators of the dashboards through an ergonomic interface (text, graph, animation…).
An intelligent tutor: it will help the tutor in his task of follow-up by making suggestions to him relating to the type of function to be carried out. This system is based on a base of the teaching rules to establish.

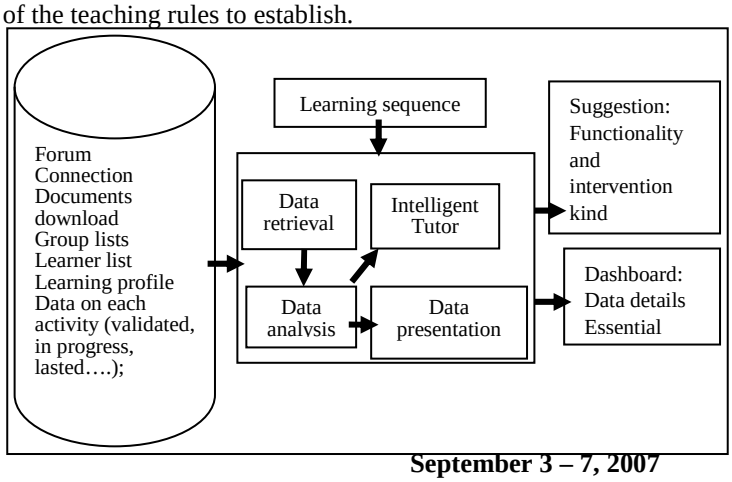

FIGURE 2
STRUCTURE SYSTEM OF ASSISTANCE TO THE FOLLOW-UP

CONCLUSION

Our research tasks are focused around guidance and in particularly accompaniment's guidance.
In this present paper we put the point on the importance of the roles of guidance of accompaniment in the remote formation. Indeed, this role of teaching accompaniment allows learning how to progress, include/understand its weakness, to fill them and be motivated in follow any sequence of training comfortably.
We also defined the principal actors of our system of tracking assistance, its context of exploitation and its architecture.
Our work now will be directed towards the following axes:

- Define the method of calculation of each qualitative indicator to leave the elements of measurement.
- Work out a detailed specification of each module of the system as well as the interaction between these modules.
- Define a format of presentation and exploitation of the data.
- Work out a knowledge base starting from the experiments of the tutor. This base will be a reference for the intelligent tutor module.

Our system will be implemented progressively.

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