DEVELOPMENT OF A MOODLE TOOL FOR MASSIVE GROUP TEACHING, LEARNING AND MANAGEMENT IN STATISTICS

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Statistics should always be taught to groups of students no larger than 120. Unfortunately, that is rarely the case. The strategies for teaching and learning Statistics to larger groups are very complex and yield questionable results. Learning Statistics often requires very personalized work that would be very difficult or simply impossible to achieve in a large classroom. Here we present an application, called UB-Tracking (UB: University of Barcelona), structured within the Moodle environment for teaching and managing large groups in Statistics. The application allows teachers to schedule various simultaneous tasks to monitor all the students, both working individually and in groups, and to profile those tasks by types of students. It also facilitates fast track display yield obtained during the course. Finally, it also provides teachers with more profitable teaching time due to the large amount of information readily available.

INTRODUCTION

The delicate balance between continuous evaluation and group size has been approached from different points of view. For some, that is an unreachable goal, and it is misleading, or even fictional, to think of anything other than a continuous evaluation process with few students. For others, the purpose matters more than the inherent difficulties of the large numbers of students registered (Etxebarria, Garay and Romero, 2012; Holmes & Dodd, 2012 and Aydin & Tirkes, 2010). For that reason, they advocate maintaining the concepts of continuous evaluation, though applied "creatively", given the real difficulties of following up 80 or 90 students per group.

The latter option is mainly based on the supposed advantages of high-performance students in a continuous learning system, which get lost within a so-called "discreet" learning system.

In our opinion, both sides have assumable aspects and are partly right. The budgets of continuous evaluation are obvious in theory – and inapplicable in massive groups if unadjusted.

However, when adjusted, the usual thing to do is to return to conventional evaluation systems "disguised" as continuous evaluation. As is known, repeating that we are doing continuous evaluation does not make it true. Our experience in recent years (Data Analysis in Psychology in the Psychology major, and Research and Statistics Techniques in the Psychology degree) has taught us that all the processes helping to consolidate continuous evaluation make students have a better approach to learning. All the actions we have set in motion regarding the approach to and follow-up of every student's activities have shown an improved performance – both the actions regarding on-site projects and those dedicated to off-site projects. However, whereas on-site activities were within the teaching expectations for every course and program, off-site activities have continuously exceeded the real expectations and the workloads.

With such large numbers, it is extremely difficult to conduct personalized follow-ups of the students. It is true that we foster group work, and that takes some emphasis off of that aspect, but eventually we need to evaluate the students individually. Therefore, we need much more thorough evidence – at least in very technical, instrumental courses like ours.

Consequently, we need a personalized follow-up system that enables us to know in what phase every student's individual work is. At the same time, we need the same informative input about the work group. That is, we need to conduct a follow-up of every student, of their role in a small work group, and evidence of the group as an academic work unit. We have set in motion several proposals which have partly fulfilled some of our needs. Nonetheless, in the long term, they did not prevent the loss of emphasis of some aspects of the evaluation system due to a real lack of time. For instance, if four tutoring sessions were programmed per group and semester, eventually only two took place with care, and then another rather partial one. In our opinion, there is no relationship between the incidence of this on the final grade and the necessary guarantees in the teaching action. It needs to be done in much more detail. Ranging from the preparation of common work wikis for groups of students to the creation of shared documents to conduct projects, or the

use of special repositories, etcetera – all of them within the Moodle environment – all turned out to be successful tests, albeit partially in their final performance. But not even then is a formally correct personalized follow-up feasible.

Perhaps we have improved the collective follow-up of every group, but not that of every student. Some experiences follow computer systems where the students and teachers keep several levels of teaching contact that allows the former to work individually and in groups, and the latter to be witnesses of it all without complex organization systems through very easily managed systems. With many students per group, organization is obviously complex. These initiatives (some within the Moodle environment, some not) are based on the global conception of teaching management and are self-regulated systems in agreement with both sides – very similarly to the notion of the academic contract. Both sides set individual and group goals for themselves that must be filled in by a computer system controlling the activities of the two agents involved and allowing both of them to know where they are all the time.

Therefore, our goal is to develop an individual and group follow-up system (*UB-Tracking*), within the Moodle environment, of the teaching activities of the students in the Research and Statistics Techniques course of the Psychology degree of the University of Barcelona (UB) that can be extended to other courses with many students. We intend to work within the budget limits of a real continuous evaluation system (McNeill1, Arthur, Breyer, Huber & Parker, 2012; Guàrdia, Peró, Freixa, Turbany & Gordóvil, 2013 and Aydin & Tirkes, 2010). The design of this contribution is based on the possibility to acces students' performance instant information, individually or by working group. Furthermore, unlike other moodle tools, this tool allows the teacher to establish a task sequence related to the needs of any student or to the needs of each student work group. This optimization task function of the UB-tracking tool makes it a ductile option for any task type.

UB-TRACKING TOOL FOR MOODLE

The basic idea is to develop a tool for *Moodle* that helps teachers to monitor a group of students. It is important to note that this tools is not a task summary or a closed continuous assessment system. It will depend on each user (teacher) the content definition, and its validity will depend on a correct mixture between assessment contents and options of the moodle tools.

Figure 1 shows a scheme of this monitoring. A group of new students must answer a questionnaire to let us know if they meet the initial level required to follow the course correctly; in our case, initial concepts of mathematics and statistics. Considering the results of this test, the tool generates the collaborative groups of students. They can be generated in two formats: merging students with different levels of performance (compensated group), or merging students with the same level of performance (balanced groups). Once the groups are formed, the UB-tracking tool allows the teacher to assign different activities to the groups and to each student. These activities could be different for every group or student, and eventually, when the students upload the activity to *Moodle*, a window similar to figure 2 appears in order to follow the students' evolution during the course. The green code indicates an activity solved correctly, the red code is an activity solved incorrectly, and the orange code is an activity pending assessment by the teacher.

Figure 3 shows a screenshot of the UB-Tracking tool with the different screens that will appear while using it. Firstly, in the figure we can see the four initial commands of the tool:

- Establishing a questionnaire to assess the initial level (*Establecer cuestionario de evaluación de nivel inicial*).
- Generating groups of students (*Crear distribuciones de alumnos*).
- Linking activities to groups of students (*Asociar actividad a distribución de alumnos*).
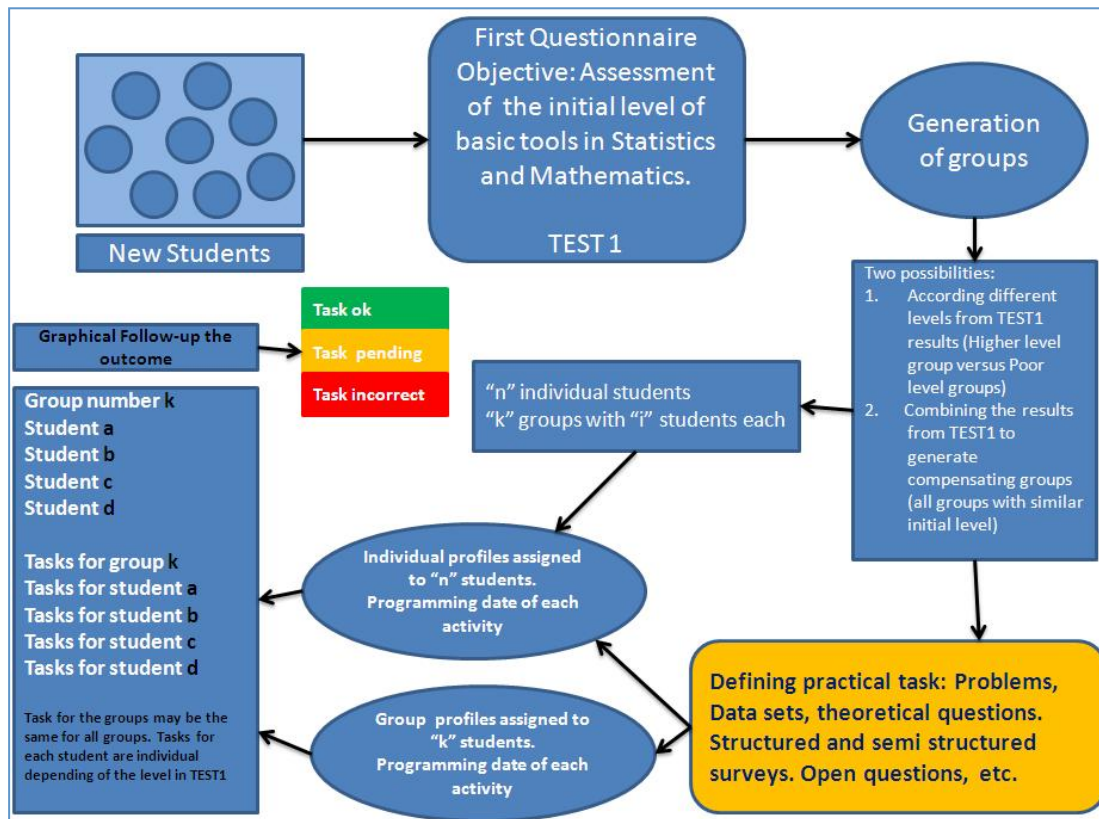- Statistics (*Estadísticas*).

Figure 1. Scheme of the main steps of *UB-Tracking*.

GROUP	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Activity 6	Activity j
1	green	green	green	red	red	red	orange
2	green	green	green	red	red	red	orange
3	green	green	red	red	red	red	orange
4	green	green	green	green	green	green	orange
5	green	green	green	green	green	green	green
6	green	green	green	green	green	green	green
7	green	red	red	green	green	green	green
k	green	green	green	green	green	red	red

Figure 2. Graphic follow-up of the outcome.

The *Establishing a questionnaire to assess the initial level* command *(Establecer cuestionario de evaluación de nivel inicial)* is the place to assign the first task that will serve to generate the groups of students (compensated or balanced groups). Once all the students have answered this initial level test, the second step is to generate the groups of students by using the *Generating groups of students* command *(Crear distribuciones de alumnos)*. With this command, the teacher can select the kind of group to generate – compensated or balanced – as well as the number of students for each group by clicking a button to configure the distributions of the groups. At this point, it is important to mention that when the groups are formed automatically by the UB-Tracking tool, the teacher can modify the groups and, if necessary, change some students manually.

The *Linking activities to groups of students* command *(Asociar actividad a distribución de alumnos)* allows the teacher to assign different activities to the groups of students and also individually to each student (Figure 3). It is not necessary for all the groups to have the same activities. This is an important point for the individual activities because the teacher can select

the most adequate activities for each student in relation to their initial knowledge and capabilities.
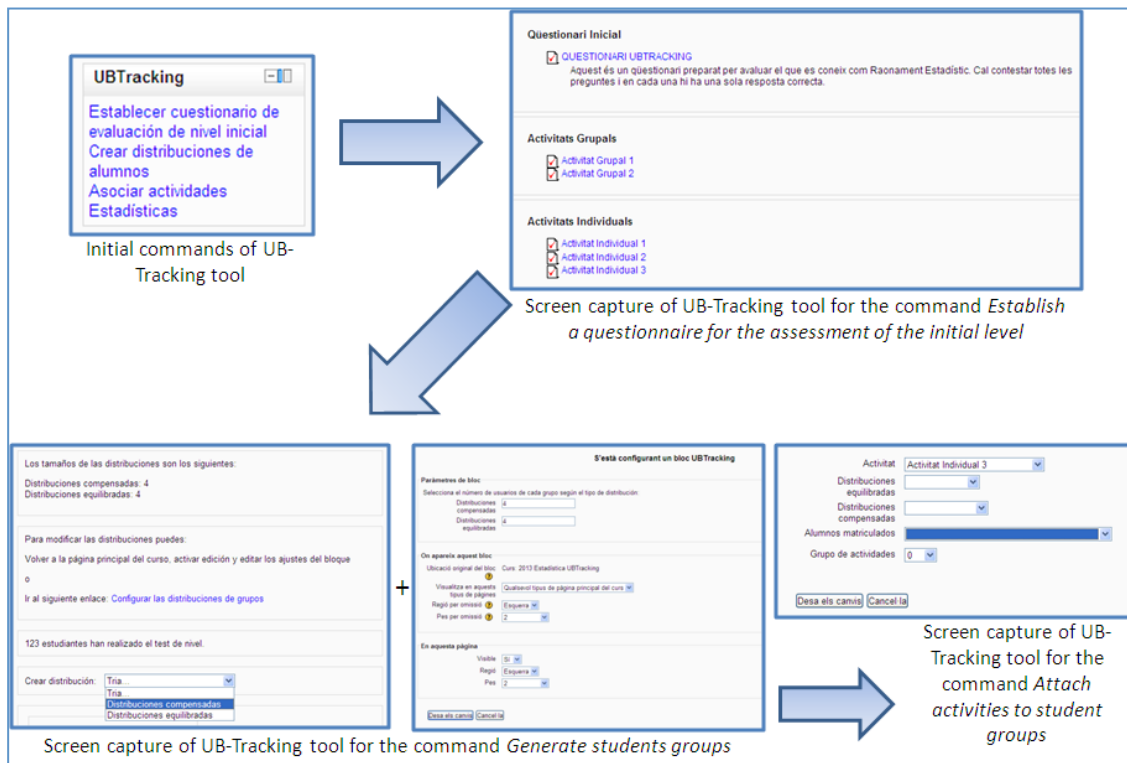

Figure 3. Screens of *UB-Tracking* tool.

Finally, in the *Statistics* command *(Estadísticas)*, the teacher can obtain a summary of the monitoring or follow-up of the groups and of each individual student, similarly to those presented in figure 2.

Likewise, it is important to remark that, at the moment, we only have partial information about the performance of the described tool because we have designed it in the subject of applied statistics in Psychology and with students of this grade. It is obvious that it is not logical to have this complex tool only for one subject as the contents could be adapted to different subjects, and especially, in those cases with high-density student groups by course.

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