A demonstration of ALAS-KA: A learning analytics tool for the Khan Academy platform

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Abstract. Instructors and students have problems monitoring the learning process from low level interactions in on-line courses because it is hard to make sense of raw data. In this paper we present a demonstration of the Add-on of the Learning Analytics Support in the Khan Academy platform (ALAS-KA). Our tool processes the raw data in order to transform it into useful information that can be used by the students and instructors through visualizations. ALAS-KA is an interactive tool that allows teachers and students to select the provided information divided by courses and type of information. The demonstration is illustrated with different examples based on real experiments data.

Keywords: learning analytics, Khan Academy, technology-enhanced learning, visualizations

1 Introduction

It is common the use of Virtual Learning Environments (VLEs) to support the learning process. However, it is very hard to interpret the raw data that these platforms generate, thus instructors and students need help to understand the learning process in online courses [1]. For this reason, the transformation of raw data into useful higher level information is required so that low level interactions are not only presented.

Khan Academy is an educational web-site which provides a free education for everyone. The Khan Academy platform is able to provide different types of exercises and videos but also implements some innovative features like gamification techniques and learning analytics visualizations. These default visualizations include low level interactions and also some higher level information. In this work we present a demonstration of ALAS-KA, which is a learning analytics tool that provides new visualizations with new information for Khan Academy which are not available by default. In addition we illustrate this demonstration with real examples of courses where ALAS-KA has been applied, showing visualizations that stakeholders should interpret to understand the learning process. There are other works [2-3] that have developed other similar learning analytics tools for different platforms such as Moodle and WebCT, although the provided information is not the same as the one ALAS-KA provides.

2 Overview of ALAS-KA

2.1 Technology

ALAS-KA is designed as a plug-in for the Khan Academy platform. The Khan Academy system as well as ALAS-KA run over the Google App Engine (GAE) architecture and use the GAE Datastore for data persistence. In addition, the underlying programming language is Python. ALAS-KA needs the data generated by students while interacting with Khan Academy to process it to obtain higher level information. Furthermore, we use the Google Charts API for visualizations. An in-depth description of technology aspects have been addressed in previous work [4].

2.2 Metrics

It is hard to make sense of raw learning data without prior processing. We have developed a set of metrics that transforms raw data into meaningful information that can be used by the actors who intervene in the learning process. A total set of 20 different parameters have been introduced in ALAS-KA. Specific formulas for some of these metrics have been presented in previous work [5].

We have divided the different metrics into five functional modules [5] which are explained next. *Total Use of the Platform* gives insight about the use students has done in the platform. *Correct Progress on the Platform* contains parameters which try to assess how good the interactions have been. *Time Distribution of the Use of the Platform* focuses on analyzing the distribution of the time in which users have interacted with the platform. *Gamification Habits* offers a couple of metrics to see if students are motivated by gamification elements. Finally, *Exercise Solving Habits* analyzes users' behaviors when solving exercises such as hint avoidance, try abuse or unreflective.

2.3 Visualizations

We use visualizations with the aim of presenting the information obtained by the processing of the metrics previously explained. Some of the design criteria followed to implement the interface are the following: keep the interface as simple as possible, make a meaningful use of the colors, divide the user interface in parts and use the same standards in the entire application. The objective is that teachers and students can have a good interaction with ALAS-KA. The implemented visualizations for the explained metrics can be divided in two groups:

- Class visualizations: These visualizations present an overview of the status of the entire class or a set of students. The main type of graphic used for class visualizations are pie charts because we want to give an overview of how the class is distributed for each kind of metric. An example is shown in figure 1.

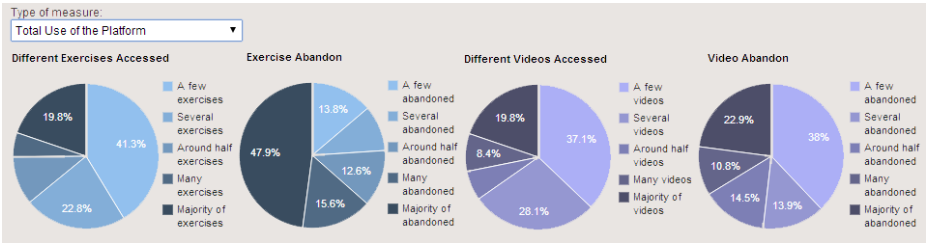

Fig. 1. Example of class visualizations retrieved from the *Total Use of the Platform* module.

- Individual visualizations: In-depth visualizations enable teachers to analyze each student separately or self-reflection for students. We have decided to use bar charts for individual visualizations. Each type of metric has its individual visualization with two bars: the first bar represents the result for that student and the second the mean value of the class. Two different examples are shown in figures 2-3.

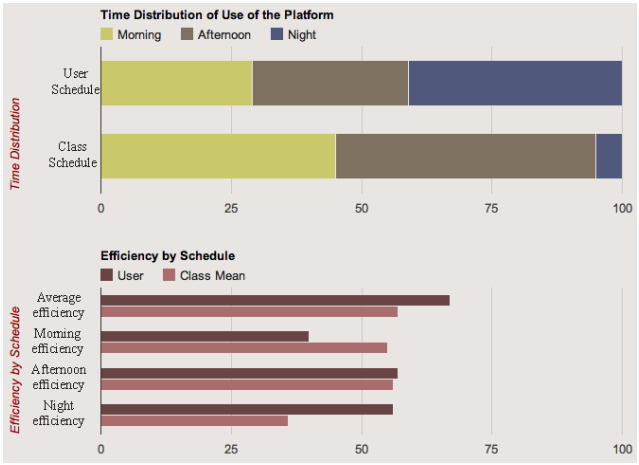

Fig. 2. Individual visualizations about the *Time Distribution of the Use of the Platform*.

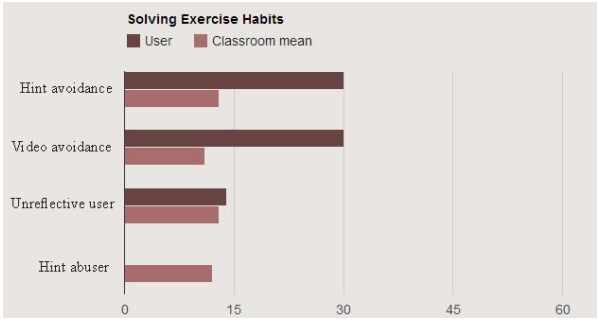

Fig. 3. Example of individual visualizations about *Exercise Solving Habits* metrics.

3 Demonstration Outline

The demonstration will show the different main functionalities of ALAS-KA and how students and teachers can interact with the tool. In addition, the demonstration will show different visualizations in real courses to enable instructors improve their learning decisions and interventions. The live demonstration outline will be as follows:

- The demonstration will start first with a very brief explanation of the objectives of ALAS-KA, as well as its scientific contribution.
- Secondly, the general menus of the tool will be explained (selection of a course, selection of individual or class visualizations, selection of the type of metrics, etc.)
- Next, some class visualizations will be provided using the tool, analyzing the learning process based on these visualizations and promoting the discussion for other possible interpretations depending e.g. on the context.
- Finally, ALAS-KA will be used to present some visualization of individual students in order to make a deep analysis of some selected students. We will give an analysis of these specific visualizations, and the possible interpretations and ways of teachers to act.

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