

Student Focused Dashboards

An Analysis of Current Student Dashboards and What Students Really Want

Gabriel Reimers¹ and Anna Neovesky²

¹*Quality and Usability Lab, Technische Universität Berlin, Ernst-Reuter-Platz 7, 10587, Berlin, Germany*

²*Digital Academy, Academy of Sciences and Literature Mainz, Geschwister-Scholl-Str. 2, 55131, Mainz, Germany*

Keywords: Dashboards, Learning Analytics, Visualisation, Self Reflection.

Abstract: Online learning analytics dashboards are already available in various online learning platforms and are in use at schools and universities. In this paper we give an overview about several existing dashboard applications. Most of these dashboards are either targeted at teachers and tutors or focus on the presentation of research relevant learning analytics concepts. We present two surveys among school and university students asking them about their requirements on a learning dashboard. The results show that basic requirements of students are not addressed in current learning platforms and dashboards. We formulate several research questions that need to be answered to create dashboards that put students in the center of dashboard design processes and give an outline of our own efforts in that direction.

1 INTRODUCTION

Learning Analytics and Quantified Self currently are quite popular topics in educational research. Learning Analytics are “the use of intelligent data, learner-produced data, and analysis models to discover information and social connections, and to predict and advise on learning.” (Siemens, 2010).

So, Learning Analytics are the evaluation of the learners’ activity in order to improve learning and teaching. Quantified Self, on the other hand, is a concept coming from the consumer industry and describes the detailed tracking of personal activity, especially in sports. Fitness trackers like the FitBit fitbit.com and Jawbone jawbone.com log the movement of their owner and present that data in concise, graphical form on an online dashboard. Quantified Self and dashboards have quickly been adopted by education research. In the next section we will present several of these educational dashboards and will discuss their very purposes.

It will be shown that most of the scientific dashboards were designed from a learning analytics perspective. That means they are usually intended to present learning data collected from data mining or detailed user tracking. The purpose of these dashboards often is to easily identify problems of single students or to analyze the teaching method. Other – often commercial – tools offer dashboards for teach-

ers and parents to supervise their children’s grades and attendance. Both approaches focus on observation of students, which can also be seen in the current NPC Horizon report on higher education saying “Dashboards filter this information [from learning analytics] so that student progress can be monitored in real time.” (L. Johnson, 2014a).

Certainly, it is very valuable for teachers, researchers and parents to have an overview of the students’ progress and possible issues. However, hardly any of the presented dashboards is intended to be the central starting point for students to see their progress. Those that are, are scientific prototypes and often designed for specific courses.

We conducted two surveys among school and university students asking them what they want to see in their online learning platform. The results of these studies are presented in section 3. Our surveys show that students lack a dashboard as their personal control center. Basic information, like an overview of grades and upcoming deadlines, are not sufficiently covered by existing dashboards.

2 EXISTING FORMS OF DASHBOARDS

When looking on existing online tracking systems for student progress, we think it makes sense to distinguish between the environments of schools in K12 and higher education. Requirements of students in schools and universities differ just as much as resources of institutions and expertise of staff do. Therefore, we present current dashboard examples from both K12 and higher education environments, focussing on how well they might serve as a central personal dashboard for students.

2.1 Dashboards in K-12

2.1.1 Teacher & Parent Focused

US school books publisher Pearson offers the commercial online “student information system” *PowerSchool* pearsonschoolsystems.com. PowerSchool is mostly a class management tool for teachers and school administrators and allows tracking of grades and absences as well as management of schedules and student files. PowerSchool also offers an overview of progress. Even mobile apps are available for students and parents to be notified about new or noteworthy grades. After all, the system mainly targets parents and teachers and does not provide a graphical progress and activity dashboard to students.

A quite similar approach is taken by the German private school *Schloss Neubeuern*. The school has an online grading portal schloss-neubeuern.de/de/SchuleUndInternat/Noten.Online, where parents can access “real time presentations of your children’s grade book”. Students also have online access to their grades but clearly are not the target audience. Presentation is limited to a tabular gradebook.

The commercial learning management system (LMS) *Edmodo* snapshot.edmodo.com/snapshot-for-schools, which is specifically targeted on schools, has extensive statistics on dashboards, which feature a slick modern design but are available to teachers and administration only.

2.1.2 Student Focused

It is noteworthy that some initiatives and private organizations provide very advanced dashboard tools in order to keep students motivated. Especially the non-profit education platform *Khan Academy* is to be mentioned, even though their dashboard is strictly embedded in a gamification context with levels and badges.

khanacademy.org However, KhanAcademy is an independent project and not linked to institutional learning in schools

Also, the *schoools.com* platform, developed at the Instituto Superior Politécnico Gaya in Portugal for K-6 schools, gives a lot of social feedback to students and is indeed a very mature and complete private social network for children. Yet, a dashboard or any form of statistics is not part of the platform.

2.2 Dashboards in Higher Education

2.2.1 Learning Management Systems

Ideally, dashboards should be provided by the learning management systems (LMS) which often are already in place at schools and universities. Regarding the top LMS (Green, 2013), however, none of them has dashboards for students.

Moodle and *Blackboard* both provide very basic overview tables of student grades for instructors but have no equivalent for students. But it should be mentioned that at least for Moodle there is an extension available that gives students a dashboard, displaying graphs of the students online activity within Moodle moodle.org/plugins/view/block_mystats.

Brightspace claims to offer “Advanced Analytics” brightspace.com/solutions/higher-education/advanced-analytics and so does *Schoolology* schoolology.com/lms-reporting.php, but both only provide learning analytics tools to instructors, not to students.

2.2.2 OLI Dashboard

Carnegie Mellon University has a very broad project called *Open Learning Initiative* (OLI) which is a platform to create eLearning courses. oli.cmu.edu OLI provides learning analytics data for educators and even has a dashboard to track students’ activity. However, this students’ dashboard is basically just a tabular grade book.

2.2.3 Competency Map

The *Competency Map*, developed at Capella University, takes a more gamified approach and displays a student’s progress split up into several competencies (Grann and Bushway, 2014). For each course, key competences are defined that should be obtained by the student — a bit like in role play games (RPG), completing single tasks accounts to specific competences. Progress in each of these competencies is then graphically displayed in a dashboard. Therefore, the

competency map is a very student oriented tool, giving learners a concise overview of what is expected of them, and how much progress they have achieved. The authors' position is "that the most direct way for institutions to help students appreciate their educational experience is to align faculty grading practices with specific competencies and to visualize student learning for multiple stakeholders." Accordingly, one extra step is required to use this dashboard concept in common grade-oriented institutions and courses.

2.2.4 Grade Craft

Similar to the Competency Map, researchers at Michigan University created a dashboard for unconventional, gamified courses. (Holman et al., 2013) The *GradeCraft* dashboard system was used in two courses: *Videogames & Learning* and *Political Science*. Both courses used game elements to increase motivation and participation. Students could collect badges for special tasks and would select assignments from a bigger pool so they could choose their own 'path'. GradeCraft provides an overview of current progress and achievements and shows what needs to be done to get the next achievement. As students are free in what tasks they choose, GradeCraft also includes a performance prediction tool, which allows informed decisions on what to do next.

It is especially worth pointing out that GradeCraft targets students and instructors equally and provides interfaces for both groups. All performance measuring, assessment and analytics are thus managed in one central tool.

2.2.5 Case Studies

Especially the team around Erik Duval at Katholieke Universiteit Leuven (KU Leuven) has a strong focus on researching dashboards. Several prototype dashboards were developed there. The *Student Activity Monitor* (SAM) (S. Govaerts, 2012) and an unnamed prototype (J. L. Santos, 2012) are dashboards that display activity and time spent during a course to both teachers and students. Building on that, the dashboard *StepUp!* was developed at KU Leuven, which "visualizes different learning traces, such as: time spent on the course, resource use (e.g. wiki and blog use) and social media use (e.g. Twitter)" (J. L. Santos, 2013). All dashboards of KU Leuven provide students with detailed tracking of their activity and are in that sense very similar to fitness trackers' dashboards.

At Melbourne University a dashboard was deployed in a biology course in order to explore students' interpretation of learning analytics dashboards.

(Corrin and de Barba, 2014). The dashboard displayed bar charts of performance in online tests and assignments as well as LMS activity. For each value the course mean was given. So students can see if they are above or below average. The authors report that "the ability to view their feedback in this format was found to have an impact on students' motivation towards the subject and helped to guide them in their progress and performance in learning activities and assessments".

2.3 Summary

While commercial dashboards show more basic information like grades, they strongly focus on teachers and parents as users. Benefit for students is usually very limited.

The scientific dashboards, on the other hand, are usually more student targeted. They are often designed for single courses and display learning analytics information like the time spend on certain tasks or the activity in social learning settings.

None of the existing dashboards does really give students the greater picture of their progress, especially not across courses. Key information like grades is often missing, and the graphical presentation and usability are not on par with what commercial trackers like FitBit or Jawbone or not-institutional providers like Khan Academy offer.

Higher education institutes like universities are closer to providing useful dashboards to their students as they directly profit from research results. Still none of the research-driven dashboards has gained wider acceptance and learning management systems like Moodle or Blackboard do not offer real dashboard solutions.

Schools, in contrast, don't directly profit from research projects and rely on commercial or open source software solutions. Accordingly, it takes longer for student focused approaches to dribble down to K-12 education. This is also reflected in the current NPC Horizon reports, which show dashboards as a current or soon-to-be topic in higher education but only as a long-term trend for schools (L. Johnson, 2014b).

3 RESEARCH POSITION

Erik Duval is right when he says "one of the big problems around learning analytics is the lack of clarity about what exactly should be measured" (Duval, 2011). When building a dashboard, the biggest question still is what data to present there. In our opinion,

the contents of a dashboard should not be determined by what data is the most accessible or most research relevant. A user centered design approach must be followed and user studies have to be made to evaluate what the users – i.e. the students – need and want to see on the dashboard.

We conducted two surveys to ask students about their expectations of online learning systems and especially learning dashboards. Focus was put on performance analysis, and we did not ask about badges or LMS activity measures. On the one hand, performance data like grades or homework ratings are a very general pattern found in almost any course in schools and universities. On the other hand, performance data is the primary information to students. It will probably be helpful to expand dashboards later with additional activity metrics, but the first step must be to display performance progress to the students in a satisfying way.

3.1 K12 Students Survey

First, we did a small survey among 47 German students attending 12th and 13th grade of a comprehensive school in Mainz, Germany. The survey was conducted during a career day at the *Academy of Sciences and Literature Mainz*. The students were aged between 16 and 19.

The questionnaire asked several general questions about the participants use of computers but especially covered how students would like to see their performance online. The given statements and the possible answer options are given in Table tab:schoolSurvey.

Two items aimed to evaluate to what extend students would like to see their grades online. On the statement “I would like to see all my grades online.” the students mostly agreed. 33 of the 47 participants (70%) “generally” or “always” want to have an overview of their grades online. The item “My classmates should be able to see my grades online.” largely received disagreement. 35 “never” want that (74%), 11 only after explicit clearance (23%). No student said she wanted her grades to be always visible to classmates.

Three items under the headline “How would the following online services affect your motivation to learn:” should evaluate what form of online performance analysis students would consider motivating. The idea of “Detailed online statistics of my grades, graphically displaying my progress” received the most agreement. 17 of 47 respondents (36%) were “neutral” to that item and 4 students (9%) considered it “frustrating” or “strongly frustrating”. 18 (38%) said such statistics would be “motivating” and

Table 1: Items asked in the survey among school students.

Statement	Answer options
I would like to see all my grades online.	No, never Generally not Generally Yes, always
My classmates should be able to see my grades online.	No, never After clearance If not blocked Yes, always
How would the following online services affect your motivation to learn: <ul style="list-style-type: none"> • Detailed online statistics of my grades, graphically displaying my progress • Online comparison to the grades of my classmates • Online ranking (High-Scores) of my classmates 	strongly frustrating frustrating neutral motivating strongly motivating

8 (17%) even “strongly motivating”.

The option of an “Online comparison to the grades of my classmates” received more disagreement. 17 of 47 respondents (36%) found that “strongly frustrating”. To almost half of the students (22) such comparison would not affect their motivation. Only 8 (17%) found that “strongly motivating”. Even more refusal was met with the concept of “Online ranking (High-Scores)”. Over half of the students (24 of 47) considered that as “frustrating” most of these (15) even as “strongly frustrating”. Besides 13 neutral respondents (28%) only 10 students (21%) could imagine high scores as motivating.

3.2 University Students Survey

We also asked 194 university students in an online survey about what they expect from an online learning platform. Participants were all from Germany or Austria and consisted of 164 Bachelor and 20 Master students. The focus of the survey was evaluating possible dashboard elements. Among others, the following statements were given:

- “I would like to see all information relevant to my studies in one place.”
- “I would like to have an overview of deadlines to organize my studies.”

- “Automatic notifications / reminders would be useful.”
- “Notifications about my learning activities motivate me to continue learning.”
- “I would like to have a statistical analysis of my study performance.”
- “I would like to compare my performance with my fellow students.”
- “I would like to see my position in a course wide anonymous ranking.”
- “I would like to have a social media button in my online learning platform.”

To each statement participants could express their agreement on a scale from 1 (totally agree) to 5 (totally disagree).

Nearly all questioned students stated that they would like to see all information relevant to their studies in one central place. 93% expressed agreement by selecting 1 or 2 on the scale. Almost as many (85%) agreed (selecting 1 or 2) on wanting an overview of deadlines to better organize their studies. Both might appear as very obvious and comprehensible desires. Yet, none of the online platforms discussed above provides these two features.

A lot of students also agreed to wanting automatic notifications like reminders. 77% of the respondents expressed agreement to that (1 or 2 on scale). However, no clear opinion formed on whether notifications about learning activities would be motivating. 18% totally agreed on that but 15% totally disagreed. 28% were undecided (3 on scale). Learning analytics in form of statistical analyses of personal study performance gained more agreement with 60% agreeing (2) or strongly agreeing (1).

Social sharing of progress and comparing with others does not seem to be very popular among students. 44% of the respondents disagreed or totally disagreed on the statement “I would like to compare my performance with my fellow students”. Only 34% expressed agreement. An almost similar response was received on the item “I would like to see my position in a course wide anonymous ranking”. 29% agreed on that statement; 42% disagreed.

The strongest disagreement was expressed on wanting a social media button on the learning platform. 54% totally disagreed on this item, 19% disagreed. Only 14% expressed desire for such a sharing option (selecting 1 or 2).

4 CONCLUSIONS AND FURTHER RESEARCH

Both surveys showed a strong desire among school and university students to see statistics of their performance online. However, students are very conscious about their privacy. Despite strong usage of social networks like Facebook and Instagram (87% of school students stated regular usage of Facebook in our survey, 47% used Instagram), the majority of students don’t want others to see their grades. Direct comparison and competition with classmates or fellow students is also seen very critically. In general one can say that students want to use learning analytics, but only for their personal motivation and self reflection.

However, our surveys can only serve as a starting point. We are currently building an online prototype with modular graphic panels on which we want to conduct iterative user studies. Using the prototype we want to further validate the outcomes of the surveys above, and we might be able to get more detailed results on those items from the survey where respondents did not express clear preferences. Responses on concepts like course wide rankings might be difficult to imagine and could result in different responses if students experience them in a working prototype.

Ultimately, we hope to answer questions such as: What are the basic elements of information all students want to see? What are the best approaches to present that information? What data is it that students are not interested in or specifically don’t want to see? Are there different requirements across students of different disciplines, social or age groups?

Another very practical question is how to get students’ data into the dashboard. We like to elaborate what useful data can be pulled from the APIs of learning management systems such as Moodle and what data needs to be collected specifically for the dashboard. Finally, a way must be found to integrate such a dashboard in existing infrastructures and platforms of institutions. Creating a plug-in for existing LMS, for example, will probably result in bigger acceptance among students and administration than creating yet another platform.

ACKNOWLEDGEMENTS

Thanks to Guimfac Steve Leolin, Mike Schubert and Tobias Zillmann for conducting the survey on university students.

REFERENCES

- Corrin, L. and de Barba, P. (2014). Exploring students' interpretation of feedback delivered through learning analytics dashboards. In *Proceedings of the ascilite 2014 conference*.
- Duval, E. (2011). Attention please! learning analytics for visualization and recommendation. In *LAK '11: Proceedings of the 1st International Conference on Learning Analytics and Knowledge*. ACM.
- Grann, J. and Bushway, D. (2014). Competency map: Visualizing student learning to promote student success. In *LAK '14 Proceedings of the Fourth International Conference on Learning Analytics And Knowledge*. ACM.
- Green, K. C. (2013). The national survey of computing and information technology. *The Campus Computing Project*, October.
- Holman, C., Aguilar, S., and Fishman, B. (2013). Grade-craft: what can we learn from a game-inspired learning management system? In *Proceedings of the Third International Conference on Learning Analytics and Knowledge*, pages 260–264. ACM.
- J. L. Santos, K. V. (2013). Addressing learner issues with stepup!: an evaluation. In *LAK '13: Proceedings of the Third International Conference on Learning Analytics and Knowledge*. ACM.
- J. L. Santos, S. G. (2012). Goal-oriented visualizations of activity tracking: a case study with engineering students. In *LAK '12: Proceedings of the 2Nd International Conference on Learning Analytics and Knowledge*. ACM.
- L. Johnson, S. Adams Becker, e. a. (2014a). *Horizon Report: 2014 Higher Education Edition*. The New Media Consortium, Austin, Texas.
- L. Johnson, S. Adams Becker, e. a. (2014b). *Horizon Report Europe: 2014 Schools Edition*. Publications Office of the European Union and The New Media Consortium, Luxembourg / Austin, Texas.
- S. Govaerts, K. V. (2012). The student activity meter for awareness and self-reflection. In *CHI EA '12: CHI '12 Extended Abstracts on Human Factors in Computing Systems*. ACM.
- Siemens, G. (2010). *What are Learning Analytics*. <http://www.elearnspace.org/blog/2010/08/25/what-are-learning-analytics> (2015-01-21).