On the Evaluation of OLEs Using the HEART Framework

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In 2010 Google's researchers introduced the HEART framework for the evaluation of online products. HEART, which stands for Happiness, Engagement, Adoption, Retention and Tasks, tries to provide guidance on a set of key metrics that need to be measured in order to evaluate an online product in an objective and holistic manner. While each metric quantifies an angle of key factors, we need all of them in order to achieve safe conclusions. Our position is that the same framework could be used in the assessment of the deployment of an OLE. We present the framework and an example of its application.

Keywords: evaluation framework, online learning environment

Evaluation of Online Learning Environments

Every modern educational institution offers access to an Online Learning Environment (OLE), or as interchangeably used in the literature: Virtual Learning Environments, Managed Learning Environments, Personal Learning Environments and Learning Platforms. An OLE has been characterised as an online space that includes the components through which the learners and the tutors participate in online interactions including online learning (Joint Information Systems Committee, 2006, p. 6).

Without argument, an OLE has become an online space where a significant amount of the teaching experience of students takes place. However, it is not clear how an institution can measure the effectiveness and the impact of their OLE. This is even more difficult if the institution needs to measure the impact from students' perspective. Simple metrics such as the number of Daily Active Users, or Monthly Active Users that measure the number of students that login on a daily or monthly basis, may have significant hidden issues. To give an example, students may login every day to the OLE to access core materials for their courses because they were given no alternative option and not because they necessarily enjoy using the OLE. Traditional surveys may offer some limited insights and actually they are part of the HEART framework especially when the survey concerns measuring students' satisfaction. Nevertheless, the question on whether the evaluation of an OLE is complete and as objective as possible remains unanswered.

In this paper, the Happiness-Engagement-Adoption-Retention-Tasks (HEART) framework is presented and its potential use as a measuring framework for OLEs in higher education is discussed. The original purpose of HEART framework was to help software designers to create online products, monitor their quality, detect problems and give directions for future modifications. Currently, the HEART framework is used by software companies for the evaluation of their online products. Although the HEART framework doesn't discuss specific metrics, it provides a set of recommendations on perspectives that need to be taken into account. The exact metrics can be decided by the higher education institutions based on their aims and needs.

The HEART framework

The HEART framework was presented by Google's User Experience (UX) researchers (Rodden et al., 2010), as an effort to establish a framework around user-centered metrics in the era of big data and analytics. In particular, Rodden et al. (2010) discuss not only the established practices in the UX community, i.e., small scale analysis of attitudinal and behavioral data, but also the opportunities created by taking advantage of the large scale data created by the instrumentation of online products.

Goals, Signals and Metrics

The HEART framework doesn't focus on specific metrics but rather presents a structured way to organise the metrics that should be captured in an evaluation in order to ensure that all the useful aspects are captured. According to HEART, the set of key themes are organised as rows and the set

of Goals-Signals-Metrics as columns as illustrated in Table 1.

Each piece of new content, as for instance a new course or a new activity, is uploaded at the OLE for a particular purpose and with specific goals. The goals need to be well defined and each one should be measured by the use of one or more signals. Signals are what most people refer to as “metrics”. The distinction between signals and metrics is technical. A signal is a high level description of the quantity that a non-technical person wants to capture. For instance, a signal could be: “The number of students that are active within a day”. Metrics are more formal and low-level technical descriptions of signals and reflect the underline infrastructure of the OLE. To give an example, the metric of the afore mentioned signal could be: “The number of registered users in the OLE; which have a student status; who perform one or more actions of the set: accessing material, making comments or submitting coursework; within the time period of one day; and as captured by the analysis of the log files that store the meta-data of the OLE”.

In another example, we may upload some new material at the OLE that we believe could enhance students' interaction with the OLE. The question that emerges is how can we assess whether this particular action was successful or not. Suppose that our goal is to increase by 50% the overall engagement of the new students with the OLE. In this case, one related signal could potentially be “the time spent by students at the OLE”. However, the actual metric that implements that signal requires some low-level details. In this hypothetical scenario, it would be necessary to split users' timeline in 5 mins slots because of the nature of the logs available and then capture if each student was active within each time slot. Further decisions involve: The identification of students who have left their browser tab open without interacting with the OLE, or those students who could be considered as outliers because of untypical high frequency of usage.

Table 1 – Summary of the goals, signals and metrics for an OLE component based on the HEART framework

Theme	Goal	Signal	Metric
Happiness	We want 80% of students to provide positive or very positive feedback.	Run a survey with the question “How would you rate the online environment for the course?”	Run survey during the 3rd week of the course; answers will be in scale 1 to 5 and we count the percentage of students that answered 4 or 5.
Engagement	We want 80% of students that use the OLE to visit it at least once per week.	Measure number of logins per week.	Measure number of logins from distinct users that have student status per week based on log files.
Adoption	We want 100% of students to access the OLE within the first week at least 2 times.	Measure number of logins within the first week.	Measure the percentage of logins from distinct users that have student status, per week based on log files within the first week that they enrol to the course.
Retention	We want every student that used the OLE at least once before, to revisit every week.	Measure the number of returning students.	Measure the fraction of students that use the OLE out of the number of students that logged in at least once within the semester for the course.

Task Success	We want 50% of students, to complete at least one self-assessment test. Also, less than 20% of the students should drop out from a started test.	Measure the number of tests that are completed and the number of tests that are abandoned each week per student.	Measure the number of active students, and the number of self-assessment tests that each student completes or abandons week over week.

Themes of the Student Experience with the OLE

The goals, signals and metrics should capture different and complementary aspects of students' experience. These aspects are organised in the core themes of the HEART framework as described below:

Happiness. This theme answers the question: “How happy are the students from using the OLE?” The theme Happiness can be measured with the use of a traditional survey that asks a few simple questions such as: “How satisfied are you with the OLE?”, where students can answer in a Likert type scale. Alternatively, the survey could include open ended questions such as: “What do you like the most when you use the OLE?”. Qualitative techniques can be deployed for the analysis of this particular set of data. There is no need to ask students whether they use the OLE or not or which part they use the most or how often they use the OLE because these questions can be answered with the use of the OLEs analytics. Moreover, these questions are covered by the other themes of the HEART framework.

Engagement. This theme measures the level of engagement of students who use an OLE with the use of analytics. In this theme, it is important to measure how frequently students visit the OLE, how much time they spend, what type of interactions students have with the different features of the OLE and the available content within a certain period of time (e.g. per month or per semester). Summary statistics can be produced per course, per department or any other segmentation that is useful for feature action.

Adoption. New students have different needs compared to students who have used the OLE before. For example, they need to learn how to interact with the OLE. This explains why new students should be treated as a distinct cohort and the focus for them should be on the identification of problems and issues relevant to the adoption of the OLE. For the new students we may be interested to find out how easy it has been to get value out of the OLE, how many different features of the OLE have they used, or whether they have accessed all the available content or just a subset of it. A low usage of a specific feature, like direct interaction with other students via instant messaging, can potentially indicate that this feature is not easily “discoverable” by students.

Retention. This theme aims to identify how often students re-visit the OLE. Here, we try to identify issues relevant with retention. For instance, the identification of cases where students visit specific page only once to get the course material but do not return, could be an indication that those students use the OLE as a repository for downloading material rather than a true online environment for learning. It is important to point out that retention is different to engagement as the former monitors whether students return to specific pages of the OLE despite the fact that they know what type of material is available on those pages. A low retention may reveal that the OLE doesn't provide long standing value.

Tasks. Depending on the exact OLE setup, it may provide a set of different tasks that students may complete. For example a task could be the submission of coursework via the OLE instead of submitting it via email. The number of students that complete each task should be measured separately. Students may interact with the OLE and spend significant time using it, however this does not imply that they complete the tasks that we would like them to complete.

Application Example

We want to setup the OLE for a new course offered to students. Students use the OLE to find course

material, perform self-assessment tests and submit coursework. We want to evaluate the effectiveness OLE. We start by completing the goals column of Table 1 for each theme of the HEART framework. This answers the simple question of what success looks like. Then we define the signals and the metrics that we would need to measure to quantify each goal.

As the students start using the OLE we can start monitoring the different metrics and start assessing how close or far we are from the original goals. Depending on the collected data, we can either support the argument that students get the value we targeted or detect issues that need to be tackled. We may discover for instance that adoption is high whereas engagement is low. This may imply that students try out the OLE at first, however they use it less often as time passes. In this case, we should take appropriate actions as for example, increase the quality of the material or decrease the quantity of the material offered. We may also discover that adoption, engagement and retention are high, but happiness is low. In this case it should be examined whether students use the OLE not because they like it but because they have no alternative choice.

References

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