"EDX INSIGHTS" METRICS FROM A SOCIO-CONSTRUCTIVIST PEDAGOGICAL PERSPECTIVE

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Abstract

Understanding learning analytics from a socio-constructivist pedagogical perspective implies the design and use of learning analytics to inform decision-making, so teachers, as relevant stakeholders, can create richer educational experiences. We focus on the learning analytics module facilitated by OpenEdX and implemented, in an early stage yet, by two MOOC providers: Thai MOOC and UNED MOOC. Using the Community of Inquiry model, we explore the type of data that *EdX Insights* provides for analysing each of the presences included in the model. Finally, we conclude with a pedagogical discussion about learning analytics.

Introduction

Learning analytics has been defined as "the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environments in which it occurs" (LAK, 2011). This concept has been included as a development in technology in the NMC Horizon Report (Higher Education Edition) in years 2012, 2013, 2014 and 2016 (Adams Becker, Cummins, Davis, Freeman, Hall Giesinger, & Ananthanarayanan, 2017). In the 2017 Horizon Report, learning analytics is conceived as the foundation for facilitating assessment of learning, within what the report identifies as the mid-term trend "growing focus on measuring learning" (p.14).

The goal, in any case, should be the improvement of student learning. Domínguez, Álvarez, and Gil-Jaurena (2016) have identified two major approaches to the implementation of learning analytics:

- A maximalist approach that holds a determinist model of human action and proposes to measure any activity related to learning, which is facilitated by big data. Privacy and security issues derive from this approach that tries to collect as much data as possible. The assumption is that the analysis of data obtained in learning activities is a key for unlocking the "black box" of human mind, improving educational processes and making learning more efficient (Cuban, 2015; Westervelt, 2015).
- A different approach supports the study of learning analytics to better understand students' performance in digital environments, but assumes that big data cannot give

direct answer to relevant questions for improving learning. Using Justin Reich's (2015) words, "we have terabytes of data about what students click but little understanding about what changes in their heads" (p.34).

In this paper we want to explore the topic of learning analytics from a critical pedagogical perspective, that pursues a better understanding of learners' performance in an attempt to develop a pedagogical knowledge derived from data facilitated by technological tools that can lead to making educational decisions regarding instructional design, management of students support services, etc. As stated in ECAR (2015), "analytics without action is merely reporting; interventions based on analytics are needed to improve student outcomes" (p.3). The collection and analysis of relevant data from a pedagogical perspective is the approach we defend at this stage, which permits to go beyond deterministic models and analyses big data within a broader set of information about learners.

Our focus will be on MOOCs (massive online open courses), as an online educational modality introduced in our respective countries and institutions. Specifically, Thai MOOCS and UNED MOOCs.

Pedagogical framework

Socio-constructivism learning theory

Among different approaches to learning, we adhere to constructivism. Its central idea is that human knowledge is constructed. Learners build new knowledge upon the foundation of previous learning. The construction of knowledge takes place within the socio-cultural context in which the individual acts (IGI Global, 2017). This approach implies:

- An active role of the learner in the process of learning.
- The importance of interaction with the environment.
- The importance of collaboration.
- The role of teachers as creators of rich learning experiences.

In online environments, the development of high order cognitive skills (Anderson & Krathwohl, 2001) and the development of soft skills (Gil-Jaurena, 2017) under this socio-constructivist approach implies that teachers have to design and create rich interaction environments using technological tools that can support better learning experiences. Learning analytics, in this regard, can be considered as a tool that, used by teachers, can lead them to better know learners' behaviour and interaction patterns in order to improve their teaching.

The Community of Inquiry model

The Community of Inquiry model (CoI), also based on socio-constructivism, is a model that has been widely used in online education. An educational community of inquiry is a group of individuals who collaboratively engage in purposeful critical discourse and reflection to construct personal meaning and confirm mutual understanding (The Community of Inquiry, 2017). Thus, an online higher education course, a MOOC, etc. can be considered communities of inquiry.

The Community of Inquiry conceptual framework represents a process of creating a deep and meaningful (collaborative-constructivist) learning experience through the development of three interdependent elements: social, cognitive and teaching presence (The Community of Inquiry, 2017), as shown in Figure 1.
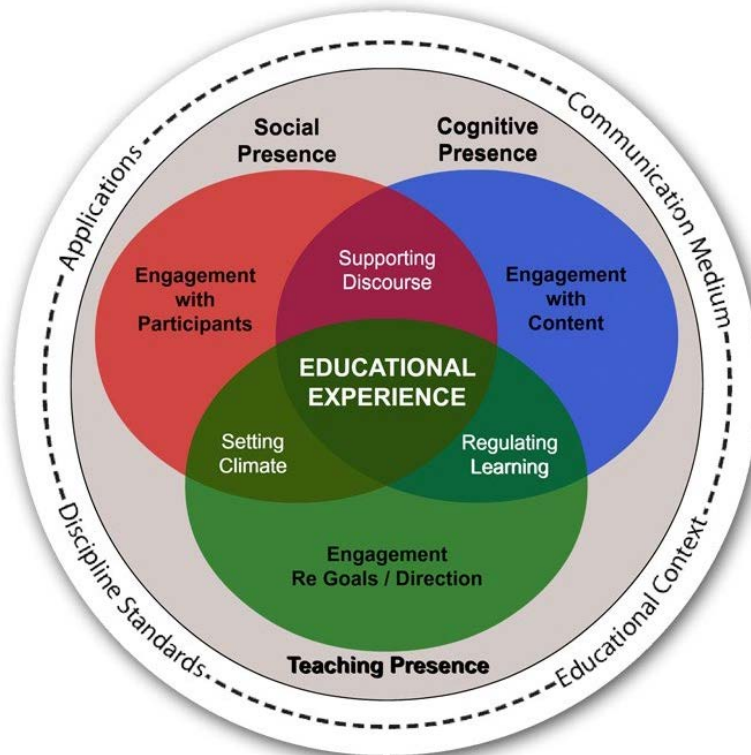

Figure 1. The Community of Inquiry model
(source: http://www.thecommunityofinquiry.org/content/images/diagram.coi.jpg)

- Social presence: the ability of learners to project their personal characteristics into the community of inquiry, thereby presenting themselves as 'real people.' It refers to interaction with peers.
- Cognitive presence: the extent to which the participants are able to construct meaning through sustained communication. It refers to interaction with content.
- Teaching presence: the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educational worthwhile learning outcomes. It refers to interaction with the teachers and/or their directions.

Any educational community can be characterized according to this model. For instance, distance education courses have relied, traditionally, in strong cognitive presence and teaching presence (in the sense of design and structure of the course, not necessarily direct interaction with the teacher). Connectivist MOOCS (cMOOCs), as another way of providing education, have relied on a strong social presence (connection with other learners) and less teaching presence (less structure and previous course design). xMOOCs, on the other hand, resemble more to traditional education.

It is important for teachers, in order to create rich educational experiences, to understand which type of interactions they are promoting and for which purposes. In traditional distance education, the existence of an increasing number of technological tools can support the potential of social presence, thus promoting collaborative learning and new ways of interaction in distributed learning systems.

Learning analytics within a CoI pedagogical framework

Learning analytics is based on collecting information about learner's behaviour and performance in a learning experience, course or environment. As shown in Figure 2, there are a series of relevant questions that stakeholders need to ask before accomplishing the use of learning analytics. Teachers are key agents to reply to what, why, how and who can collect, analyse or use the information.
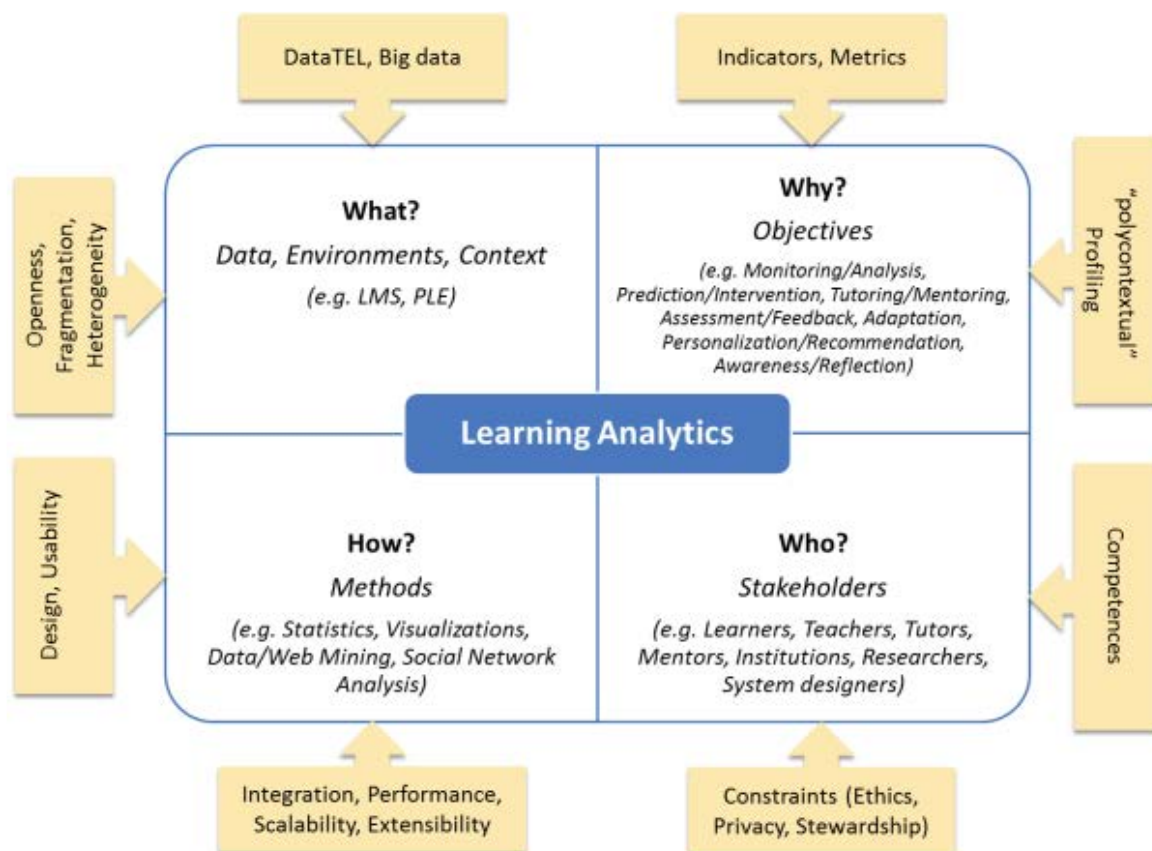

Figure 2. A reference model for learning analytics
(source: https://eleed.campussource.de/archive/10/4035/dippArticle-1.png)

Based on the CoI model and thus on a socio-constructivist approach to learning, it is important to collect and analyse information related to the interactions learners get involved in during the learning process.

In our study, we have focused on MOOCs as a learning experience and, particularly, in two MOOC providers that use the same learning management system, OpenEdX. We have selected the case of Thai MOOCs (a national programme developed in Thailand) and UNED MOOCs (an institutional programme developed in the Spanish National Distance Education University)

to analyses the implementation of learning analytics from a pedagogical perspective. Given that these two MOOC providers are in their early stages in the use of EdX Insights (the OpenEdX LA module), as a first step we have focused on the type of data that this tool provides. It is not possible, at this moment, to analyses; current data from either Thai MOOC or UNED MOOC.

"EdX Insights provides the course team members with data about learner activity, background, and performance throughout the course. Using EdX Insights can help you monitor how learners are doing, and validate the choices you made in designing your course. It can also help you re-evaluate choices and inform efforts to improve your course and the experience of your learners" (EdX, 2017). This module provides data in the following domains:

- Individual Course Enrolment Metrics;
- Enrolment Activity;
- Enrolment Geography;
- Enrolment Demographics;
- Engagement with Course Content;
- Engagement with Course Videos;
- Performance: Graded Content Submissions;
- Performance: Ungraded Problem Submissions.

When compared to other learning management systems (LMS) used in online education (such as Moodle, dotLRN, etc.), the new information we can find in OpenEdX is "engagement with course content" and "engagement with course videos". All the other data were, somehow, present also in other LMS. Engagement is, as stated before, a measure of the interaction with the course, thus these data provide input for analysing the CoI presences in the MOOCs (Table 1).

Table 1: Engagement in "EdX Insights" in relation to the Community of Inquiry model

"EdX Insight" domain	Specific data about individual activity	Type of presence in the CoI model
Engagement with course content	Watched a video last week	Cognitive presence
Engagement with course content	Tried a problem last week	Teaching presence
Engagement with course content	Participated in discussions last week	Social presence and / or Teaching presence
Engagement with course videos	Replayed segments	Cognitive presence

If we consider the specific data that EdX Insights collects in each engagement measure in relation to individual learners' activity, we can state that it permits to analyses, along with other data:

- The cognitive presence: as direct interaction with the course content, that in the MOOCs is primarily video based.

- The teaching presence: as the interaction with the course structure and activities designed by the teacher (problems, tests, etc.), but not directly with the teacher. If the participation in discussions is an assignment in the course, it is a measure of the teaching presence, along with social presence.
- The social presence: as the participation in the forums where peers can interact.

From a socio-constructivist approach to learning, the data collected by this LMS used in the MOOCs shows a quite traditional educational model, based on content (video), structure of the course and a not so important social learning experience. MOOCs (or, more accurately, xMOOCs), not necessarily take advantage of the potential of social presence.

Discussion and conclusions

Technologies permit access to information and data not available before; when course content is embedded in the LMS, information about the interaction and engagement of learners with the course content is one of the measures we can access. MOOCs, unlike traditional distance education courses (where the content, usually a textbook, is not in the LMS in a traceable format), are self-contained, so the interaction with content, assignments, peers, etc. can be more easily measured and analysed. Learning analytics can then provide input for understanding the learning process and, consequently, improve the courses. But we cannot forget the limitations that, when we are blind and overwhelmed by data, can lead us to biased conclusions about learning. We would like to highlight the following due to their pedagogical relevance:

- Not all relevant data can be collected automatically from the LMS.
  - The collected data does not provide qualitative information; for instance, about participation in discussions, the system can inform about number of interactions, networks, etc. but not about the content of the interaction.
  - Other information has to be collected by other means: asked to learners by survey, satisfaction questionnaire, etc.
- Data can be incomplete (not all learning happens in the LMS). What about interactions with content or peers that does not happen within the LMS? They are part of the learning experience, but are not traceable by the LMS system. The use of standards such as those by IMS Global can help to overcome this limitation and integrate different learning environments.

As a conclusion, we would like to stress the importance of working collaboratively between teachers, learners, IT specialists and other stakeholders both in the development of technological tools that can support the teaching and learning processes, and in the analysis of the collected information about them. Particularly, teachers are a key agent and they should receive understandable data about their courses. In a survey study undertook by Gil-Jaurena and Domínguez (2018) among teachers at UNED, they found that teachers use learning analytics in their online courses (54.5%) and in the MOOCs (59.1%); at the same time, they demand more technological tools, learning analytics among them. The perspective of the Thai MOOC project with the implementation of Thai MOOC Insights (https://insights.thaimooc.org) is similar: empowering teachers to improve their courses thanks

to data. To make a proper use of the already available learning analytics and of those that will be available in the future, teachers and institutions need to be aware of the underpinning learning theories that lay under the technologies, and of the pedagogical implications.

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