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Learning Analytics : Pedagogy has to rule the way

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Purpose of the research : Adjust the feedback to student characteristics taking into account the learning context to support self-regulation.

Presentation of the research :

1) Background of departure

- **The emergence of Learning Analytics is not without effect for the field of higher education. It initiates a series of promising changes for the adaptation of higher education to the changes that characterize it. Nevertheless, they also require a certain vigilance regarding their deployment.**

Learning Analytics are a game changer in the field of education

- Sources of information
- Amount of information
- Frequency of information
- Delay for transmitting information
- Scope, dissemination of information
- Visualization of information
- Usability of information
- …

It is necessary to consolidate the links between the Learning Analytics and the field of pedagogy

- These two areas must feed each other
- Experts have been arguing for this for several years (Wise & Cui 2018)
- Learning is a complex phenomenon, the theoretical contributions are therefore important to apprehend it at best
- « […] analytics tools wich are not informed by learning theory are unlikely to achieve effective adoption. » (Gasevic et al. 2015 in Sclater 2017)

Links exist between Learning Analytics, Assessment for Learning, Feedback and Self-Regulated Learning

- They are mainly aimed at student progression
- Learning Analytics and Assessment for Learning mobilize Feedback for regulatory purposes
- Feedback is the first gear of a regulatory process, so it plays a major role in the evolution of students
- Self-regulation is a key step in developing skills and the ability to the lifelong learning

2) What are the issues related to the meeting between Learning Analytics and pedagogy?

- **Feedback communication that effectively supports a process of regulation in students**
- « Without feedback, students are limited in their capacity to make judgements about their progress, and what they need to know and do in order to improve their future outcomes. As such, it is important that students are **receptive** to the comments they receive. » (Molloy et al. 2013 in Ryan & Henderson 2018)

Feedback is not risk free for students

- Meta-analyzes attest to these risks and count up to 32% of feedback with negative effects on students' trajectories (Kluger & DeNisi 1996)
- The amount of feedback received produces curvilinear effects (Soar & Soar 1979)
- However, the Learning Analytics increase the frequency and forms

The different learning contexts generate a certain ambivalence in the needs of the individuals

- The level of student engagement depends on several factors including :
  - Self-confidence
  - Self-efficacy
  - Personnal goals
  - Level of motivation
  - Type of motivation
  - Causal attributions
  - Emotions management
  - …

It is necessary to better understand how students receive feedback in different learning contexts

- « I used to think giving more feedback and better feedback was the answer [to improving education], and it is the exact opposite : How do […] students receive feedback? How do they interpret it? (Hattie 2018)
- Build student's capacity for self-assessment (Wiliam 2016) while increasing their agency on feedback
- "One size doesn't fit all" : to really personalize a feedback, should not we leave some action to the student?

3) What educational resources for feedback and self-regulation in the context of Learning Analytics?

- **Many theoretical resources can guide Learning Analytics approaches to effectively support regulation**

The literature on self-regulated learning and the resources that support it

- Evolutionary adaptation process
  - Kagan (1983)
  - Pintrich & DeGroot (1990)
  - Butler & Winne (1995)
  - Carver & Scheier (1999)
  - Zimmermann & Schunk (2001)
  - Wigfield & Eccles (2002)
  - Allal (2007)
  - …

The literature on Assessment for Learning and Feedback

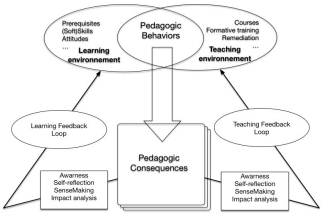
- Feedback attributes and Curriculum design
  - Black & Wiliam (1998, 2018)
  - Nicol & Macfarlane (2006)
  - Hattie & Temperley (2007)
  - Brookhart (2008)
  - Hounsell et al. (2008)
  - Shute (2008)
  - Sambell (2011)
  - Boud & Molloy (2013)
  - Carless (2015)
  - …

Literature on Motivation to learn, Motivation to change behavior and Academic Emotions

- Mediators of change : cognitive, affective and conative factors
  - Ajzen & Madden (1988)
  - Deci & Ryan (2000)
  - Pekrun et al. (2002)
  - Govaerts & Grégoire (2005)
  - Sander & Scherer (2009)
  - …

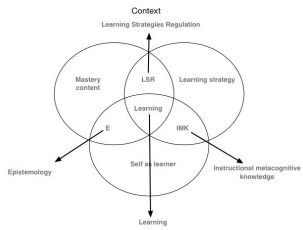
4) Proposed modeling of the regulation process in which the personalized feedback and the dimensions that they impact

- Inspired by both the *SoTL* stream (Boyer, 1990), the Greller & Drachsler model (2012) and the Verbert et al. (2014), the figure on the left positions the role of feedback in the regulation of the learner. On the right, the figure inspired by Koehler & Mishra's *Tpack* (2007) refers to the dimensions that a feedback should impact. In order for these dimensions to be effectively impacted, the parameterization of the feedback must avoid two types of error; the type 1 error, which consists of giving the student useless or even confusing informations, and the type 2 error of not giving useful informations for the progression of the student. Two elements favor the avoidance of these errors are a good knowledge of both the student and the context in which he evolves, the learning ecologies. It is necessary to distinguish between stable variables and adaptive variables to determine the variables to be modulated in different learning contexts.



(Object X Feedback attributes) X (Student characteristics X Context) = Regulation action

~~Errors 1 & 2~~



5) What are the key steps in our methodology?

- **Brief work plan for our research project**

Literature review

- Learning Analytics
- Success factors at the university
- Motivation to learn
- Motivation for change
- Self-regulated learning
- Assessment for Learning
- Feedback
- Emotions and learning
- …

Design of a typology of students

- For example :
  - Confident / Reactive
  - Confident / Passive
  - Not confident / Reactive
  - Not confident / Passive

Experimental situations and study of the reception of feedback and its use

- Analysis of the relationship that students of the institution have with feedback
- Experimentation of various types of feedback (form, valence, types of information) with different student profiles in different contexts
- Measure of intention to implement new behavior

Experimentation of a flexible interface based on dynamic variables

- Iterative evaluations of the interface, Lean approach
- Adaptation of the interface to improve it
- Interactivity with some students to support the implementation of regulation
- Qualitative assessment of the student's learning experience

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Summary : The primary ambition of this research project is to focus on the recipients of feedback, to better understand their relationship to feedback and supporting elements influencing this relation. Indeed, two students receiving the same feedback may not react in the same way at all. From where do these different reactions come from? Can the underlying variables be identified and used in a categorization or clustering process of students to send them a more appropriate type of feedback in order to support regulation actions? That's what we'd like to determine. The title chosen for this poster is somewhat provocative because we believe that Learning Analytics are changing the game in terms of feedback. And if they carry with them promises of significant changes in the field of education, risks for the development of students can appear if they are developed blindly regarding to existing pedagogical knowledge.

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