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Current and Alternate Approaches to Personalization in Online Learning

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Abstract
In the context of distance (online) learning programs, the current paper focuses on two specific goals. First, we outline how personalization based on learning analytics has been implemented in online programs offered by traditional universities, but also providers of MOOCs and virtual institutions. However, this established approach is not without its limitations. Second, we introduce two alternate concepts that may support personalization based on work around readability indices and job crafting. These approaches may also help to address some of the limitations of learning analytics. The emphasis is on how personalization may support the development of individual learning paths that would provide means for both self-pacing and co-construction of the experience. The paper concludes with a review of facilitating and challenging factors for program leaders, online technical staff and designers working in open educational contexts.

Author Keywords
Online education; personalization; individual learning paths; readability; job crafting; accountability.

ACM Classification Keywords
H.3.4 Performance evaluation (efficiency and effectiveness), user profiles and alert services; I.2.6.

Learning: Knowledge acquisition; K.3.1 Computer Users in Education: Distance learning.

Introduction

The use of learning analytics and educational data mining over the last few years have provided several new ways of tracking and interpreting how different users interact with technological platforms, the various media and content available on these platforms. However, learning analytics (see definition on side bar) tend to be predominantly based on the data produced as part of teaching and learning activities, while educational data mining may involve a variety of different sources of data. Learning analytics relies on data to be available for a comparable set of online users. However, with some cohorts, data about the users' characteristics and online engagement may not be readily available.

In more traditional university settings, the degree of personalization may often be very limited. Many online platforms take on the form of repositories alone. By and large, however, the learners are expected to be self-directed and motivated to learn online, and thus predominantly on their own.

In addition, the option to consider the diversity and needs of learners is often limited. When we consider that the diversity may also extend to groups with different special needs due to various disabilities (including acquired ones), the notion of one-size-fits all in terms of learner profiles is evidently problematic. Providing individuals with a voice and stake in the design of their learning environment will be key to ensuring that learners needs align with personalization tools. Based on these observations, it is important to consider alternate approaches to personalization that also allow for other user characteristics to be considered in online learning.

Alternative Personalization Approaches

We introduce two alternate approaches which may also provide some means to expand on existing learning analytics-based personalization.

Personalization via 'readability indices'

Such indices (see side bar for definition) provide ways to expand on existing learning analytics-based personalization. A number of authors have already raised the importance of readability for text (and images) [5] and text books [3]. In addition, they can be used to assess reader comprehension and test answers [1, 6] in online settings.

Research has demonstrated that text readability is more of a challenge for non-native speakers, particularly in the presence of distractions [4]. The assessment of actual readability of learning materials should be matched by assessments of language skill levels. Creating and offering options that allow students to customize their learning paths based on the existing reading and language skill levels may ensure that they are using and engaging more with these online tools. A number of tools exist [8, 12] that can be modified to support readability-driven assessments.

The benefit of personalization could go beyond readability assessments and the provision of additional tools. Readability indices (using student work) and automatic feedback generation (accessible to students and educators) would also help educators identify potential third party support. That is, using the records

Main Definitions

Learning analytics: A popular definition of learning analytics describes it as 'the measurement, collection, analysis, and reporting of data about learners and their contexts, for the purposes of understanding and optimizing learning and the environments in which it occurs' [11].

Readability indices: These measures of complexity can be readily generated for texts in different languages – and have also been successfully used to construct online modules [2], assess competence [12] and support language learning [10]. New approaches also assess semantic relations inside texts (e.g., by computing the algebraic complexity of text, see [9]).

Main Definitions

Job Crafting. This concept captures 'the physical and cognitive changes individuals make in the task or relational boundaries of their work' [14]. This concept is particularly prominent in the area of applied/work psychology.

This concept usually captures how individuals at work proactively attempt to change the nature of the tasks they are completing, the degree to which they interact with others, and how they view and cognitively evaluate their job (reflecting task, relational, and cognitive crafting; [14]). Job crafting may therefore be initiated by the individual and may be subject to the person's work situation (e.g., task independence, autonomy and access to resources and feedback).

of past readability of assignments, combined with frequent errors observed for said student, educators could readily identify situations where an assignment exceeded expectations – suggesting that the student submitted somebody else's work on their own. Transparency via readability and feedback automation (generating stats and records for students) may also counteract such attempts to game the system.

Personalization via 'crafting': A different approach

A particularly helpful literature for training and development is the work on job crafting (see definition on side bar). Using the idea of job crafting, we propose that if we enable learners to self-evaluate, influence and track their own progress on tasks and performance over time, and we build our systems to support this process, we are optimizing fit between learners' circumstances and their learning needs. And by doing so, we can increase success of online and distant learning programs. We outline two examples.

Crafting might take different forms. We first focus on learner-centric flexibility due to cognitive and task-specific crafting. In education, tasks and deadlines are usually set to fit the educational schedule, but not the previous learning experience or schedule of the student completing the program. This is where crafting comes in: We argue that there would be a benefit in considering such approaches in online and distance learning as well. Good examples are deadlines and instructions. These are often set by the institution in a uniform manner. How about an online system that tracks student engagement over time (e.g., using log files) to generate a starting point and estimate a potential delivery date or deadline based on the pace of the student? This may be particularly relevant for individuals who are submitting assignments in a second language or require more time for dyslexia or similar.

Team learning may be another area worth considering in relation to crafting. Many learners are also part of peer groups or work jointly on group assignments. The concept of collaborative crafting maybe be relevant here. This concept is attributed to Leana et al. [7]. These authors considered this approach to involve a dyad or group of workers who together make physical and cognitive changes in the task or relational boundaries of their work. A form of collaborative crafting is team crafting [13]. This means that job crafting may be influenced by demands and resources that are available at team and organizational level as well. This is in line with the suggestion that training development is similarly influenced not just by the skills and abilities of the trainees alone, but also a question of the resources that they can access themselves, as part of their team, or via their organization overall. It is worth considering how such joint and reciprocal optimization could be implemented in online and distant learning as well.

Facilitating Personalization and Implications

Personalization as we proposed may be able to take more account of the users' needs, paving the way to success. In the context of the open education movement, and given the innovativeness of tools developed for online courses by the open source community, we hope that our paper will stimulate the development of new personalization methods in line with the two outlined alternate approaches. Such engagement can build on a number of research examples in the area of open educational resources. We strongly believe that the open source community may

provide both insight and experience with the provisions of free tools, tools that may support personalization in open access, educational or commercial settings.

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