

Multidisciplinary learning analytics development team's perceptions on supporting student agency

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Abstract: There are concerns of learning analytics (LA) development being too data-driven and developers limitedly considering the human aspects of it. We interviewed a multidisciplinary LA development team about their perceptions on student agency. Developers mentioned similar aspects of agency but there was misalignment between their conceptions of supporting student agency. Our results highlight the importance of fostering conversation among multidisciplinary LA development teams to enforce mutual understanding to develop tools that best support students.

Introduction

There is a growing need to develop LADs that support student agency, i.e., intentional acting and self-influencing in one's studies (Bennett & Folley, 2019). This is done through enhancing students' self-efficacy beliefs, decision-making, motivation, and performance (Bandura, 1993). LADs can support these processes by providing learners with targeted support and personal feedback that foster self-reflection and aid strategic study planning. Still, there is shown to be misalignment between students' need of support and the information that LADs' provide (Klein et al., 2019).

Studies have highlighted the need to better link the knowledge about learners with LAD development (Tsai et al., 2020). Previous studies of LA have mostly focused on students' viewpoint and there is a limited amount of research about the developers' perceptions (Johanes & Thille, 2019). Developers, who are responsible for the decision-making about student data usage and LAD features, have received critique about their limited consideration of nontechnical aspects of LAD development (Johanes & Thille, 2019). Since the developers are an important link between student needs and LADs, we investigated their conceptions of student agency and decision-making behind a student-facing LAD to understand how they envisioned it to support student agency.

Procedure

We explored a multidisciplinary LA development team members' perceptions of student agency in general and as part of LAD development process as well as their ideas on supporting student agency with the LAD. The participants were mainly from educational sciences and computer sciences. The LAD consisted of three different visualizations about the student's completed and planned courses, grades, and estimated graduation time. Students had an option to view their progress and plans in a specific period as well as their grades compared to peers. 12 members of the development team were interviewed, and the transcribed recordings arranged by a social cognitive theory-supported analysis frame into 4 categories. The categories summarized developers' descriptions of 1) Characteristics of agency 2) Acts of student agency, 3) Ways to facilitate student agency and 4) Obstacles of student agency. Cohen's kappa coefficient summary agreement calculation was conducted for 10% of the data resulting in a value of 0.922 suggesting a very good level of agreement (Altman, 1991, pp. 403-408).

Results

Developers defined student agency mostly as ownership and decision-making of one's studies (see Table 1). In LAD development context student agency was mostly described as participation in pilots and offering feedback and ideas. Developers had varying ontological viewpoints to agency, which seemed to reflect their varying disciplinary backgrounds. Developers with educational science background mostly described student agency similarly to social cognitive theory (e.g., Bandura 1993). When asked to define agency, 3 developers stated not being familiar with the concept but later proceeded to discuss ways to support it with the LAD.

Even though their ontological premises differed, the developers had relatively congruent thoughts about acts and characteristics of student agency. Mostly they highlighted the importance of students' supportive self-efficacy beliefs and being motivated to progress in one's studies. Developers considered that the LAD could support students' self-efficacy beliefs and strategic study planning by giving them real-time personal and motivating feedback about their progress and accomplishments. They expressed uncertainty on whether comparative feedback between student and their peers would support or counteract students' agentic beliefs and motivation to study.

There were mentions of communicational difficulties hampering the LAD development work. One of the developers mentioned acting as a “Babel fish”, translator, between developers from different faculties. When discussing student agency in LAD development process, some developers highlighted the importance of student participation in every step of the work: starting with gathering student needs. At the other end of the spectrum there were developers who stated students not needing to be involved in the beginning of the development process at all. Some developers were doubtful about the ‘usefulness’ of involving students who lack understanding about the purposes of LADs since they could have negative preconceptions of it. On top of that, data and resource limitations were brought up as challenges in both involving student in the development work as well as developing tools that would best answer students’ needs and support their agency.

Table 1
Developers’ frequently mentioned descriptors of student agency

	a) Student agency in one’s studies.	b) Student agency in LAD development.
1. Characteristics of agency	Self-efficacy beliefs and motivation. Ownership of one’s studies.	Motivation to participate. Students’ abilities to use LADs.
2. Acts of agency	Strategic study planning and progressing. Utilizing LAD’s feedback.	Active participation in pilots. Providing feedback about the LAD.
3. Ways to facilitate agency	Providing students with relevant, easily interpretable, and customizable LADs.	Creating opportunities for students to participate meaningfully. Utilizing students’ ideas and feedback.
4. Obstacles of agency	Uncertainty of LAD’s feedback’s effects on students.	Resource and technological limitations in involving students and utilizing their ideas.

Conclusion

Our findings point out the similarities and contradictories in the developers’ perceptions on student agency and participation in the development work. Developers expressed caring about enhancing student agency in higher education studies but their ontological approaches to the concept of agency varied. They also expressed communicational and resource challenges that inhibited executing these intentions. Previous studies have recognized the need for pluralistic approaches to develop LADs that effectively support students (Ferguson, 2019). Our results underline the importance of fostering conversation and mutual understanding in multidisciplinary teams about the user of the tool as well as clarifying the common course and goal of the development process. We suggest studying how the multidisciplinary teams communicate their knowledge and clarify their conceptions regarding students.

Key references

- Altman, D. G. (1991). *Practical statistics for medical research*. Chapman and Hall.
- Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist*, 28(2), 117-148. https://doi.org/10.1207/s15326985sep2802_3
- Bennett, L., & Folley, S. (2019). Four design principles for learner dashboards that support student agency and empowerment. *Journal of Applied Research in Higher Education*, 12(1), 15–26. <https://doi.org/10.1108/JARHE-11-2018-0251>
- Ferguson, R. (2019). Ethical Challenges for Learning Analytics. *Journal of Learning Analytics*, 6(3), 25–30. <https://doi.org/10.18608/jla.2019.63.5>
- Johanes, P., & Thille, C. (2019). The heart of educational data infrastructures—Conscious humanity and scientific responsibility, not infinite data and limitless experimentation. *British Journal of Educational Technology*, 50(6), 2959–2973. <https://doi.org/10.1111/bjet.12862>
- Klein, C., Lester, J., Rangwala, H., & Johri, A. (2019). Technological barriers and incentives to learning analytics adoption in higher education: insights from users. *Journal of Computing in Higher Education*, 31(3), 604–625. <https://doi.org/10.1007/s12528-019-09210-5>
- Tsai, Y.-S., Rates, D., Moreno-Marcos, P. M., Muñoz-Merino, P. J., Jivet, I., Scheffel, M., Drachsler, H., Kloos, C. D., & Gašević, D. (2020). Learning analytics in European higher education—Trends and barriers. *Computers & Education*, 155. <https://doi.org/10.1016/j.compedu.2020.103933>

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