Synergies of learning design and analytics: Design patterns of higher education courses

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Abstract. *Synergies of learning design and learning analytics benefit higher education teachers by enabling structured and visualized presentations of expected learning outcomes, student workload, activities, and assessment, thereby facilitating the (re)design of curricula. This study investigated, first, what learning (re)design aims teachers articulated. Second, twenty learning designs were examined with learning analytics methods to identify patterns and structural features. Finally, we investigated how students (N = 580) evaluated course learning design and analytics for supporting their learning. The study suggests future research combining qualitative, micro-level understanding of learning design, tool support, and macro-level pattern analysis for guiding curriculum renewal.*

Keywords. Learning design, Learning analytics, Higher education, Pattern analysis, Student feedback

1 Introduction

Learning design (LD) has been emphasized as one of the key factors for successful learning (Martin et al., 2019). LD follows a student-centered approach on the development of pedagogical processes, based on contemporary sciences of learning and education, and it is the key for providing efficient, effective, and engaging learning experiences (Wasson & Kirschner, 2020). Empirical evidence supports this: large-scale analyses at the Open University, covering over 150 courses, have shown that well-structured LDs, with a balanced mix of collaborative, independent and assessment activities correlate with higher student satisfaction and better pass rates (Rienties & Toetenel, 2016; Nguyen et al., 2022). Systematic LD frameworks such as the '7Cs' (Conole, 2013) or Balanced Design Planning (BDP) (Divjak et al., 2022) offer structured methods for making pedagogical intentions explicit, thereby facilitating iterativeness and improvement. This study contributes to the understanding of how LD developed with the support of learning analytics can provide educators and learners with insights for enhanced learning experiences and outcomes. Learning design (LD) can be defined as the conscious, systematic process of planning, documenting, and sequencing teaching and learning activities (TLA) (Conole, 2013; Lockyer et al., 2013). In contrast to traditional lesson planning, LD combines educational theory with the practical structuring of learning tasks, thus making the intentionality of teaching visible and shareable (Laurillard, 2012). It is based on the assumption that effective learning environments are the result of decisions about learning outcomes, activity types, resources, and assessment strategies (Divjak et al., 2022). Whether through a LD or in class, clarity in planning helps students develop a strong understanding of what is expected and supports their engagement and learning regulation.

Synergies with learning analytics have been suggested to benefit design work (Macfadyen et al., 2020), especially by focusing on enabling visualized LD including learning outcomes, student workload, ensuring constructive alignment and assessment validity. Studies have shown that visual representations of LD, including workload distribution graphs and constructive alignment maps, help educators identify misalignments and overemphasis, leading to targeted course revisions that improve student engagement and performance (Lockyer et al., 2013; Divjak et al., 2023; Nguyen et al., 2022). A recent survey of 53 teachers from four European countries found that user experience feedback is critical to the further development of LD tools, such as the BDP tool (Divjak et al., 2023). Learning outcomes, constructive alignment, and analytics were highlighted as core components of effective LD. The benefits of systematic LD have been recognized as important for course success (Prieto et al., 2014; Drugova et al., 2024) and innovative tools are currently developed. This study investigated teachers' LD with one LD tool. The study contributes to identifying benefits of systematic LD by combining teachers' and students' lived experiences across four countries with pattern analysis of teaching and learning activities designed in the LD tool used by teachers.

2 Background

2.1 Learning design and analytics to support pedagogical development

Technological tools support the development of LDs by simplifying the planning and implementation of learning activities and promoting interaction between teachers and learners. As examples we mention the BDP concept and tool which supports LD through visual analyses of workload distribution, constructive alignment and assessment validity (Divjak et al., 2023) and edCrumble, a (blended) LD authoring tool (Albó et al., 2022). Based on visualized feedback created by analytics functions, teachers are able to identify discrepancies between intended learning outcomes and assessment practices, workload bottlenecks, and course structures to be iteratively refined (Kauppi et al., 2020). Empirical studies have shown that such data-driven, iterative design processes lead to measurable improvements in student performance, satisfaction, and progress rates (Rienties et al., 2015; Divjak et al., 2025).

LD tools incorporate multiple purposes. First, they offer structure and conceptual guidance to plan the design or redesign of a course, by supporting a teacher in specifying learning activities and their sequences (Divjak et al., 2022). Second, they are intended to document design and sequencing of teaching practices, for the purposes of improving understanding, and evaluating TLAs (Lockyer et al., 2013). Third, the created designs can be examined with learning analytics (design analytics) visualizations or feedback for teachers on specified features of the design, such as time reserved for collaboration in the designed unit or means of feedback for students. Fourth, LDs can be collaboratively advanced or evaluated by teacher peers, designers or students (Lakkala et al., 2015).

Transparent practices, such as clearly communicating objectives, assessment criteria, and expectations, have been recognized repeatedly in the literature as fostering higher levels of student achievement. The time and effort instructors invest in planning and organizing their courses correlates strongly with student learning outcomes (Feldman, 2007). The aim of LD is therefore not just to be a descriptive representation of teaching practice, but a strategic design science (Laurillard, 2012), which integrates educational theory, empirical findings, and analytics to systematically improve the quality and equity of higher education curricula.

2.2 Patterns in learning design

Learning paths and patterns are well-known concepts in learning analytics. Commonly learning paths represent sequenced sets of learning activities which are designed to lead learners towards the achievement of the intended learning outcomes (Martínez-Carrascal et al., 2024). A distinction can be made between designed (or ideal) learning paths, which reflect the intended sequence of activities, and enacted learning paths, which represent the actual sequences of learning activities chosen by students during the learning process (Angrave et al., 2020). This study examines learning paths in LD and looks into learning patterns, which are recurring behaviors or structures, indicating common paths, detours, or cycles (Real & Pimentel, 2025).

When we investigate learning patterns, one perspective that can be taken is to analyze patterns typical for innovative pedagogical approaches. Quality LDs are based on innovative pedagogical approaches such as Flipped Classroom (FC), Project-Based Learning (PBL) and Inquiry Learning (IL). For example, FC incorporated in a course LD is likely to provide a typical pattern: pre-class acquisition, formative assessment, active learning, and assessment (Divjak et al., 2024).

While substantial progress has been made in terms of the conceptual development of LD and learning analytics (Law & Liang, 2020), and recent studies have provided empirical evidence of how LD and learning analytics data could be effectively combined to provide crucial insights into learning processes and outcomes (e.g., Rienties & Toetenel, 2016; Nguyen et al., 2022), most of these studies were nested within one institutional context. Furthermore, most of the studies reviewed by Drugova et al. (2024) were unable to close the loop on LD and learning analytics with actual stakeholders. While Albuquerque et al. (2025) found,

in a range of European countries, important similarities in how teachers designed learning activities, to the best of our knowledge no study has looked at the lived experiences with LD of educators and students in a multi-country context.

2.3 The present study

In this study, as a starting point, higher education (HE) teachers from four European countries were invited to participate in workshops organized within the Innovating Learning Design in Higher Education (iLed) project. Teachers had an opportunity to learn about the concept of LD and to practically work with the Balanced Design Planning (BDP) LD tool (Divjak et al., 2022). They designed or redesigned a course or a part of a course using the BDP tool with the workshop support. A subset of the courses was then implemented in HE study programs and students were invited to evaluate and give feedback on the LD for their course.

The study examined first, the aims teachers set for their LD. Subsequently, teachers created LDs, which were analyzed for recurring patterns and emphasis in teachers' design work. We aimed to discover typical forms of learning outcomes (LOs) teachers specified as well as the patterns in teaching and learning activities (TLA) designed. The final research question was related to the analysis of student evaluations on how access to the LD supported their learning.

RQ1: What aims did teachers set for their LD?

RQ2: What levels of learning outcomes were represented in the LDs, and how were TLAs distributed across these levels?

RQ3: What patterns can be identified in the sequencing of learning types across the designed TLAs?

RQ4: How did students evaluate the implemented course learning designs in terms of how well it supported their learning and how useful it was?

3 Methodology

3.1 Participants and context

Teachers from five HE institutions participated in workshops, as part of the Erasmus+ iLed project, designed to enhance the competencies related to digital pedagogies and tools for innovating HE curriculum. The teachers used the BDP tool to create and develop the LD of their course as well as to update the LD based on what they learned from the workshop, peer feedback, and BDP design analytics. Teachers' reflections were collected during the process. Developed LDs (N = 20) from the workshop were collected for analysis.

The (re)designed courses were implemented by HE institutions and student feedback on the LD of the courses was collected. The courses ranged from 1 to 5 ECTS credits in scope and were mostly organized in line with innovative pedagogies, especially flipped classrooms (see Appendix). Teachers of the (re)designed courses introduced to students the course LD created in the BDP tool. Specifically, the teacher introduced to the students the course overview of the TLAs, the design analytics, and provided students with the tool access link so they could check the LD on their own time. At the end of the course implementation of these 13 courses, students were asked to complete a brief online survey and evaluate the course design from the student's perspective. Students' (N = 580) feedback in the form of two Likert-type questions (if the LD overview and analytics were useful to them) and two open-ended questions were collected (the experienced positive and negative aspects of the course designs). Additional nine courses were included in the pattern analysis of LD content without student evaluations (courses 14-22 in Appendix).

Overall, the courses involved a wide variety of students and course set-ups (small group of 8-9 to a large class of 979). The central content of courses was in the studies of medicine, STEM, and education. All teacher participants gave written informed consent to be included in the study and its reporting, and the students also gave consent to participate in the study. An ethical approval was granted by the ethics committee of the University of Zagreb (FOI).

3.2 LD tool and concept

The BDP concept and tool support educators in LD, which is a student-centric development of pedagogical processes focusing on determining learning conditions, activities, and their sequences (Divjak et al., 2022).

The BDP concept and tool are strongly grounded in learning outcomes as a starting point for LD. The concept focuses on ensuring constructive alignment (Biggs, 1996) between learning outcomes, TLAs, and assessment, as well as the corresponding student workload. In the tool, educators can plan their courses from learning outcomes, to topics, units, and teaching and learning activities, including details like workload, learning types, delivery modes, presence of collaboration and group work, and assessment.



Figure 1. The BDP tool analysis function visualization example (left learner workload and right collaboration).

Another specific feature refers to the learning types that a teacher designs for their course. These TLAs are marked as Acquisition, Discussion, Investigation, Practice, Production, or Assessment (Divjak et al., 2022). The tool also provides design analytics that can support educators in ensuring constructive alignment and developing LDs in line with the intended pedagogical approach (Fig. 1).

3.3 Data analysis

To address RQ1, teacher reflections on their aims for (re)design of courses were thematically reviewed for descriptive purposes. This involved identifying teachers' redesign ideas and key aims of course update described in the brief written reflection notes.

To respond to RQ2, we analyzed the distribution of LO levels (based on 176 LOs) and the distribution of TLA learning types among LO levels (based on 1624 TLAs) in the 22 LDs (including a total of 161 LOs, 1477 TLAs), using the tidyverse packages in R. Note that for analyses which required links between LOs and learning types we excluded the *Assessment* learning type because it is horizontal and can be linked to several LOs. While the overall sample included 1624 TLAs, this subsample included 1150 TLAs.

A Kendall's Tau correlation was performed to determine any correlations between LO levels, TLAs, and specific types of engagement included in the courses (teacher presence, group work, feedback, collaboration, assessment, and delivery mode). We analysed the subset of 1150 TLAs, using the vcd, vcdExtra, rcompanion, ggcorrplot2, and DescTools packages in R.

To respond to RQ3, we examined the sequencing of TLAs within the LDs looking for regularities among samples of sequentially ordered data (Bechini et al., 2023). Particularly, we conducted **sequential pattern mining** (Agrawal & Srikant, 1995) to identify the most frequent patterns in learning type occurrence, using the arulesSequences library in R. Sequential pattern mining belongs to the process mining family, aiming to identify sequences in a dataset, which appear statistically significant number of times to verify interesting recurrences. It is focused on finding regularities among samples of sequentially ordered data (Bechini et al., 2023). It has been used in learning analytics research to identify frequent learning paths and patterns. For this study we used the SPADE algorithm. Support reflects the frequency of a sequence, confidence its predictive reliability, and lift the strength of the association relative to chance (lift > 1 indicating a meaningful association) (Zaki, 2001).

Finally, to respond to RQ4, descriptive statistics was extracted from student feedback on their course LDs and experiences with the tool.

4 Results

Regarding RQ1, based on teachers' reflections, most of the courses in the study were redesigned, instead of being planned from scratch. The updates were in the form of fine-tuning and small changes in already existing TLAs and pedagogies to better reflect student learning needs and course realities, e.g., availability of AI for students or an increase in the number of students in the course. Teachers' redesign ideas were based on students' feedback and teachers' experiences in previous course implementation as well as collective observations in the project workshops. The most frequent aims of course update were as follows:

1. To improve the clarity and structure of the LD of the course.
2. To better align TLAs with LOs.

3. To better plan and distribute student workload.
4. To include more formative assessments (e.g., in seminars).
5. To include AI in some of the tasks for problem solving (e.g., an essay).

Many teachers also emphasized that they continually redesign, update and overwise improve LDs in their courses based on student feedback and curriculum development.

To address RQ2, the frequency of levels of LOs, following a revised version of Bloom's taxonomy proposed by Krathwohl (2002), was analyzed with LO levels presenting remembering (1), understanding (2), applying (3), analyzing (4), evaluating (5), and creating (6). Based on the LD data for all courses (N = 22), a majority of LOs were described through concepts related to applying knowledge (42%), followed by outcomes related to understanding (20%) and analyzing (16%) phenomena under study. The lowest numbers of LOs related to remembering (2%), while evaluating and creating were each present in c. 10% of the data.

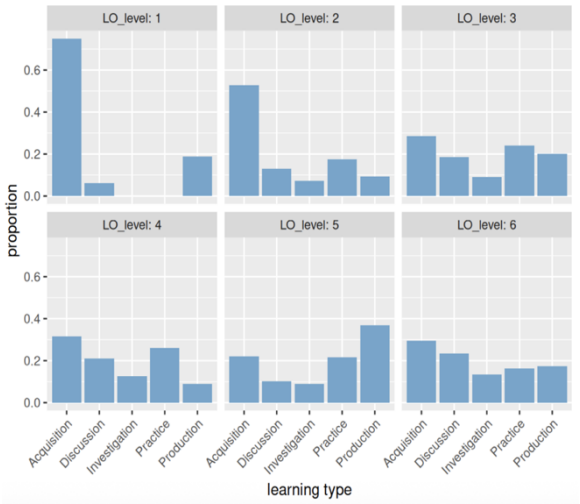


Figure 2. A comparison of learning outcome level (LO_level: 1-6) and learning types present in the learning designs.

As mentioned already above, the learning types describe the TLAs that the teachers had designed and labelled in the LD tool for their courses. Fig. 2 shows how the learning types were related to the LO levels. Acquisition was highly present in TLAs related to the LOs at the levels of *remembering* and *understanding*, while less prominent on higher LO levels. Discussion and Production were present in all LO levels, which highlights that teachers granted value to these activities in all types of designs. Production was especially related to the LO level emphasizing *evaluating*. Investigation was the least included type of learning activity. Except for the lowest LO level, that is *remembering*, Practice was also present in all types of designs, with most emphasis on LO levels *applying*, *analyzing*, and *evaluating*.

The correlation analysis shown in Fig. 3 presents Kendall's τ correlation coefficients in the lower triangle and their statistical significance in the upper triangle ($p < .05$, $p < .01$, $p < .001$). Most coefficients were weak, with only a small number of moderate to strong positive associations observed between pedagogically related variables. There are strong, significant correlations between teacher being present and feedback, teacher being present and synchronous delivery, feedback and synchronous delivery. This indicates that feedback for students was mostly planned to be provided by a teacher in synchronous teaching sessions. However, feedback to students did not correlate with the level of LO, learning type, or assessment. It should be noted that learning type is a categorial variable and for more meaningful insights it would be appropriate to analyze each learning type separately.



Figure 3. Correlations (Kendall) between learning outcome levels, learning types, and various types of engagement.

Regarding RQ3, pattern mining revealed the common sequences and patterns (Table 1). Altogether, 32 sequences with frequency equal to or greater than 2 were identified.

One of the most prominent sequences of learning types in the LD sample turned out to be Acquisition + Assessment + Practice → Practice. This reflects a possible strong emphasis on the flipped classroom approach.

Table 1. Subsequences for consecutive learning types in the learning designs.

rule	support	confidence	lift
<{Practice},{Production}> => <{Production}>	0.0360360	0.5333333	1.4095238
<{Production},{Production}> => <{Production}>	0.0855856	0.5757576	1.5216450
<{Assessment},{Practice}> => <{Practice}>	0.0540541	0.8571429	1.6989796
<{Acquisition},{Assessment},{Practice}> => <{Practice}>	0.0540541	0.9230769	1.8296703
<{Investigation},{Acquisition}> => <{Practice}>	0.0405405	0.5000000	0.9910714
<{Practice},{Investigation},{Acquisition}> => <{Practice}>	0.0405405	1.0000000	1.9821429
<{Investigation},{Acquisition},{Practice}> => <{Assessment}>	0.0360360	0.8888889	2.2424242
<{Practice},{Investigation},{Acquisition},{Practice}> => <{Assessment}>	0.0360360	0.8888889	2.2424242
<{Acquisition},{Practice},{Practice}> => <{Assessment}>	0.0405405	0.6428571	1.6217532
<{Acquisition},{Acquisition},{Acquisition}> => <{Assessment}>	0.0360360	0.5714286	1.4415584
<{Practice},{Investigation}> => <{Acquisition}>	0.0405405	0.6923077	1.1057001

The sequence of Practice + Investigation + Acquisition → Practice has the strongest confidence level (1) and it occurs in about 4% of LDs (0.0405405), suggesting that whenever this sequence occurred, it was consistently followed by Practice. It indicates that problem-based and inquiry-based learning, as examples of modern pedagogical approaches, are present in the analyzed LD sample. This is expected, since the aim of the project exercise was specifically to redesign courses in a way that reflects innovative pedagogies. Similarly, the sequence of Investigation + Acquisition + Practice → Assessment, which also has a high confidence level (0.8888889) but a bit lower support (0.0360360) is consistent with inquiry-based learning as well. Some other patterns, although with weaker metrics (support, confidence), are also consistent with constructivist approaches and active learning, e.g., Practice + Investigation → Acquisition.

The results also show that sequences most frequently end with Practice, Assessment, or Production. While assessment is a traditional end of a learning sequence, sequences that end with practice and production indicate that students often learn through hands-on experiences, which again points to active learning practices.

Surprisingly, while Discussion activities were frequent, they did not appear as part of the most prominent patterns.

Regarding RQ4, 543 students answered the question about the usefulness of LD analytics and visualizations. Students were asked to provide their feedback on the usefulness of the two learning design parts in the BDP tool: a general overview of the teaching and learning activities and analytics. Fig. 4 shows the distribution of responses: 56% agreed that the overview was useful, 23% did not disagree or agree, 6% did not find it useful, and an additional 15% had not checked it afterwards.

Although analytics and visualizations provided very different information compared to general teacher and learning activities in the overview of the course design, students' evaluations of their usefulness were almost identical. From all the students, 55% agreed the analytics part was useful, while 23% remained undecided. At the same time, 7% of students indicated that analytics and visualizations were less useful to them, and 15% had not checked the tool afterwards.

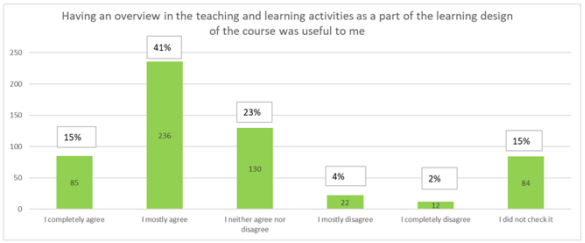


Figure 4. Distribution of students' responses to overview of the teaching and learning activities. "Having an overview of the teaching and learning activities as a part of the LD of the course was useful to me".

In their open answers, students typically highlighted that the design shown with the tool gives the learner a better idea of what they are supposed to learn. They expressed liking and finding it useful to know which lessons were dedicated to engaging with particular learning outcomes. Students also commented on how they perceived the LD helpful and useful for planning the workload, e.g., "It also helps to prepare for the course and understand what is expected" (Student 2).

5 Discussion and Limitations

RQ1 captured which aims teachers had for redesigning their courses. The continual need to redesign, update, and otherwise improve LDs was evident. These align with the review findings of Drugova et al. (2024) that the areas of LD improvements are often based on monitoring of learning to detect problems and addressing these problems with redesign. Particularly teachers were raising the questions of how to include AI-mediated teaching and learning activities in meaningful and ethical ways for problem solving.

The analysis of LOs and learning types (RQ2) showed that while teachers planned a variety of learning activities, knowledge acquisition was dominant, suggesting that more traditional teaching methods were preferred. Simultaneously, the results also reflect a typical flipped classroom design, where for a large part students study independently and are provided with feedback in synchronous classes led by teachers. Our correlation analyses further showed that activities involving teacher presence, feedback, and synchronous engagement were interlinked, emphasizing the importance teachers gave for real-time interaction for formative assessment and learner support.

With the pattern mining (RQ3), we observed an evident emphasis on practice and production signifying that teachers valued active learning and planned opportunities for students to develop their skills. The dominant sequence of learning types observed in the data (Acquisition, Assessment, Practice, Practice) exemplifies the characteristic structure of flipped classroom setups, highlighting that students spend substantial class time practicing knowledge and skills they have acquired independently through preparatory materials. The learning type Discussion was unexpectedly not part of most prominent patterns, possibly reflecting a less structured or explicated use of discussion as activity contributing to learning outcomes. This may reflect a lesser emphasis on facilitation and discourse as aspects included in a LD when designing with a LD tool. This calls for further identification of how Discussion is used in course LDs.

Student evaluations of the learning design (RQ4) enabled us to examine how students valued the information on learning outcomes and the teaching and learning activities for the course. While not everyone took up this opportunity, the majority of students evaluated that the course design and design analytics supported their learning. The results closely align with Feldman's (2007) findings, which emphasize the critical role of teacher preparation and course organization in promoting student engagement and success.

The effectiveness of the patterns found and positive evaluations of the learning designs by students are empirically supported by meta-analyses. van Alten et al. (2019) found that flipped classroom models are particularly effective when classroom time is not reduced, allowing students to engage with content independently before class and then use in-person sessions exclusively for collaborative work and applying knowledge. Their meta-analysis demonstrated medium to large effect sizes in student learning outcomes compared to traditional teaching formats.

The analysis offers suggestions for continued development of LD tools. For example, what would be the typical sequences for flipped learning or inquiry learning which could be benchmarked by teachers in need of on-demand, AI-supported guidance while creating new types of LDs. Further observing and detailing high quality designs (e.g., Lee et al., 2017) and how they are portrayed at system level through the analysis of LO and learning types offers future means to scaffold learning design.

The limitations primarily concern the variability in the quality of LDs, which stems from differences in teachers' pedagogical experience and training. While this variability poses challenges for interpretation, the findings nonetheless reflect the reality of HE, where a wide diversity of teaching qualifications and practices is common. Another source of variability was that not all courses were of the Flipped classroom pedagogy, future studies could identify patterns related to specific pedagogies. Overall, this study included a relatively small number of learning designs with variability of courses (FC, PBL, and IL) from a project-specific sample. This poses limitations on generalizability, but offers a synthesizing view on the variability existing in any HE curriculum development endeavor.

6 Conclusions

The study offers evidence on how teachers understand learning design, e.g., the interplay of learning outcomes and teaching and learning activities as well as how students benefit from LD and design analytics. It points to a continued need for constructive alignment of learning outcomes with teaching and learning activities, especially for more advanced levels of learning outcomes in higher education. It expands on how tools supporting design and analytics can make course learning design more explicit and tangible for collaborative design and professional development. This case study supports that if teachers undergo systemic training in learning design, innovative approaches (e.g., flipped classroom) can be detected by design analytics. Furthermore, the use of visualizations and design analytics may contribute to the quality of learning design and help teachers to resolve design errors in real time, which is in line with prior research (Albó et al, 2022; Schmitz et al., 2017).

The central features of the BDP tool, the general overview of the teaching and learning activities and the design analytics, offered useful information also for students enrolled in those courses. The value was generated by support for own planning, evaluating the workload, and understanding what is expected. These are aspects related to improved regulation of own learning, through planning, monitoring, and reflection. The results are consistent with empirical studies that provide robust evidence of the significant improvement in student learning outcomes that can be achieved through transparent teaching and course structure (Ambrose et al., 2010).

Transparent practices, such as clearly communicating objectives, assessment criteria, and expectations, have been recognized repeatedly in the literature as fostering higher levels of student

achievement (Feldman, 2007). The benefits of better planning, clearer objectives, and more effective self-regulation, are not only noted by users, as documented in our study, but are also supported by robust evidence linking transparency with increased learner achievement (Feldman, 2007). Therefore, the positive results of the last research question are likely to be enhanced by the transparent communication embedded in the course designs. This matches international research findings postulating that increased learning success is related to transparency in higher education (e.g., Rienties et al., 2015).

When students are provided with explicit information about course processes, goals, and evaluation procedures, they report feeling more empowered and experience fewer misunderstandings, which may contribute to better outcomes (Ambrose et al., 2010; Feldman, 2007). Hattie (2013) also emphasizes that teacher clarity is a critical factor for effective learning and achievement. The structure and visualizations of the BDP tool support teaching practices and were also perceived as helpful by the students in our study. Qualitative feedback underscored the helpfulness of knowing lesson objectives and activity distribution. Nevertheless, not all students reported engaging with the overview or analytics, revealing potential gaps in user uptake or perceived relevance. Addressing these gaps could encourage data-informed decision-making.

Further research efforts are needed to examine patterns from both a micro-level perspective of the LDs and the macro-level pattern generation. This will contribute to the understanding of teachers' strategic planning of learning and teaching, design practices, and alignment of curriculum development involving multiple levels of learning outcomes.

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APPENDIX

Table A. Overview of the courses and participants. Flipped Classroom (FC), Project-Based Learning (PBL), and Inquiry Learning (IL).

(Re)designed course and key content	N of students in the course	N of student responses	ECTS	N of teachers in the course	Course delivery	Compulsory /Elective	Pedagogy
1. Information systems	115	88	5	2	Blended, asynch.		FC
2. IT projects	101	17	3	1+1asis.	Blended, asynch.	Elective	PBL
3. Mathematics	415	131	5	3+6asis.	Bended	Compulsory	FC
4. Business	351	219	4	2+2asis.	Blended	Compulsory	FC
5. Education	32	20	5	2+1asis.	Online, synch.	Compulsory	FC
6. Mathematics	38	15	4	1+1asis.	Blended	Compulsory	FC
7. Data analysis	30	18	4	1+1asis.	Blended	Compulsory	FC
8. Medicine	11	11	1	6	Blended	Elective	FC
9. Medicine	15	15	1,5	2	Blended	Elective	FC
10. Medicine	35	11	1	5	Online, synch.	Compulsory	FC
11. Education	24	24	5	2	Blended, synch.	Compulsory	IL
12. E-learning	8	6	-	2	Online	Elective	FC
13. Education	12	5	1	1	Online	Compulsory	FC
14. Medicine	30	-	4				
15. Education	20	-	5				
16. Management	90	-	5				
17. Management	30	-	1,5				
18. Medicine	979	-	NA				
19. Education	9	-	NA				
20. Education	26	-	NA				
21. Management	320	-	NA				
22. Social studies	NA	-	NA				
Total	2691	580					