



Evaluation of the piloting (WP4)

“Improving the quality and sustainability of learning using early intervention methods based on learning analytics”

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Abstract	<p>This report presents the evaluation of the piloting of learning analytics dashboards across partner institutions, based on feedback from teachers and insights derived from student engagement data, SRL results, and responses to personalized interventions. Teachers rated the dashboards positively, highlighting their clarity, usability, and value for monitoring participation and supporting targeted, data-informed interventions. Dashboard insights were used frequently to identify students at risk, plan personalized feedback and adjust teaching strategies. On the student side, analysis of behavioural patterns revealed highly variable engagement, often influenced by external, organizational, and emotional factors. SRL data showed differences between students’ self-perceptions and their actual behaviour, while personalized interventions, whether responded to or not, were often followed by increased activity. Students valued timely support and clearer awareness of their progress, although privacy concerns affected data availability in some courses. Overall, the piloting demonstrates that learning analytics dashboards meaningfully support both teaching and learning by enabling early identification of challenges, more responsive pedagogy, and enhanced student motivation. The findings provide a strong foundation for further refinement of the platform and its long-term adoption across institutions.</p>
Keywords	Learning analytics, dashboard, teacher feedback, intervention, usability, student engagement, course monitoring, educational data, pilot evaluation, survey

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1 Introduction

The purpose of this report is to collect and analyze both teacher and student feedback following the piloting of the learning analytics dashboards. All interventions and the active use of the dashboards have been completed in selected courses across all partner institutions. The evaluation focuses on understanding how teachers and students used the dashboards during the piloting phase, how the dashboards supported teaching interventions, and how students responded to those interventions in terms of engagement and learning behaviour. The aim is to assess the usability, clarity and pedagogical value of the dashboards from both perspectives and to identify insights that can guide further development of the platform and the intervention guidelines.

The main objectives of the evaluation were to:

- assess how easily teachers could navigate the dashboard and interpret the data presented;
- determine whether the dashboards helped identify students requiring additional support and enabled timely, informed instructional interventions;
- examine how dashboard insights influenced teaching strategies and student engagement;
- collect suggestions for missing features, improvements and future training needs from the standpoint of both teachers and students.

Teacher feedback was collected through a structured questionnaire. At the same time, student-related insights were derived from SRL data, LMS behavioural patterns, responses to personalized interventions and informal comments gathered during the piloting.

The teacher questionnaire included both quantitative (Likert-scale items) and qualitative (open-ended) questions. The questions were divided into four sections, each focusing on a key aspect of the pilot experience:

- Usability of the Dashboard (questions 1.1 - 1.6) - measured navigation, clarity of performance and engagement data, actionable insights, and support for decision-making.
- Usefulness of Dashboard (questions 2.1 - 2.5) - assessed whether the dashboard helped teachers identify students requiring additional support, adjust their strategies, and stay aware of student engagement.
- Frequency of Dashboard Use for Interventions (questions 3.1 - 3.6) - included categorical and open-ended questions about dashboard usage frequency, types of interventions (individual, group, feedback), and the proportion of students supported.
- Effectiveness of Interventions (questions 4.1 - 4.8) - evaluated how dashboard data informed teaching actions, improved student engagement, and influenced teachers' plans for future use.

The questionnaire was sent to all instructors who participated in the pilot activities at partner institutions. In total, 20 teachers completed the questionnaire after the pilot ended, so their feedback reflects real classroom experience. The collected data were analyzed using descriptive statistics (means, standard deviations, response distributions) and through a discussion of the answers to the open-ended questions.

In addition to the teacher-focused questionnaire, the evaluation also incorporates an analysis of student behaviour and experiences during the piloting. Student insights were collected through SRL questionnaires, LMS activity data, responses to personalized interventions and informal feedback shared throughout the courses. These data provide an indirect but meaningful perspective on how students engaged with the courses during the piloting period, how they reacted to teacher interventions informed by the dashboards and what challenges, motivations and learning patterns characterized their progress. The student-focused analysis complements the teacher feedback by offering a broader understanding of engagement dynamics, emotional and organizational factors affecting learning and the overall impact of learning analytics-supported teaching on student behaviour.

2 Teacher Evaluation of the Piloting

2.1. Dashboard Usability and Visualization Clarity

Questions in section 1 collected information about the usability of the dashboard, clarity of the visualizations, usefulness of the insights, and the extent to which the dashboard design supported teachers in decision-making. Table 1 shows the mean, standard deviation, and median for the six questions in this section.

Table 1. Statistics for Section 1 items (Dashboard Usability and Visualization Clarity)

Questions	Mean	SD	Median
1.1 The dashboard is easy to navigate and understand	4.15	0.81	4
1.2 The visualizations clearly represent student performance data	4.30	0.72	4
1.3 The visualizations clearly represent student engagement	4.35	0.99	5
1.4 The dashboard provides actionable insights about student progress	4.20	0.89	4
1.5 I feel confident interpreting the data presented on the dashboard	4.20	0.83	4
1.6 The dashboard’s design supports my decision-making	4.20	0.89	4

Questions from Section 1 have average scores above 4.0, showing that teachers have a positive opinion about the dashboard’s usability and clarity. Question 1.3, “The visualizations clearly represent student engagement,” has the highest average score (Mean = 4.35, Median = 5). Most teachers agree with this statement, which means that student engagement visualizations are clear and useful. Question 1.1, “The dashboard is easy to navigate and understand,” has the lowest score (Mean = 4.15). Some teachers give lower ratings on Question 1.1, which shows that navigation is not equally easy for everyone. Question 1.2, which refers to student performance data visualizations, has the smallest standard deviation (SD = 0.73), which shows a high level of agreement among

teachers. Question 1.3 has the highest standard deviation (SD = 0.99), meaning that answers to this question are more varied.

Based on these results, dashboard usability and visualization clarity are rated by teachers as clear and easy to use. Engagement visualizations receive the highest ratings, while navigation shows the most variation in teacher experience, indicating that navigation is the area where improvements are most valuable.

2.2. Usefulness of Dashboard

Section 2 measured how the dashboard helped teachers identify students requiring support, monitor participation, and adjust teaching strategies.

Table 2. Statistics for Section 2 questions (Usefulness of Dashboard)

Question	Mean	SD	Median
2.1 The dashboard helps me identify students who may need additional support	4.05	1.15	4
2.2 The dashboard allows me to adjust my teaching strategies	4.05	0.94	4
2.3 The dashboard supports my ability to provide timely interventions	4.15	0.99	4
2.4 The dashboard identifies/predicts at-risk students	3.95	1.10	4
2.5 The dashboard enhances my awareness of student engagement and participation	4.4	0.68	4

Similarly to Section 1, all questions from Section 2 have averages above 4.0, which shows that teachers rate the dashboard as a useful tool for supporting teaching and monitoring students, with the strongest agreement on its role in improving awareness of student engagement and participation.

The highest rating is for Question 2.5, “The dashboard enhances my awareness of student engagement and participation,” with a mean of 4.40 and a median of 4, showing that teachers see the dashboard as very effective for monitoring student participation. The lowest rating is for Question 2.4, “The dashboard identifies/predicts at-risk students,” with a mean of 3.95, and answers are more spread out (SD = 1.10), showing mixed opinions among teachers. Questions 2.1–2.3 have similar results, all above 4.0, showing that the dashboard helps teachers find students who need extra support, adjust teaching strategies, and give timely interventions.

2.3. Frequency of Dashboard Use for Interventions

Questions in section 3 evaluated how often teachers accessed the dashboard and what types of interventions they implemented during the course. Questions 3.1–3.5 use multiple-choice answers, so results are presented as frequency counts and percentages rather than averages. Question 3.6 is open-ended and is analyzed thematically.

Half of the teachers access the dashboard more than five times during the course, and over one-third use it 3–5 times. Very few report using it once or twice, and none say they never use it. Results are summarized in Table 3.

Table 3. Frequency of Dashboard Access (Q3.1)

Option	Number of Answers	%
Never	0	0%
Once during the course	1	5%
2 times	1	5%
3–5 times	7	35%
More than 5 times	10	50%
Other	1	5%

The most common type of implemented interventions is personalized feedback (70% of teachers). About one third adjust lesson plans or meet individually with students, and a quarter organize group activities. No teacher reports that they do not implement interventions. Results for Question 3.2 are summarized in Table 4.

Table 4. Types of Interventions Implemented (Q3.2)

Type of Intervention	Number of Answers	%
Personalized feedback to individual students	14	70%
Assigned additional resources or assignments	8	40%
Adjusted lesson plans or teaching strategies	7	35%
Conducted one-on-one meetings	6	30%
Organized group activities or discussions	5	25%
None	0	0%
Other	1	5%

As shown in Table 5, most teachers (70%) initiate at least three individual interventions, showing frequent use of dashboard insights for personalized support. Group-level interventions, shown in Table 6, are less common: 30% of teachers report none, and most others implement one or two during the course.

Table 5. Number of Individual Interventions (Q3.3)

Times	Number of Answers	%
0	1	5%
1–2	5	25%
3–5	7	35%
More than 5	7	35%

Table 6. Number of Group Interventions (Q3.4)

Times	Number of Answers	%
0	6	30%
1–2	8	40%
3–5	5	25%

More than 5	1	5%
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The results show that interventions are implemented for about 10–25% of students in most cases, while one quarter of teachers reach up to half of the class. Only a small number of teachers report intervening with more than half of their students. These results are summarized in Table 7.

Table 7. Proportion of Students Receiving Interventions (Q3.5)

Coverage	Number of Answers	%
Less than 10%	3	15%
10–25%	10	50%
26–50%	5	25%
More than 50%	2	10%

Open-ended Question 3.6 focuses on other interventions or considerations teachers made based on dashboard insights. Teachers describe several actions they take during the course. Many mention adjustments to teaching content, such as adding extra exercises or refining assignment instructions (e.g., “I created extra exercises for students who struggled with programming tasks.”). Some teachers report changes in course organization, including moving deadlines or balancing the weekly workload (e.g., “I moved deadlines to give students more time for quizzes.”). Teachers also highlight direct communication with students, sending reminders, encouragement, and feedback, or arranging short meetings with those with low participation (e.g., “I contacted students with low participation individually.”).

2.4. Effectiveness of Interventions

Questions in section 4 examine how teachers evaluate the impact of interventions and their intention to continue using the dashboard. Questions 4.1–4.6 use a 5-point Likert scale which results are summarized in Table 8, while Questions 4.7 and 4.8 are open-ended questions.

Table 8. Statistics for Section 4 questions (Effectiveness of Interventions)

Question	Mean	SD	Median
4.1 The dashboard helps me take timely action	4.15	0.88	4
4.2 The dashboard improves my ability to support students	4.25	0.84	4
4.3 The interventions have a positive effect on student engagement	4.10	0.91	4
4.4 The interventions have a positive effect on student performance	4.05	0.94	4
4.5 The dashboard helps me improve my course design	4.00	0.95	4
4.6 I plan to continue using the dashboard in the future	4.30	0.80	5

The highest mean score is for Question 4.6 (Mean = 4.30), showing that most teachers plan to continue using the dashboard in the future. Questions 4.3 and 4.4, which ask about the effect of interventions on engagement and performance, have slightly lower scores (Means = 4.10 and 4.05) but still show agreement that interventions are beneficial. Open-ended responses confirm that teachers value the dashboard but also see opportunities for improvement. Teachers highlight the need for more detailed visualizations of student progress (e.g., number and scores of assignments per student), clearer representations of test results, and better integration with other platforms and tools. Some request faster system performance and more intuitive filtering options. Several comments highlight the need for instructor training to ensure the correct interpretation of the data. Others suggest using generative AI to explain charts or to create automated recommendations for students. There are also requests for more flexible statistics and the possibility of generating combined reports from multiple courses.

2.5 General Synthesis of Teacher Evaluation

The overall findings of the teacher evaluation indicate that the learning analytics dashboards were generally perceived as clear, usable and pedagogically meaningful across partner institutions. Teachers reported that the dashboards supported their understanding of student engagement patterns, helped them monitor participation more effectively and provided useful insights for identifying students who might benefit from additional attention. The frequency of dashboard use during the semester suggests that the tool was incorporated into regular teaching routines rather than serving solely as a passive reporting mechanism.

Teachers also noted that dashboard information informed pedagogical decisions, such as adjusting course structure, refining instructional strategies and improving the timing of interventions. Personalized feedback, guided by dashboard insights, was commonly used to support students, particularly those showing signs of disengagement. Several teachers mentioned that having access to consolidated data strengthened their confidence in interpreting students' progress and planning appropriate responses. At the same time, the evaluation highlights areas where teachers would benefit from further support. Differences in how instructors interpret visualizations, navigate the interface or understand risk indicators suggest that additional training and more detailed documentation could enhance consistency and confidence in use. Teachers also expressed interest in potential enhancements, including automated alerts, extended reporting options and AI-supported recommendations, which they believe could simplify monitoring and reduce manual workload.

Taken together, the teacher evaluation shows that the dashboards provide useful insights into student behaviour and can support a more informed and responsive teaching approach. While teachers see meaningful value in the tool, they also identify clear opportunities for further refinement to strengthen its long-term effectiveness and integration into institutional practice.

3. Student Evaluation of the Piloting

This chapter aims to provide an integrated view of how students experienced the piloting across all institutions. Data was collected from SRL questionnaires, LMS behaviour, responses to interventions, and informal comments shared during the pilot courses. The following sections focus on five core dimensions of the student experience and illustrate each with concrete examples from individual courses. A general synthesis follows.

3.1 Student Engagement Patterns and Learning Behaviour

Across institutions, students showed varied engagement patterns, often marked by late starts, irregular activity, or short bursts of work near deadlines. These patterns were particularly evident in the course Object-Oriented Programming 1 at BMU, where students did not begin any activity until the sixth week of the semester. Students S45, S57 and S75 all recorded their first interaction with course materials only at this time, despite reporting relatively high anxiety levels in the SRL questionnaire. A similar pattern appeared in Fundamentals of Web Development at BMU, where protests and disruptions to the academic calendar delayed students’ engagement. Most students reported that they “lost study rhythm” and significantly postponed work.

In contrast, the Data Management Systems course at UEF demonstrated a different form of discontinuity. Student 7, for example, showed strong activity at the beginning of the semester, with a sudden drop in activity and stopped submitting exercises, prompting early intervention. Other courses, such as Digital Design and Multimedia at SU, exhibited “wave-like” engagement where students increased activity shortly before project deadlines or assessment points. Even in courses with high-performing groups, such as Distributed Systems at BMU, engagement was uneven, with several students presenting average activity but high anxiety or passivity despite strong SRL self-assessments.

These diverse behavioural patterns indicate that external factors, personal circumstances and emotional states, all visible through LA and SRL data, substantially shape student engagement and progress.

3.2 Student SRL Profiles and Emotional Factors

SRL questionnaires provided useful insight into how students viewed their own learning processes. A recurring pattern across institutions was a mismatch between students’ self-perceptions and their actual behaviour or performance. For instance, students S54, S69 and S71 in Object-Oriented Programming 1 rated their self-regulation highly but had low performance and irregular activity. This suggests that planning and motivation may be present, but not successfully translated into effective study habits.

Another significant group consisted of high-achieving but highly anxious students. On the same BMU course, students S61, S65, S76, S80 and S88 achieved strong results and showed steady activity, yet reported heightened levels of stress, worry and fatigue. The

fact that high performance coexisted with high anxiety highlights the emotional pressures experienced even by the most successful students.

An interesting contrast came from UEF’s Data Management Systems course. Student 3 reported low effort and low learning goals in the SRL questionnaire, but a detailed analysis of clickstream data showed significantly higher activity than expected. This mismatch illustrates that some students underestimate their own learning behaviours or lack awareness of their study patterns.

In the HCI course at SU, SRL data showed large variation in students’ ability to maintain focus, manage distractions and seek help proactively. Emotional scores also differed widely, with some students performing well academically but experiencing fluctuating motivation or concentration. Altogether, SRL data across courses reveal that cognitive performance alone cannot fully explain student success, and emotional and metacognitive dimensions play a crucial role.

3.3 Student Responses to Personalized Interventions

Personalized interventions proved to be one of the most influential components of the pilot. Although many students did not reply to messages explicitly, their reactions when they did respond provided candid insight into their challenges and motivations. In Object-Oriented Programming 1 at BMU, several students used the personalized email as a moment to articulate their situation. Student S36 wrote that they would start studying from a particular date the following week, suggesting that the message prompted a reset in study planning. Student S25 similarly expressed an intention to begin working on assignments “in the next days,” acknowledging their earlier inactivity.

Other students used the intervention to communicate personal or contextual obstacles. Student S22 reported work obligations that limited their ability to study regularly; student S4 cited family issues; and students S58 and S74 described personal difficulties that delayed their coursework but expressed willingness to catch up. Student S10 explained that they were learning through Udemy rather than the official materials, but intended to complete all requirements. These responses reflect a high degree of honesty once personal contact was established.

In Distributed Systems at BMU, several students expressed increased stress, overlapping responsibilities or uncertainty about expectations, which instructors addressed through additional explanations and reassurance. At UEF, students in both Data Management Systems and Social Network Analysis often took the opportunity to acknowledge workload pressure, difficulty balancing parallel courses or a need for more applied examples. In some cases, students specifically requested supplementary sessions or clarification materials.

In the SU Digital Design and Multimedia course, students often reported that messages helped them refocus their efforts, particularly in the context of teamwork where expectations were interdependent. Similarly, in ULe’s Computer Architecture course, anxious students actively asked for guidance, especially on connecting theoretical content

with practical tasks. Student responses show that personalized communication plays a key motivational role by providing clarity, emotional support and a sense of being noticed.

3.4 Behavioural Effects of Interventions

Across all institutions, a noticeable increase in engagement typically followed teacher interventions, even when students did not send a response. On BMU courses, Object-Oriented Programming 1, Fundamentals of Web Development and Distributed Systems, platform logs showed increases in visits to materials, quiz attempts and assignment submissions in the period immediately after interventions. This suggests that personal messages, even when unanswered, triggered behavioural adjustments.

At UEF, students in both Data Management Systems and Social Network Analysis demonstrated improved participation after receiving tailored feedback, particularly regarding pacing strategies, assignment sequencing and resource usage. These behavioural changes indicate that students benefited not only from emotional reassurance but also from concrete guidance on organizing their study routines.

In the SU courses, especially HCI and Digital Design and Multimedia, students often increased their activity after receiving clarification about tasks or additional examples, indicating that targeted instructional support complemented the motivational function of interventions. At ULe, the Animation course showed improvements not only at the individual level but also in team dynamics. Students explicitly commented that visual insights into their contribution to group work helped them redistribute roles more effectively and keep the project on track.

Interventions had behavioural consequences across courses, supporting the value of timely, individualized communication in shaping engagement patterns.

3.5 Student Perceptions of Dashboards and Data Use

Although students were not directly surveyed about the dashboards, their behaviour, comments and consent patterns provide meaningful insight into how they perceive data-driven teaching. In DIGI110: Fantastic Data at UiB, students appeared motivated by progress visualizations and transparent indicators of activity, yet the overall consent rate was moderate. The issue of consent was even more pronounced in STAT110, where only 14 of 115 active students agreed to share their learning data despite full anonymization. This suggests a strong focus on privacy as a fundamental value, even when students recognize potential benefits from analytics.

In contrast, students in SU and ULe courses seemed more comfortable with data use, frequently describing dashboard visualizations as helpful for understanding expectations and tracking progress. In the ULe Animation course, several students referenced that seeing their contribution in relation to teammates gave them a clearer sense of responsibility within the project. These reactions highlight that students appreciate

transparency and personalized guidance when they understand how their data is being used.

Overall, the dashboard was not only a tool for teachers but also indirectly shaped students' awareness of their learning behaviours, expectations and progress.

3.6 General Synthesis of Student Experience

Synthesis of student experiences across all pilot courses reveals several interconnected patterns that collectively illustrate how students perceive, interpret and respond to LA-supported teaching environments. When analyzed together, behavioural data, SRL profiles and reactions to personalized interventions form a coherent narrative: students benefit most when the technical elements of learning analytics are embedded within a supportive, human-centric pedagogical approach.

Throughout the piloting, the majority of challenges that students encountered were not rooted in the academic complexity of the courses but in organizational, contextual and emotional factors. Late engagement, inconsistent study routines, overlapping obligations, work commitments, family issues and academic calendar disruptions were repeatedly cited across institutions. These obstacles often overshadowed students' actual abilities. Importantly, many students showed strong intentions, high intrinsic motivation, or robust SRL profiles that were not fully reflected in their performance due to these external pressures. This mismatch reinforces the idea that learning analytics must be interpreted in light of broader lived realities and not solely through behavioural data points.

The emotional dimension of learning proved especially significant. Across multiple courses, high-performing students simultaneously reported high anxiety, worry about deadlines and self-doubt despite strong academic outcomes. Conversely, some low-performing students expressed confidence or strong self-regulation even when their behaviours suggested disengagement. This duality confirms that cognitive performance and emotional well-being cannot be separated; effective teaching must address both. Personalized interventions played a crucial role in bridging this gap. Even when students did not reply, their subsequent behaviour often showed increased engagement, suggesting that the mere act of receiving an individualized message, one that acknowledged their situation and offered concrete guidance, had a motivating and normalizing effect.

Institutional context also shaped the student experience in meaningful ways. In Serbia, external socio-political events influenced student routines and delayed engagement; in Norway, privacy concerns significantly limited the extent of student data available for personalized feedback; in Finland, early interventions were essential to prevent early-term dropout; and in Bulgaria and Spain, students showed high receptiveness to dashboard support, particularly in project-based and team-oriented tasks. Despite these contextual differences, the core pattern remained remarkably consistent: students valued transparency, clarity, timely feedback and a sense that someone was monitoring their progress with understanding rather than judgment.

Whether expressed through explicit responses, behavioural changes or SRL reflections, students demonstrated that personalized communication helped them regain structure, reduce stress and re-engage with coursework. This confirms that learning analytics are most impactful not when used as an automated warning system, but when they enable a more empathetic, informed and responsive relationship between teachers and learners.

The student perspective reinforces the findings from the teacher survey. Dashboards and LA-informed interventions enriched teaching practice, supported student success and provided an additional layer of insight into the complex interplay between behaviour, motivation and emotional well-being. More broadly, the pilot demonstrates that learning analytics, when combined with human support and understanding, support earlier identification of difficulties, more adaptive teaching strategies and a heightened sense of agency and belonging among students. This integrated approach lays a solid foundation for future development of the ISILA results and the broader adoption of analytics-driven pedagogies across institutions.

4 Conclusion

In conclusion, the results of the teacher survey confirm that the piloting of the learning analytics dashboards within the ISILA project was successful and positively received across all partner institutions. Teachers consistently evaluated the dashboards as clear, usable and pedagogically valuable, with average ratings above 4.0 on nearly all items. Visualizations of student engagement and participation were particularly appreciated, demonstrating that the dashboards effectively support instructors in monitoring learning processes and maintaining awareness of student activity throughout the course.

The piloting also showed that the dashboards were not merely observational tools but actively shaped teaching practice. Most instructors accessed the dashboards regularly during the semester and used the insights to implement targeted interventions, primarily through personalized feedback, individual communication and tailored support. These interventions reached a significant number of students, confirming that the dashboards facilitated early identification of learning challenges and actionable guidance. Teachers reported that using dashboard insights helped them adjust course structure, clarify expectations, refine assessment approaches and provide timely assistance, contributing to improved engagement and perceived student performance.

At the same time, survey responses revealed several opportunities for further development. Variability in teachers’ experiences with navigation, risk indicators and specific visualizations suggests that enhancements in interface clarity, reporting features and predictive elements would further strengthen overall usability. Teachers also expressed a need for additional training, clearer guidelines for data interpretation, smoother integration with existing institutional systems and the inclusion of advanced features such as automated alerts, customizable notifications and AI-supported recommendations.

Importantly, the findings mirror patterns observed in student behaviour and feedback during the piloting. Students responded positively to personalized interventions, valued the sense of being noticed and supported, and frequently increased their activity after receiving targeted messages, even when they did not respond directly. These insights highlight that dashboards not only enhance monitoring but contribute to stronger communication, transparency and student–teacher connection.

Overall, the piloting period demonstrates that learning analytics dashboards can meaningfully enhance early intervention strategies and data-informed teaching practices. Teachers’ clear intention to continue using the dashboards reflects their perceived long-term value and relevance. The feedback collected through the piloting process provides a strong basis for refining the platform, ensuring its sustainability, scalability and alignment with the practical needs of teachers and learners across diverse educational environments.