

## Moodle Activity Logs and Online Course Design: An Exploratory Study of Four Doctoral Projects

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### Abstract:

**Background:** First-year doctoral students are often asked to design an online course during pedagogical training. The platform logs generated while they build such courses offer a partial view of this process. This study aimed to describe the types, temporal distribution, and recorded sequences of Moodle events associated with the construction of four online course projects by first-year doctoral students.

**Materials and Methods:** This observational, descriptive and exploratory study analysed four doctoral student–project units, selected among 100 enrolled students, from the distance module "Innovation Pédagogique" (one from the 2025 cohort, three from the 2026 cohort), using Moodle log exports. Of 1,147 exported events, 892 were retained after excluding the trainer's actions (70), guided-tour events (74), events linked to an edited object (67) and events of uncertain status (44). Events were coded into six categories; sessions were delimited at 30 minutes, with 15 and 60 minutes as sensitivity thresholds.

**Results:** Retained events ranged from 44 to 462 per case, active days from 1 to 13, created modules from 8 to 17, and module modifications from 0 to 40. The busiest day accounted for 45% to 100% of each case's events. Of 851 transitions, 543 linked events time-stamped in the same minute, whose order cannot be verified, and the share of creations followed by a course page view varied with exclusion decisions (53.8% to 41.2%).

**Conclusion:** Moodle logs document recorded construction operations and their timing, but not design intentions, competences or course quality. Four cases support neither generalisation nor comparison between cohorts.

**Key Word:** Learning analytics; Moodle logs; online course design; constructive alignment; doctoral education; event sequences.

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### I. Introduction

Doctoral students are frequently asked to teach during or after their doctorate, although their training prepares them mainly for research. Studies of doctoral socialisation have long described preparation for teaching as uneven and loosely structured<sup>1</sup>. Pedagogical modules offered early in the doctorate seek to address this gap and, when they focus on digital teaching, often ask participants to design a scenario-based course on a platform. Course scenario design is understood here as the reasoned organisation of objectives, activities, resources and assessments in a learning situation; the notion and its uses remain debated<sup>2</sup>.

Constructive alignment provides the interpretive framework of this study: teaching is coherent when learning activities and assessment tasks correspond to the intended learning outcomes<sup>3</sup>. This principle can guide decisions throughout course design, not only characterise the finished course. It is not measured empirically here; it is used to situate what the logs show and what they leave out. University teachers' design work has also been described as iterative, situated and constrained by context rather than as the linear application of a model<sup>4</sup>.

Learning analytics, understood as the measurement, collection and analysis of data about learners and their contexts<sup>5</sup>, has established links with learning design. Traces are interpreted in the light of the intended design<sup>6</sup> and can support teachers' inquiry into their own courses<sup>7</sup>. The studies reviewed by Mangaroska and Giannakos mainly analyse learners' traces to inform or revise a design<sup>8</sup>. The present study does not claim to fill a gap in the literature, which has not been reviewed systematically here. Its contribution is situated: it documents the construction operations of four Moodle courses as recorded by the platform, and it makes explicit what the analysis of such logs can and cannot establish.

The module studied, "Innovation Pédagogique", is the training course; the activities and resources analysed below are those that the doctoral students created in their own Moodle project spaces. The logs of these spaces are behavioural traces. They record operations in the platform, not design reasoning, competences or the

quality of the resulting course. The objective was therefore to describe the types, temporal distribution, and recorded sequences of Moodle events associated with the construction of four online course projects by first-year doctoral students. Two descriptive research questions (RQ) guided the analysis. RQ1: Which events are recorded during course construction, and how are they distributed over time? RQ2: Which successions of creations, modifications and views appear in the logs?

## **II. Materials and Methods**

### **Study design and context**

This observational, descriptive and exploratory study concerns the distance module “Innovation Pédagogique,” offered during the second semester to first-year doctoral students at the Faculty of Letters and Human Sciences Ben M’Sik, Hassan II University of Casablanca, Morocco. The module comprised 50 hours. Its objective was to enable doctoral students to design a course scenario through Moodle, using digital tools and applying principles of instructional design. Students were required to follow the pedagogical scenario presented during a face-to-face session of the module. Support was provided through tutorial videos demonstrating how to use the available Moodle tools for course design. Each doctoral student built a scenario-based course in a dedicated Moodle space.

### **Cases and unit of analysis**

The data covered four Moodle project spaces. The module enrolled 100 doctoral students, and each of the four analysed spaces corresponded to an individual doctoral student’s project. These spaces were purposively selected because complete and attributable Moodle log exports were available for them, allowing the activity of one student and one project to be analysed consistently. The unit of analysis was therefore the doctoral student–project pair, coded D1 to D4 ( $n = 4$ ). The four cases were not intended to be exhaustive or representative of the 100 enrolled students. D1 belonged to the 2025 cohort, whereas D2, D3 and D4 belonged to the 2026 cohort. The observation window ran, for each space, from its creation to the log export of 6 October 2026. D1’s recorded activity spanned 22 March to 16 May 2025, while that of D2, D3 and D4 spanned 6 March to 4 July 2026. The final project deadline for the 2026 cohort was 30 June 2026. This pedagogical deadline did not close the observation window, and events recorded after that date were retained. The deadline for the 2025 cohort was not available. Consequently, no comparison between cohorts was attempted.

### **Data source and actors**

The data consisted of four CSV exports of the Moodle “Logs” report<sup>9</sup>, one per project space, produced by the trainer. Each row contained nine fields: time, full name, affected user, event context, component, event name, description, origin and IP address. Numerical identifiers of users, course modules, forum discussions and posts were extracted from the descriptions. The exports contained neither seconds nor log-entry identifiers. The platform was running Moodle 4; however, the exact minor or patch version, logging configuration and export time zone were not documented in the available material. The logs of the training module, project instructions, course products and grades were not available.

Roles were inferred from the logs. In each space, one trainer and one doctoral student were identified. The trainer was the author of the “Course created” event, while the doctoral student was the user enrolled and assigned a role by the trainer. No other actors appeared. The local identifier of the assigned role (3 in all four spaces) does not establish the associated permissions. Editing capacity was supported by the recorded operations themselves, as each student created or modified objects in their space (8 to 85 events). Accordingly, the correspondence between the identified users and their institutional roles should be understood as an operational inference from the logs rather than as an independently verified role assignment.

### **Exclusions**

The files contain 1,147 events, all of web origin, with no empty cell. Table 1 details the 255 excluded events. Because the export does not distinguish an event generated by Moodle from a user action, all exclusions other than the trainer’s actions are analytical decisions rather than demonstrations of automatic origin.

One hundred and two events carry a gradebook, calendar or wiki-lock label. According to the documentation, graded activities send their items to the gradebook, but a grade item can also be created manually<sup>10</sup>. For each event, the analysis script searched the same minute for a creation or modification by the same actor on the same object. For gradebook and calendar events, the object match relies on normalised titles and textual inclusion of the module name; it is a probable match that may be ambiguous, not a certain identity. For the wiki lock, the match relies on the page identifier. This actor–minute–object concordance was found for 67 events, which were excluded on that basis; their automatic origin is plausible but not demonstrated. It was not found for 35 events: 18 course-total gradebook items, which designate no module; 16 grade items of a module not edited in that minute; and one calendar event whose title did not match. Only one of these 35 events has no

associated action in its minute. The only other gradebook events are seven views of the grader report; a manual intervention can be neither established nor excluded.

Nine further events are uncertain for a different reason: they coincide with an action on the same object, but the export does not show whether they duplicate it or reflect a separate action. They comprise three activity-completion updates, one discussion subscription, one tag and four forum events (three "Content posted", one "Post deleted") whose probable partner shares the actor, the discussion, the minute, adjacent export rows and, when both descriptions contain it, the post identifier. Co-occurrence is not proof of redundancy. The 44 uncertain events were excluded from the main analysis of 892 events and reintegrated in two sensitivity scenarios.

**Table 1:** Events excluded from the main analysis, by reason (255 of 1,147 events). Apart from the trainer's actions, exclusions are analytical decisions.

| Reason                     | Event names in the export (counts)                                                                                                                                                                                                                              | n          | Justification and status                                                                                                     |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------------------------------|
| Trainer                    | Course section created (20); Enrolment instance created (12); Course viewed (9); User list viewed (9); Log report viewed (5); Course created (4); Role assigned (4); User enrolled in course (4); Course activity report viewed (2); Live log report viewed (1) | 70         | Out of scope: set-up of the space, enrolment, views and export by the trainer                                                |
| Guided tours               | Step shown (41); Tour started (30); Tour ended (3)                                                                                                                                                                                                              | 74         | Interface help displayed when a page opens; analytical decision                                                              |
| Linked to an edited object | Grade item updated (27); Calendar event updated (14); Calendar event created (13); Grade item created (12); Wiki page locks deleted (1)                                                                                                                         | 67         | Same actor, same minute and probable same object as a creation or modification; automatic origin plausible, not demonstrated |
| Uncertain                  | Grade item updated (30); Grade item created (4); Course module completion updated (3); Content posted (3); Discussion subscription created (1); Post deleted (1); Tag added to an item (1); Calendar event created (1)                                          | 44         | No object match (35) or possible duplicate of an action on the same object (9); reintegrated in sensitivity scenarios        |
| <b>Total excluded</b>      |                                                                                                                                                                                                                                                                 | <b>255</b> | Retained events: 1,147 – 255 = 892                                                                                           |

*Note.* Event names are the English Moodle equivalents of the French labels in the export. Object matching for gradebook and calendar events relies on normalised titles and is probable, not certain.

### Timestamps and identical rows

Timestamps are recorded to the minute; two-digit years were read unambiguously as 2025 or 2026. Each file was verified to be in reverse chronological order. Within a minute, the order used is the reversed file order, an assumption that cannot be verified without seconds or log identifiers. Among the 1,077 events of the doctoral students, 241 rows repeat an earlier row with identical time, context, event and description. This count covers repetitions beyond the first occurrence: they belong to 176 groups totalling 417 rows. Within the analysed set, there are 217 such repetitions, 162 of which are course page views. They may be logging duplicates or repeated operations within the minute, such as a page reload, and were retained. Event counts therefore enumerate recorded events; they measure neither distinct actions nor the work performed.

### Data protection

The source files contain full names and IP addresses. For the analysis and this article, individuals are designated by codes D1 to D4, assigned in the order of their first event. IP addresses were not used, and course and module titles are not reproduced. The output files intended for sharing were checked and contain no names, IP addresses, titles or Moodle user identifiers. The correspondence table is written to a separate file that must not be shared. This is pseudonymisation, not anonymisation: re-identification remains possible for anyone holding the source files.

### Event categories, indicators and analyses

Each retained event was assigned to one of six categories on the basis of its event name, following the create, read, update and delete logic of the Moodle events API<sup>11</sup>: C, creation of a module, section, quiz question, discussion or wiki page; M, modification; S, deletion; V, view of an object, including the quiz editing page; N, display of the course page; and R, view of a report. These labels designate recorded events: a display does not establish reading, a view does not establish checking, and a modification does not establish improvement. Modules were grouped by convention into resources (page, file, folder, URL, label), activities (forum, wiki, interactive content, lesson) and assessments (assignment, quiz).

Indicators were computed per case: number and diversity of events; active days and share of the busiest day; modules created by type; modifications; modules created or modified on at least two days; and transitions between categories. A session groups consecutive events of a case as long as the gap does not exceed 30 minutes; thresholds of 15 and 60 minutes served as sensitivity analyses. The number of sessions is reported separately from

their cumulative span, that is, the summed time between the first and last event of each session, which is not a measure of working time<sup>12</sup>. A transition links two consecutive events within the same session. Events within a case are repeated measures, not independent observations. With four units, no significance test, clustering, classification or predictive model was used. All figures were computed from the four files with a single script (Python 3.13.16, pandas 3.0.5).

### III. Results

#### Recorded events and temporal distribution (RQ1)

The four cases differ by an order of magnitude: 44 to 462 retained events (median 193) and 1 to 13 active days (median 6.5). Of the 892 events, course page displays account for half (446; 50.0%), followed by object views (238; 26.7%), modifications (126; 14.1%), creations (65; 7.3%), report views (11; 1.2%) and deletions (6; 0.7%). Table 2 details the indicators.

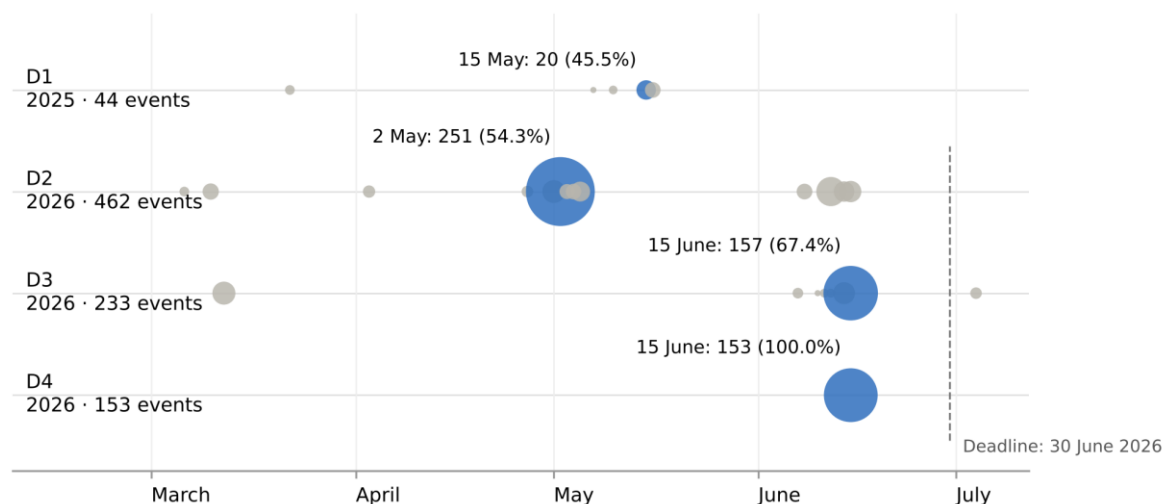
**Table 2:** Indicators per case, computed on retained events (n = 892). D1: 2025 cohort; D2–D4: 2026 cohort.

| Indicator                                              | D1 (2025)            | D2 (2026)           | D3 (2026)           | D4 (2026)       |
|--------------------------------------------------------|----------------------|---------------------|---------------------|-----------------|
| Period of recorded activity                            | 22 Mar – 16 May 2025 | 6 Mar – 15 Jun 2026 | 12 Mar – 4 Jul 2026 | 15 Jun 2026     |
| Retained events                                        | 44                   | 462                 | 233                 | 153             |
| Distinct event names                                   | 5                    | 19                  | 10                  | 10              |
| Active days / span (days)                              | 5 / 56               | 13 / 102            | 8 / 115             | 1 / 1           |
| Busiest day: events / total (%)                        | 20 / 44 (45.5)       | 251 / 462 (54.3)    | 157 / 233 (67.4)    | 153 / 153 (100) |
| C / M / S events                                       | 8 / 0 / 0            | 33 / 52 / 1         | 14 / 29 / 5         | 10 / 45 / 0     |
| V / N / R events                                       | 6 / 27 / 3           | 155 / 218 / 3       | 53 / 127 / 5        | 24 / 74 / 0     |
| Modules created (resources / activities / assessments) | 8 (8 / 0 / 0)        | 17 (9 / 3 / 5)      | 10 (6 / 3 / 1)      | 8 (6 / 1 / 1)   |
| Module modifications                                   | 0                    | 40                  | 17                  | 30              |
| Modules modified at least once / modules involved      | 0 / 8                | 12 / 18             | 5 / 10              | 8 / 9           |
| Modules created or modified on at least two days       | 0                    | 1                   | 4                   | 0               |
| Number of sessions, 30 min (15; 60 min)                | 9 (11; 7)            | 18 (23; 16)         | 12 (18; 10)         | 2 (2; 2)        |
| Cumulative session span, h, 30 min (15; 60 min)        | 1.5 (0.7; 3.1)       | 8.6 (7.0; 10.1)     | 5.2 (3.0; 6.7)      | 1.6 (1.6; 1.6)  |

*Note.* C, creation; M, modification; S, deletion; V, view of an object; N, course page display; R, report view. Modules involved include, for D2 and D4, one modified forum whose creation is not logged under the student's name. Cumulative session span is the summed time between the first and last event of each session, not working time.

Course composition varies. D1 created resources only. D2 created the widest range of modules, including five assignments or quizzes, and is the only case with recorded quiz questions (13 created, 7 modified). For D3, more events concern the course structure: 4 sections created, 12 section modifications and 5 deletions. The number of module modifications per created module ranges from 0 for D1 to 3.75 for D4 (30 for 8).

Events are concentrated in time (Figure 1). The busiest day contains 20 of 44 events for D1, 251 of 462 for D2, 157 of 233 for D3 and 153 of 153 for D4. In 2025, D1's eight creations date from 15 and 16 May. In 2026, all three students have events on 15 June, fifteen days before the final project deadline of 30 June. D4's space was created by the trainer that day, and all its events fall on that date. For D3, 192 of 233 events and 47 of 48 creations, modifications and deletions occur between 9 and 15 June; its seven events of 4 July, after the deadline, are course page displays and views. For D2, the week of 9 to 15 June contains only 91 of 462 events and 1 of 86 creations, modifications or deletions; most date from 2 May.



**Figure 1:** Retained events per active day and case ( $n = 892$ ). Circle area is proportional to the number of events on that day; each case's busiest day is shown in blue with its date, count and share of the case total. D1 was observed in 2025 and D2–D4 in 2026; the cases share a calendar axis for readability only, without implying a comparison between cohorts. The dashed line marks 30 June 2026, the final project deadline of the 2026 cohort.

The number of sessions depends on the threshold for three of the four cases (Table 2). Their cumulative span varies more: from 0.7 to 3.1 hours for D1, 7.0 to 10.1 hours for D2 and 3.0 to 6.7 hours for D3 depending on the threshold, compared with 1.6 hours for D4. These spans are not working times.

### Recorded sequences of creations, modifications and views (RQ2)

At the 30-minute threshold, 851 transitions link consecutive events (Figure 2). D2 contributes 444, D3 221, D4 151 and D1 35, so the pooled matrix mainly reflects the two most active cases.

|                  | To           |                  |              |                 |                 |                 | Total |
|------------------|--------------|------------------|--------------|-----------------|-----------------|-----------------|-------|
|                  | Creation (C) | Modification (M) | Deletion (S) | Object view (V) | Course page (N) | Report view (R) |       |
| Creation (C)     | 1<br>1.5%    | 1<br>1.5%        |              | 28<br>43.1%     | 35<br>53.8%     |                 | 65    |
| Modification (M) | 7<br>5.6%    | 15<br>12.0%      | 1<br>0.8%    | 34<br>27.2%     | 68<br>54.4%     |                 | 125   |
| Deletion (S)     |              |                  |              | 1<br>16.7%      | 5<br>83.3%      |                 | 6     |
| Object view (V)  | 16<br>7.0%   | 12<br>5.2%       | 1<br>0.4%    | 63<br>27.5%     | 137<br>59.8%    |                 | 229   |
| Course page (N)  | 36<br>8.6%   | 96<br>23.0%      | 4<br>1.0%    | 111<br>26.6%    | 163<br>39.1%    | 7<br>1.7%       | 417   |
| Report view (R)  |              |                  |              |                 | 6<br>66.7%      | 3<br>33.3%      | 9     |

**Figure 2:** Transitions between categories of consecutive events within a session (main analysis, 30-minute threshold, four cases pooled;  $n = 851$ ). Each cell gives the count and its share of the row total; the right-hand column gives row totals. The deletion ( $n = 6$ ) and report ( $n = 9$ ) rows are too small for percentage interpretation. The order of the 543 transitions between events in the same minute cannot be verified.

Three observations stand out. First, a creation or modification is followed by a course page display in more than half of cases (35 of 65; 68 of 125), and the course page precedes 96 of the 124 modifications and 36 of the 60 creations that have an earlier event in their session. Second, a creation directly followed by a modification is rare (1 of 65). Third, the object just edited is often the one viewed next. All 130 module creations or modifications carry a module identifier. Ignoring course page displays, 6 have no successor in their session, 68 are followed by a view and 57 by a view of the same module: 1 of 8 for D1, 25 of 57 for D2, 22 of 27 for D3 and 9 of 38 for D4.

A filtered sequence was also examined. Sessions were first delimited on the complete sequence; only creations, modifications and views were then kept, without any pair crossing a session boundary. The resulting 399 pairs are not log transitions but adjacencies created by removing other events. In this sequence, a creation

precedes a view in 38 of 63 cases and a modification in 14; a modification precedes a view in 58 of 121 cases and another modification in 51.

Repeated modifications of the same module are unevenly distributed. In D2, D3 and D4, three to five modules each have at least three modifications, with a maximum of 7 to 10. Most occur on the day of creation; four modules of D3 and one of D2 were created or modified on more than one day. No module modification is recorded for D1.

### Sensitivity analyses

**Order within a minute.** Of the 851 transitions, 543 link two events time-stamped in the same minute. Removing these pairs, without reconnecting the remaining events, leaves 308 transitions, of which only 2 follow a creation and 19 a modification. What follows a creation or modification therefore occurs almost entirely within the same minute (63 of 65; 106 of 125), so the observations above describe co-occurrences whose order is not established.

**Session threshold.** The number of transitions rises from 838 at 15 minutes to 857 at 60 minutes. Cell by cell, differences reach at most 6 transitions (course page to creation: 32, 36, 38) and 1.2 percentage points in row shares for the four largest rows. The deletion and report rows are too small to be judged stable. Filtered adjacencies range from 390 to 403.

**Exclusion decisions.** Two scenarios reintegrate excluded events. Forum events recover their category (creation or deletion); the others form an additional category, A ("other event"), absent from the main analysis. Row shares are computed over all destinations, including A, and compared with Figure 2. With the 44 uncertain events, the set contains 936 events (40 in A) and 895 transitions, 60 of which involve A. Adding the 67 object-linked events gives 1,003 events (107 in A) and 962 transitions, 153 of which involve A. The share of creations followed by a course page display falls from 53.8% to 44.1% and then to 41.2%, differences of 9.7 and 12.7 points; the share followed by a view falls from 43.1% to 33.8% and 32.4%. In the modification, view and course page rows, differences remain at most 0.8 and 4.0 points; the small deletion and report rows vary more and are not interpreted. The reintegrated events are logged in the same minute as creations.

## IV. Discussion

### What the logs show

The logs describe the number of recorded events, their distribution over time and the frequency of repeated modifications, and the four cases differ on all three. No module modification is recorded for D1. D4's events fall on a single day, with 30 modifications for 8 created modules. D3's events concentrate on one week, with some modules edited on different days. D2's events extend over thirteen days and include the most varied set of modules. This heterogeneity is compatible with design work described as situated and non-linear<sup>4</sup>, but it does not allow the cases to be ranked.

Read through constructive alignment<sup>3</sup>, the logs show which types of modules were created and in which order they were entered. They do not show whether objectives, activities and assessments correspond, nor whether such correspondence guided design decisions. An assignment says nothing about what it assesses, and the absence of an assessment module for D1 does not prove the absence of assessment, which may appear in an uploaded file. Traces become meaningful only in relation to the intended design and pedagogical intent<sup>6</sup>, which were not available here.

### Possible explanations

The regularities observed admit several explanations that the data cannot separate. The first is the interface: after a module is saved, Moodle returns the user to the course or to the module, so displays following an edit, nearly all within the same minute, may result from this redirection rather than from checking. The second is the course calendar: D3's and D4's events concentrate on 15 June, two weeks before the final deadline of 30 June, and the logs do not show what this date corresponded to. The third is access: D4's space existed only from 15 June. The fourth is work outside the platform: a course prepared elsewhere and entered at once leaves few events. The fifth is familiarity with Moodle; guided tours were triggered for three students. More generally, the meaning of trace-based indicators depends on the instructional conditions of each course<sup>13</sup>.

### Limitations

**Cases and selection.** Four of the 100 enrolled students were selected because complete and attributable log exports were available. This availability-based selection may favour particular profiles; the cases are not representative, and no result generalises to a cohort or to the module.

**Cohorts and observation windows.** One 2025 case and three 2026 cases, with different windows and calendars: differences between D1 and the others cannot be attributed to a cohort effect rather than to the person, the project or the instructions.

**Dependence between events.** Events from the same student are not independent observations: the 892 events and 851 transitions describe four cases, and the pooled matrix is dominated by D2 and D3.

**Coding and uncertain exclusions.** The rules were applied by a single coder without double coding, and 44 exclusions remain uncertain; the creation row shares vary by 10 to 13 points with these decisions. Double coding and documentation of gradebook logging would reduce this uncertainty.

**Identical rows, minute timestamps and sequences.** Minute-level timestamps prevent duplicates from being distinguished from repetitions and leave the order of 543 transitions undetermined. Removing them is a sensitivity analysis and does not guarantee that the remaining 308 transitions reflect the actual order of operations. Seconds or log identifiers would improve the reconstruction of logging order, not of decision order.

**Sessions as a temporal approximation.** For D1, increasing the inactivity threshold from 15 to 60 minutes reduced the number of sessions from 11 to 7, while cumulative session span increased from 0.7 to 3.1 hours. These spans should not be interpreted as working time<sup>12</sup>, which only self-reports or direct observation could approximate.

**Unobserved work.** Preparation outside the platform and possible collaborations leave no events, and the logs of the training module are missing; the absence of an event does not mean the absence of work.

**Intentions, competences and quality.** Without assessed course products, interviews or design journals, the logs support no inference about intentions, competences, pedagogical quality, cognitive load or any use of generative artificial intelligence.

## Perspectives

The following avenues remain to be evaluated; none follows from a demonstrated effect. Opening all project spaces on the same date would make logs more comparable. Intermediate milestones, such as submitting objectives and then an assessment plan, would document the order of submissions; interviews or design journals would be needed to understand pedagogical decisions. Assessing scenario quality would require archiving the courses and having them rated by at least two independent assessors. Machine learning approaches could be considered only with many more doctoral students, an independently measured target and validation that keeps each participant's data in a single fold; their usefulness for supporting doctoral students would itself need to be established.

## V. Conclusion

The logs of four Moodle project spaces describe contrasting construction operations. For RQ1, recorded events range from 44 to 462 and active days from 1 to 13, and the busiest day accounts for 45% to 100% of each case's events. For RQ2, recorded successions alternate editing, course page displays and views; their order within a minute is not established, and what follows a creation depends on exclusion decisions. The contribution is descriptive and methodological: it shows what such logs can count and what they cannot reveal about intentions, competences or course quality. Limited to four cases, these findings establish neither causal relationships nor a cohort effect.

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