Exploring Differences in Time Spent Tracking: IntelliBoard vs Edwiser Reports in Moodle

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Abstract

This study compares "Time Spent" measurements recorded by two Moodle analytics plugins—IntelliBoard and Edwiser Reports Pro—in a graduate-level instructional design course. Data from various activities were analyzed using descriptive statistics and paired t-tests. IntelliBoard recorded a significantly longer total Time Spent than Edwiser Reports Pro. Since Edwiser Reports Pro was installed after the course, it calculated Time Spent using standard Moodle log data. Scatter plots were created to visualize the relationship between the two plugins. The findings suggest that differences in tracking methods and learner behavior can influence Time Spent data. These metrics should be interpreted with caution in educational evaluations. Future research should examine diverse learning contexts and incorporate learner self-assessments to validate Time Spent as an indicator of engagement.

Keywords: Learning Analytics, Time-on-Task, Moodle, IntelliBoard, Edwiser Reports

1 Introduction

1.1 Significance and Challenges of Measuring Time-on-Task in Moodle

The growing emphasis on data-driven approaches in education has made log data accumulated in Learning Management Systems (LMS) a valuable resource for visualizing learning behaviors and improving instructional practices [1]. Time-related metrics, such as "Time Spent" or "Time-on-Task," have been discussed as important aspects of learner engagement and self-regulated learning [2].

Moodle, one of the most widely used LMS platforms, provides detailed access logs; however, it does not offer built-in features for calculating the amount of time students spend on individual learning activities. As a result, instructors and administrators often struggle to assess the duration for which students are actually engaged in learning tasks. As Azevedo and Cromley [2] note, learning time plays a central role in understanding cognitive engagement; therefore, relying solely on page clicks or login frequencies provides only a partial view of students' learning processes.

1.2 Two Plugins for Measuring Learning Time

Several plugins have been developed to enable time tracking in Moodle, of which IntelliBoard [3] and Edwiser Reports [4] are two of the most commonly used solutions.

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IntelliBoard is an analytics platform integrated into Moodle that provides real-time dashboards showing the time spent per user and per activity. According to Kobayashi and Oishi [5], evaluating learners not only by access counts but also by the amount of time spent enables educators to more accurately understand student engagement through continuous activity measures.

Edwiser Reports is a Moodle plugin that offers intuitive, customizable dashboards and reports. It calculates time spent by analyzing the intervals between user actions during login sessions, and presents the data in a visually accessible format [4]. Its lightweight installation and ease of use make it suitable for institutions seeking a quick overview of learner activity.

1.3   Lack of Comparative Research

While both IntelliBoard and Edwiser Reports offer time-tracking features, their internal algorithms differ markedly. Yet, few empirical studies have directly compared the time values generated by these tools under the same course conditions. Despite the growing use of these plugins, to the best of the author's knowledge, no previous research has presented a comparative examination of their output in a real classroom context. This gap hinders informed decision making for institutions attempting to adopt reliable learning analytics practices.

1.4   Aim

The present study aims to examine the differences in Time-on-Task data generated by IntelliBoard and Edwiser Reports in the context of a real university course delivered via Moodle. By applying both tools to the same course activities and comparing the results, the study aims to clarify how time is calculated differently and explore the implications for learning analytics and educational improvement.

2   Methods

2.1   Participants and Context

This study was conducted in the context of a graduate-level liberal arts course titled "Advanced Course in Instructional Design," offered as part of the "Global Engineering Course." The course, conducted in Japanese, was designated as an advanced global liberal arts subject. A total of 32 graduate students participated in the course. All participants provided informed consent for the use of their learning data for research purposes.

The course took place during the second quarter of the 2024 academic year (June–August) and consisted of eight 90-minute sessions held weekly. Among these, Session 7, titled "Enhancing Learning Motivation and Facilitating Understanding," was conducted as an asynchronous on-demand class via Moodle, while the other seven sessions were held in real time—either fully online or in a hybrid foWrmat combining face-to-face and online participation. The course covered fundamental theories and practices in instructional design, including topics such as learning styles, instructional planning, and educational technology. Students were expected to complete a variety of tasks, including quizzes, mini-reports, a recorded microteaching video, and a final learning plan. Table 1 provides an overview of the course schedule and session topics.

Table 1: Weekly Schedule and Topics of the "Advanced Course in Instructional Design"

Session	Topic	Description
1	Introduction – Significance of Teaching and Learning Methods	Introduction of course objectives and goals, basic concepts of instructional design
2	Deepening Personal Learning – Learning Environment and Styles	Establishment of a conducive learning environment, understanding, and evaluating learning styles
3	Understanding the Learning Process – Metacognition	Concepts of metacognition, self-reflection, and evaluation of the learning process
4	Characteristics of Academic Fields and Deepening of Learning	Distinctive features of various academic fields, cognitive developmental stages theory
5	Fundamentals of Collaborative Learning and Cooperative Learning	Basics of collaborative learning, techniques of co-operative learning
6	Time Management and Learning Efficiency	Effective time management, optimization of the learning process
7	Enhancing Learning Motivation and Facilitating Understanding	Improving learning motivation, understanding, and practicing teaching methods
8	Action Plans and Career Design	Creation of learning plans, integration with career paths

2.2 Moodle Course Description

The course was supported by a dedicated Moodle course page, which was used to distribute learning materials, manage assignment submissions, and facilitate asynchronous learning activities. This Moodle instance was equipped with the IntelliBoard analytics plugin during the course, allowing for detailed monitoring of student engagement and activity. Edwiser Reports Pro was installed after the course had concluded and was used only for the analysis of historical data. The course included various activities, such as one Assignment, three Forums, twenty-three Questionnaires, one Quiz, and one Workshop. In addition, it provided learning resources, including twelve Files and one Page, to support students' learning throughout the course.

2.3 Data Collection

Data related to student activity on Moodle were recorded in the database of the system and analyzed using IntelliBoard and Edwiser Reports Pro. In particular, the Time Spent metric, which

indicates the amount of time each student spent on individual Moodle activities and resources, was extracted. While standard Moodle logs track access frequency, the use of these plugins enabled the collection of additional behavioral data, such as device and browser types and time-based engagement metrics. These data allowed for a more comprehensive analysis of student interaction with the learning materials.

2.4   Time Tracking Methods in IntelliBoard and Edwiser Reports

This section provides an overview of the methods used to collect Time Spent data, based on previous research [6] and additional explanations provided by the developers. In IntelliBoard, authorized users with administrative privileges can enable the time tracking feature through the plugin settings. Once activated, IntelliBoard uses a JavaScript file to ping the user every 30 seconds. A subsequent 60-second waiting period is established, during which user activities, such as mouse clicks, mouse movements, and keystrokes, are monitored. If any user interaction is detected within this period, the session is considered active. Although the ping interval and waiting time can be customized, this study collected data using the default settings described by Kobayashi and Miyaura [6], without any modifications.

Edwiser Reports Pro was installed after the course ended. Although the plugin normally tracks user activity every five seconds using its real-time tracking feature, this study relied on the "Fetch old Moodle logs" function to retrieve historical data. Therefore, the Time Spent metric from Edwiser Reports Pro was calculated based on standard Moodle log entries recorded before the plugin installation.

2.5   Data Analysis

The collected Time Spent data (formatted as h:mm:ss) for each participant were obtained from both IntelliBoard and Edwiser Reports Pro.

First, the mean and standard deviation of Time Spent were calculated separately for each plugin for different types of course elements, including Assignments, Forums, Questionnaires, Quizzes, and Workshops, under the category of Activities, and Files and Pages, under the category of Resources. The Total Time Spent was also calculated by combining the values from Activities and Resources. To compare the Time Spent values between IntelliBoard and Edwiser Reports Pro, a paired t-test was performed for each category. Statistical significance was set at $p < 0.05$ to confirm differences between the two plugins. To visually compare the relationship between the two measurements, scatter plots were generated for each type of activity and resource, and the Time Spent recorded by IntelliBoard and Edwiser Reports Pro for each participant was plotted against one another.

These analyses aimed to explore the consistency and differences in time tracking results between the two Moodle analytics plugins.

3   Results

3.1   IntelliBoard vs Edwiser Reports in Time Spent

Table 2 summarizes the comparison of Time Spent between IntelliBoard and Edwiser Reports Pro. Overall, the Time Spent values recorded by IntelliBoard were consistently higher than those

recorded by Edwiser Reports across most activities and resources.

For Activities, IntelliBoard reported significantly greater Time Spent than did Edwiser Reports for Assignment ($p < 0.001$), Questionnaire ($p < 0.001$), and Workshop ($p < 0.001$). No significant difference was found for Forum ($p = 0.516$); for Quiz, the Time Spent recorded by Edwiser Reports was slightly but significantly higher ($p = 0.024$).

For Resources, significant differences were observed for both File and Page (both $p < 0.001$). IntelliBoard recorded a substantially shorter Time Spent for File access compared to Edwiser Reports, whereas for Page access, IntelliBoard recorded a longer Time Spent.

When considering the Total Time Spent across all Activities and Resources, IntelliBoard reported an average Time Spent of 3:17:38 (SD = 1:13:33), which was significantly longer than the 1:26:27 (SD = 0:28:41) recorded by Edwiser Reports ($p < 0.001$).

Table 2: IntelliBoard vs Edwiser Reports in Time Spent

		Time Spent (h:mm:ss) IntelliBoard		Time Spent (h:mm:ss) Edwiser Reports		
		Mean	(SD)	Mean	(SD)	*p* value
Activities						
	Assignment	0:06:29	(0:03:55)	0:02:52	(0:02:11)	< 0.001
	Forum	0:05:14	(0:12:24)	0:04:42	(0:09:02)	0.516
	Questionnaire	2:49:59	(1:03:34)	0:48:06	(0:16:53)	< 0.001
	Quiz	0:10:55	(0:10:01)	0:13:12	(0:10:42)	0.024
	Workshop	0:29:33	(0:17:13)	0:14:20	(0:16:55)	< 0.001
Resources						
	File	0:00:33	(0:00:11)	0:18:19	(0:08:29)	< 0.001
	Page	0:04:29	(0:04:07)	0:00:30	(0:00:26)	< 0.001
Total (Activities + Resources)		3:17:38	(1:13:33)	1:26:27	(0:28:41)	< 0.001

3.2 Relationship between IntelliBoard and Edwiser Reports

Figures 1–8 show scatter plots of the relationship between Time Spent calculated by IntelliBoard and Edwiser Reports Pro for each participant. Figures 1–5 correspond to Activities, Figures 6–7

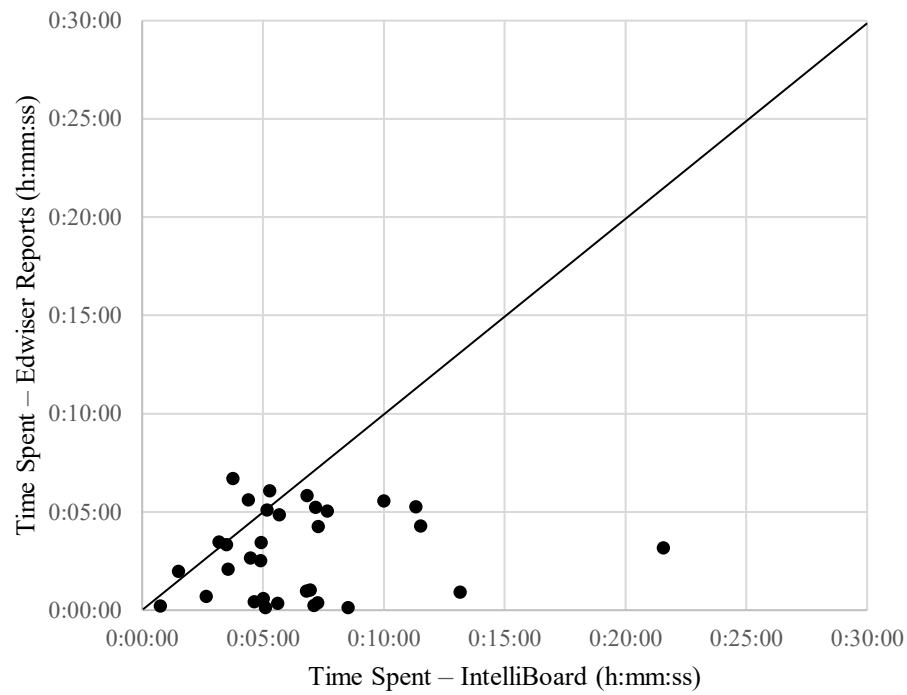to Resources, and Figure 8 to the Total (Activities + Resources).

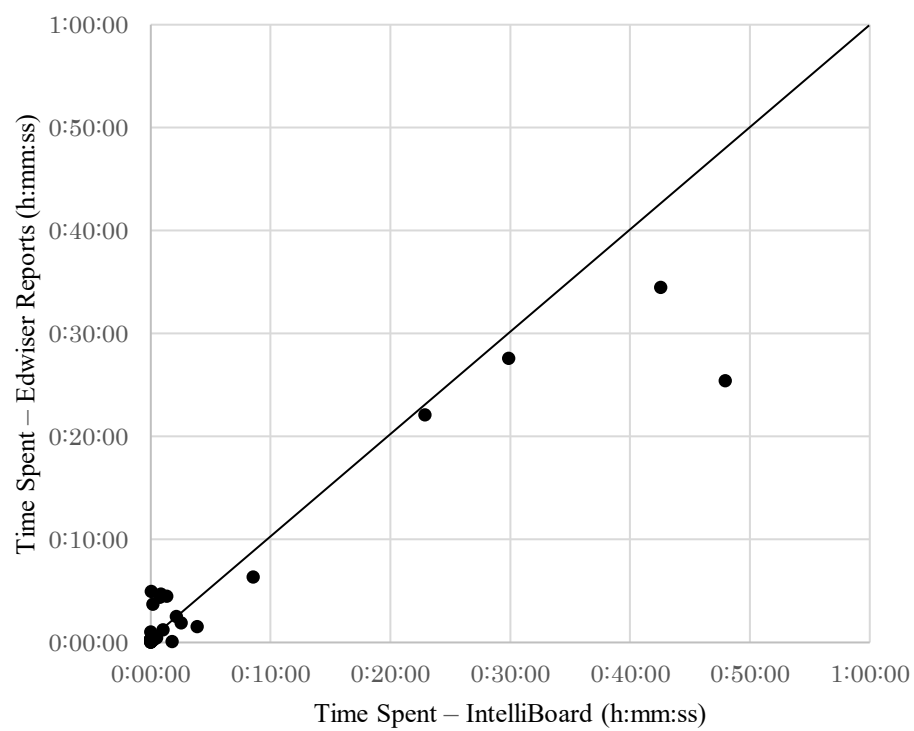Figure 1: Scatter plot of Time Spent for Assignment

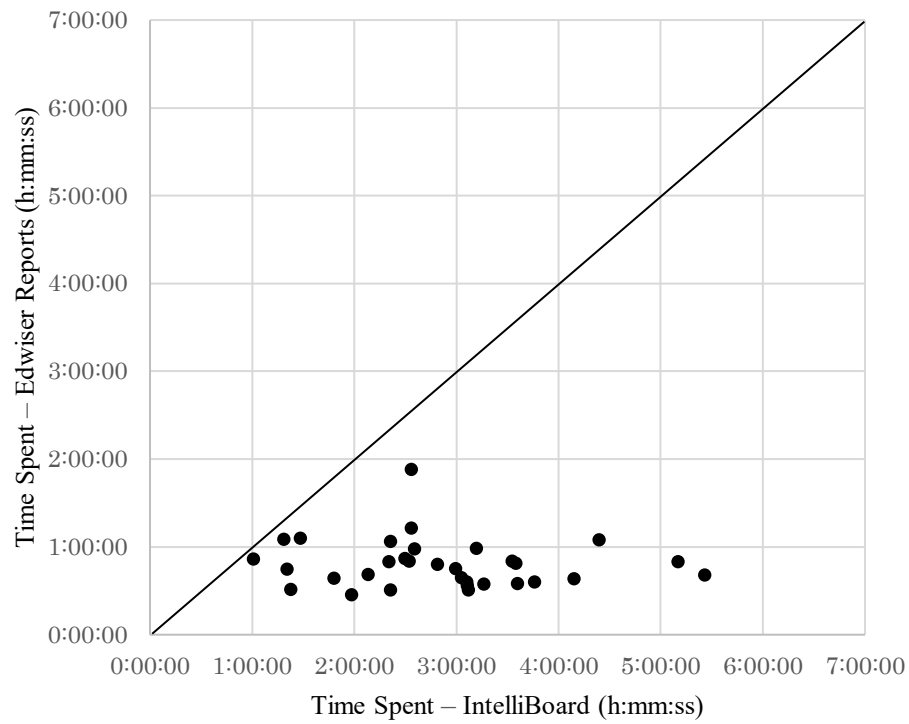

Figure 2: Scatter plot of Time Spent for Forum

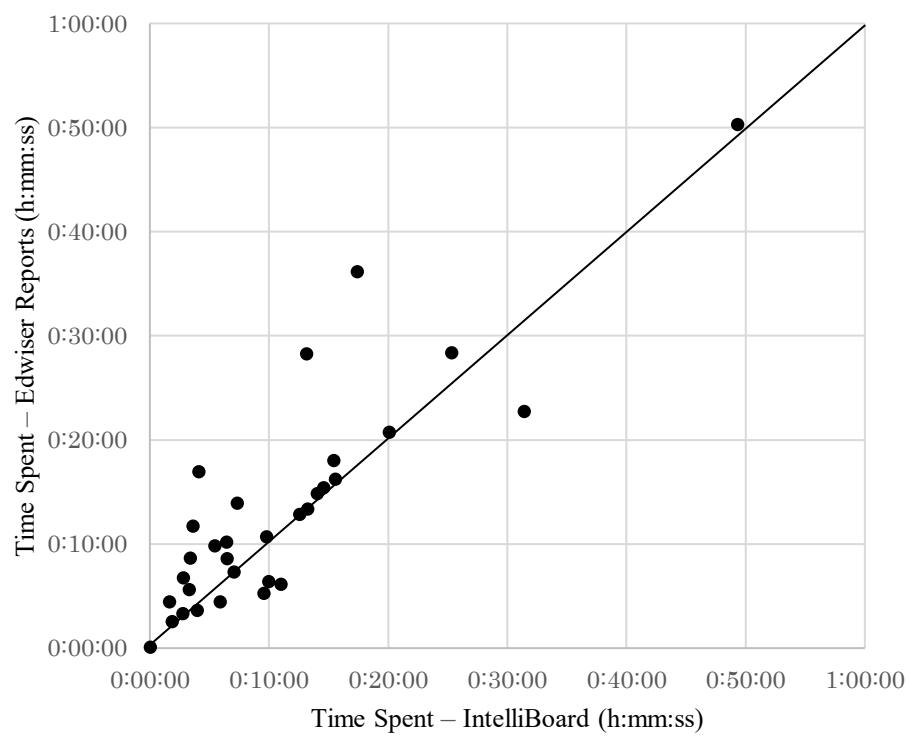Figure 3: Scatter plot of Time Spent for Questionnaire

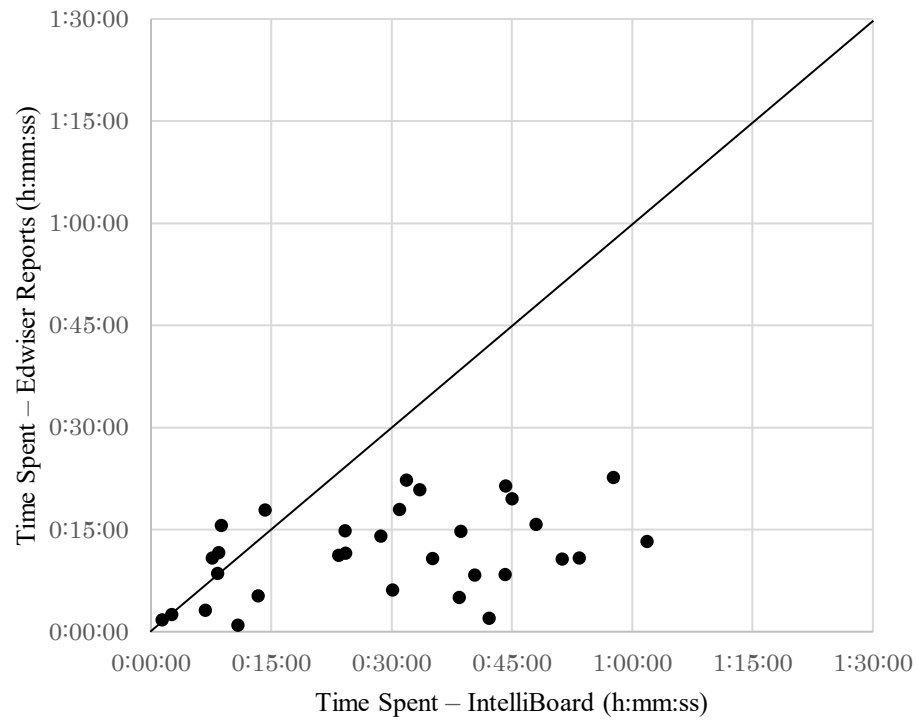Figure 4: Scatter plot of Time Spent for Quiz

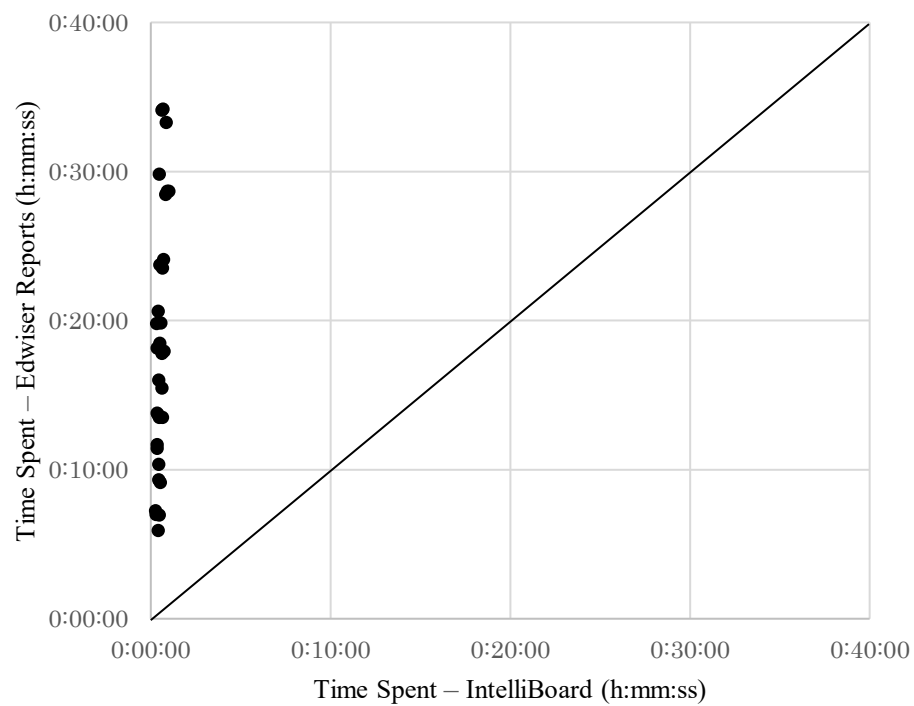Figure 5: Scatter plot of Time Spent for Workshop
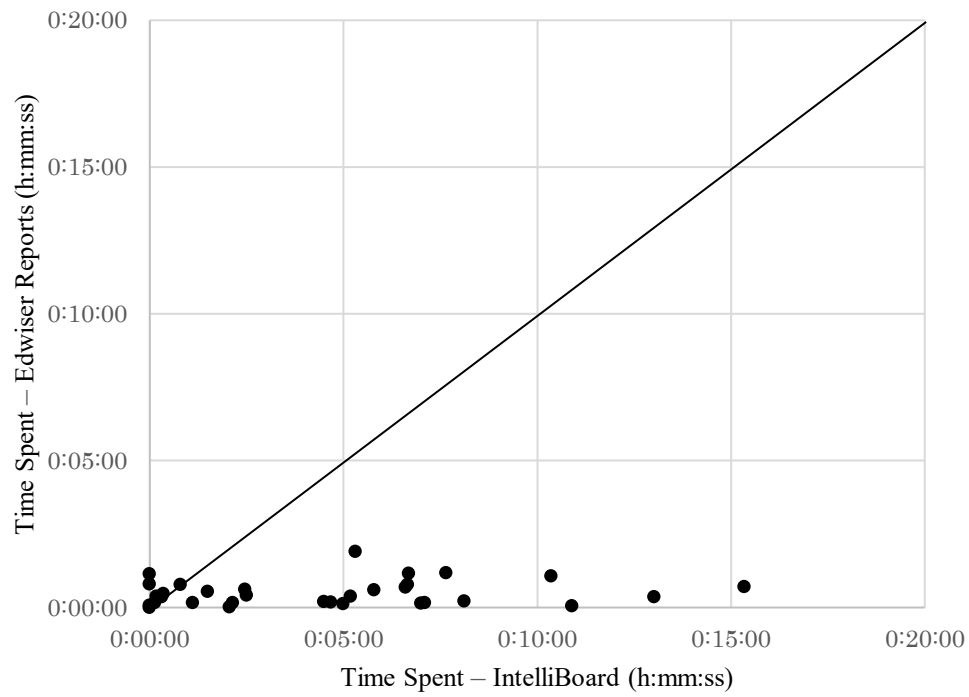

Figure 6: Scatter plot of Time Spent for File

Figure 7: Scatter plot of Time Spent for Page

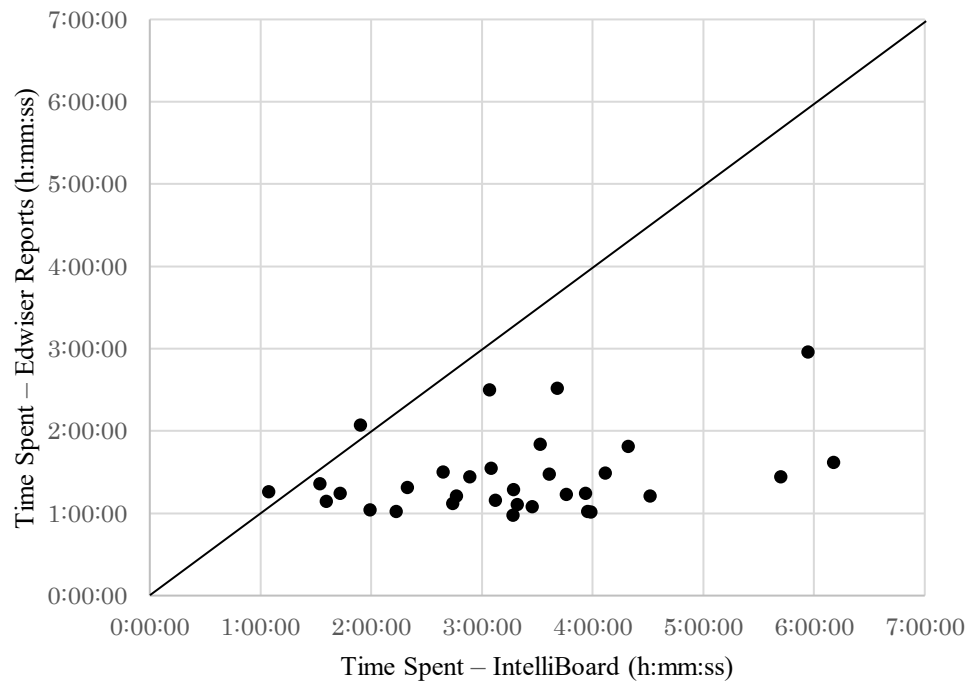
Figure 8: Scatter plot of Total Time Spent

4 Discussion

4.1 Factors Influencing Differences in Time Spent

This study revealed systematic discrepancies in the Time Spent values calculated by IntelliBoard and Edwiser Reports Pro. These differences appear to stem primarily from the distinct time-tracking methodologies employed by each plugin. IntelliBoard estimates engagement based on real-time user interactions—such as mouse movements, clicks, and keystrokes—and treats periods of inactivity as disengagement. In contrast, Edwiser Reports calculates Time Spent retrospectively by analyzing the intervals between system log events, applying a session threshold defined by the "Time Log update frequency" setting (default: 5 minutes). Focusing on file and page viewing—two types of activities within the same "resource" category—Edwiser Reports Pro recorded longer Time Spent values for files, whereas IntelliBoard reported longer values for pages. These differences may reflect not only the measurement logic of each plugin but also differences in Moodle's logging structure and the nature of learner interactions with each content type. For example, Edwiser Reports Pro calculates Time Spent based on the time gaps between log events, and in the case of file viewing, the time between opening a file and the next recorded action may be counted as part of the Time Spent. In contrast, page viewing often generates only a single "viewed" log entry, and if no subsequent actions are recorded, the Time Spent may appear short. On the other hand, IntelliBoard detects user activity such as mouse movements and scrolling on the page, allowing for a longer duration to be recorded during page viewing. However, file resources are often opened in a separate application or window, resulting in fewer interactions within Moodle itself, which may lead IntelliBoard to interpret the session as inactive and thus record a shorter duration. It should also be noted that technical factors—such as timeout configurations and the frequency or granularity of log entries—can be considered part of the measurement logic, but some of these elements are configurable by users. Therefore, the degree of discrepancy may vary depending on system settings and usage environments.

4.2 Practical Use of Time Spent Data

Given the differences in time-tracking methods, the selection and interpretation of Time Spent data must be carefully aligned with specific evaluation objectives. Time Spent data provided by IntelliBoard may be more suitable for analyzing active engagement in interaction-heavy activities, such as workshops and quizzes, where frequent user input occurs. In contrast, data from Edwiser Reports—particularly when calculated from standard Moodle logs—can be appropriate when the goal is to obtain a general overview of learning activity. It is useful for identifying access patterns or estimating time intervals between major user actions. Even in low-interaction contexts, Edwiser Reports' Time Spent can be effective when logs are properly recorded before and after an activity and when there are no idle periods exceeding the 5-minute timeout threshold.

4.3 Considerations When Interpreting Time-on-Task

In addition to technical differences, user behavior can also influence Time Spent measurements. For instance, students may leave browser windows open without engaging with the learning content, resulting in an overestimation of Time Spent. Conversely, Time Spent may be underestimated for students who complete tasks quickly and efficiently with limited system interactions. Without considering these behavioral patterns, relying solely on Time Spent as an indicator of learning engagement or effort could lead to misinterpretations. Thus, Time Spent data should be

triangulated with other learning evidence, such as assignment submissions and forum participation, to ensure a more accurate evaluation.

4.4 Limitations of the Study and Future Research Directions

This study focused on data from a single graduate-level course, which limits the generalizability of the findings. Moreover, differences in student device usage, Internet connectivity, and learning styles were not controlled for, potentially affecting the Time Spent measurements. In addition, Edwiser Reports Pro was installed after the course had concluded, meaning that its real-time tracking feature—which monitors activity every five seconds—was not used. Instead, the plugin analyzed historical data based solely on Moodle's standard logs. Therefore, this study did not compare the plugin's real-time tracking capability with IntelliBoard's approach, representing a technical limitation. Future research should replicate similar comparative analyses across different academic disciplines, course formats, and institutional contexts. Additionally, experimental studies that isolate specific learning behaviors could offer deeper insights into how each plugin measures engagement. Furthermore, comparing Time Spent data with students' self-perceptions of engagement could provide a more comprehensive understanding of how accurately these metrics reflect actual learning experiences.

5 Conclusion

This study compared the Time Spent data generated by two Moodle analytics plugins—IntelliBoard and Edwiser Reports Pro—in a graduate-level instructional design course, in order to examine their differences and implications for educational evaluation. In several activity types, IntelliBoard reported significantly longer Time Spent values than Edwiser Reports, and the total Time Spent across all activities was also longer with IntelliBoard. Since Edwiser Reports Pro was installed after the course had ended, its real-time tracking feature was not utilized in this study. Instead, Time Spent was calculated using historical analysis based on standard Moodle logs. These findings suggest that differences in time-tracking methods, as well as learner behavior, can influence the resulting Time Spent data. Therefore, educators and researchers should interpret Time Spent metrics with caution when using them for educational evaluation.

Future research should conduct comparative analyses across various learning contexts and course formats. In addition, incorporating learners' self-assessments of engagement may help validate and enhance the interpretability of Time Spent as an indicator of learning involvement.

Acknowledgement

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