IIAI Open Conference Publication Series
IIAI Letters on Institutional Research
Vol. 005, LIR423
DOI: https://doi.org/10.52731/lir.v005.423

Analysis of Learning Behaviors Using a System for Visualizing and Sharing Learning Assessments

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Abstract

This paper presents a four-year classroom practice (2021–2024) that aims to promote autonomous learning behaviors by visualizing and sharing learning assessments. The study developed and implemented a point-based evaluation system using Google Sheets to ensure that each student's progress is visible in real time. The system enabled students to monitor their learning status and compare it with peers anonymously. Data from each year exhibited a gradual shift toward higher cumulative point rates with a number of students displaying significant improvement toward the end of the semester. In addition, the responses indicated that students with more positive attitudes toward the system and frequent use tended to achieve high levels of performance. Although the study was unable to establish causal relationships, the results implied that active engagement with the system could positively impact learning. The study also discussed the effects of evaluation criteria and point allocation on learning behavior and highlighted the need for further analyses and intervention strategies to foster engagement.

Keywords: learning assessment, visualization, self-regulated learning, learning behavior.

1 Introduction

In recent years, emphasis has been increased on the promotion of active, interactive, and deep learning as outlined in national curriculum guidelines in Japan, including the evaluation of student agency in the context of reforms that aim to improve the transition from high school to university education [1]. A related concept that has been actively explored is self-regulated learning [2]. At present, the demand for educational systems that foster this ability have been increasing across levels of education, from primary and secondary education to higher education.

Previous studies have implemented gamification as a means of promoting self-regulated learning [3]. Gamification refers to the use of game mechanisms in nongame contexts to enhance motivation, which has been widely applied to the fields of education and learning support [4].

Alternatively, data-driven approaches for educational improvement, such as institutional research and learning analytics, have attracted significant scholarly attention in the past decade. In the context of fostering student agency, exploring the effective uses of data to support this goal is also necessary. In these fields, data visualization is regarded as a fundamental technique. Active research has been conducted on the design of appropriate visualization to support decision-making at various levels, from institutional to individual.

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This study focuses on a classroom-level practice designed to support active learning among students through data visualization. The authors have developed a system that incorporates elements of gamification to visualize and share learning assessments and implemented it in educational practices across several years. In this paper, the authors introduce the system and present an analysis of the relationship between system use and learning behavior on the basis of data collected through years of practice.

2 Related Theories and Previous Research

This study focuses on self-regulated learning as a theoretical framework to elucidate autonomous learning. In addition, the concept of gamification is incorporated as a means of promoting learning behavior. The following sections provide an overview of each of these perspectives.

2.1 Self-Regulated Learning

Self-regulated learning is closely related to autonomy, which characterizes one aspect of autonomous learning. It can be described as a proactive learning process in which learners systematically plan and work toward the achievement of goals. In this regard, one of the most widely recognized models is the cyclical phase model of self-regulation, which consists of three iterative stages, namely, forethought, performance, and self-reflection [2]. In this model, learners set goals, monitor learning, control behavior accordingly, and reflect on outcomes to inform subsequent planning and goal setting. These iterative processes of self-regulation represent a key component of autonomous learning.

2.2 Autonomous Learning and Gamification

As a means of promoting self-regulated learning, many studies have utilized gamification in educational settings. Gamification refers to the application of game mechanisms to nongame contexts to enhance motivation, which has been widely adopted in education and learning support [3][4]. Numerous studies and educational practices have incorporated gamification specifically in relation to self-regulated learning [5][6].

One of the core elements of gamification is immediate feedback as a response to learner actions. This feedback can be broadly categorized into four types, namely, behavioral visualization, reward for behavior, social interaction, and visual feedback [3]. Behavioral visualization includes mechanisms such as points or scores, level-ups, and badges or collectibles. Rewards for behavior refer to incentives given based on task completion, and may include monetary (external) rewards (e.g., currency or items) and inner rewards (intrinsic motivators; e.g., sense of fulfillment or self-realization). Feedback based on social interaction includes collaboration, competition, and praise from others. When appropriately visualized through effective user interfaces, these forms of feedback are hypothesized to play a crucial role in facilitating learner interaction and engagement.

3 System for Visualizing and Sharing Learning Assessments

The system for visualizing and sharing learning assessments introduced in this study assigns detailed point values based on the submission status of students for assignments and reflections, including grading results. It visualizes anonymized evaluation results using Google Sheets and ensures their continuous availability to students. This chapter introduces the courses in which this system was implemented and provides an overview of the system.

3.1 Point-Based Evaluation of Learning Activities

This system was designed for use in a liberal arts course called Introduction to Data Science (renamed Data Literacy in academic year 2024) offered at [Anonymous University] and taught by the first author. The course aims to foster data literacy across the humanities and sciences.

This system was designed to promote autonomous learning planning and self-monitoring among students by quantitatively representing various learning assessments as *points* and ensuring their continuous accessibility online. The total number of points directly contributed to the final course grade. The point distribution was scaled to obtain a maximum possible score of 100 points: scores of 59 points or lower are graded as Fail, 60–69 points as Pass, 70–79 points as Good, 80–89 points as Very Good, and 90–100 points as Excellent.

The learning activities subject to point allocation were slightly adjusted per academic year. This study reports on the implementation results from 2021 to 2024. Table 1 provides the breakdown of points for these years. Across the study period, three types of points were consistently assigned, namely, Assignment Content Points, On-Time Submission Points, and Final Assignment Points. Specifically, Assignment Content Points were awarded based on grading results for three types of out-of-class assignment set for each theme, namely, Basic, Special 1, and Special 2. In addition, if these assignments were submitted by the set deadlines, then students are given On-Time Submission Points. At the end of the semester, students were required to submit a final report, and the grading result for this report determined the Final Assignment Points.

In addition to the consistently assigned points, the system introduced several other types of points according to academic year. They include Research Activity Points, which were awarded according to students' engagement in web-based preliminary research activities for each theme and summarized using a tool called Cosense. Assignment Sharing Activity Points were awarded based on participation in activities in which students then shared and evaluated one another's assignments online. Lastly, Reflection Points were awarded after participation in reflection activities conducted at the end of each class session.

On-Time Submission and Reflection Points are only granted if the relevant submissions are made within the specified deadlines. For the other types of points, students are allowed to revise and resubmit their work based on feedback; afterward, points will be updated accordingly until the final submission deadline for the course.

Table 1: Breakdown of Points

Categories of Points	Awarding Deadline	2021	2022	2023	2024
Assignment Content Points	No	48	48	36	36
On-Time Submission Points	Yes	16	16	12	12
Research Activity Points	No	12	12	4	-
Assignment Sharing Activity Points	No	-	-	4	-
Reflection Points	Yes	-	-	17	17
Final Assignment Points	No	24	24	27	35

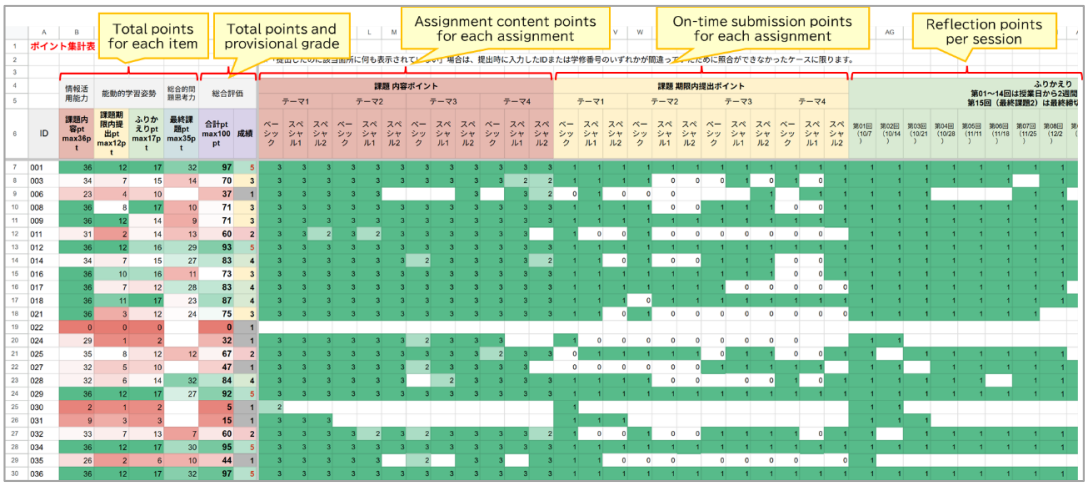

Figure 1: Overview of Aggregated and Detailed Point Information (Excerpt)

3.2 System for Visualizing and Sharing Points

Figures 1 to 3 depict screenshots of the system, which visualizes point information using Google Sheets. The system specifications are similar to those proposed by the author in [7]. Each student was assigned a course-specific ID to ensure anonymity, while the point information for all enrolled students was compiled into a single spreadsheet, which enabled students to view and share one another's point status.

Student submissions, such as assignments, are collected via Google Forms, and the responses are linked to a management Google Spreadsheet used for grading and point aggregation. Access to this management spreadsheet is restricted to instructors and teaching assistants. Submitted assignments to be graded are automatically listed in the spreadsheet, and once grading results are entered, the corresponding points are automatically calculated. Based on the aggregated results in this management sheet, the student-facing visualizations shown in Figures 1 to 3 are generated. These visualizations use anonymized student IDs and are designed to prevent students from accessing any personal information. Figure 1 illustrates a sheet that visualizes aggregated point totals by category and the detailed point status per assignment, while Figure 2 presents a dashboard version of this information per student ID. Particularly in Figure 2, the study employs a gamified design to enable students to easily understand the relationship between their learning behaviors and outcomes. Finally,

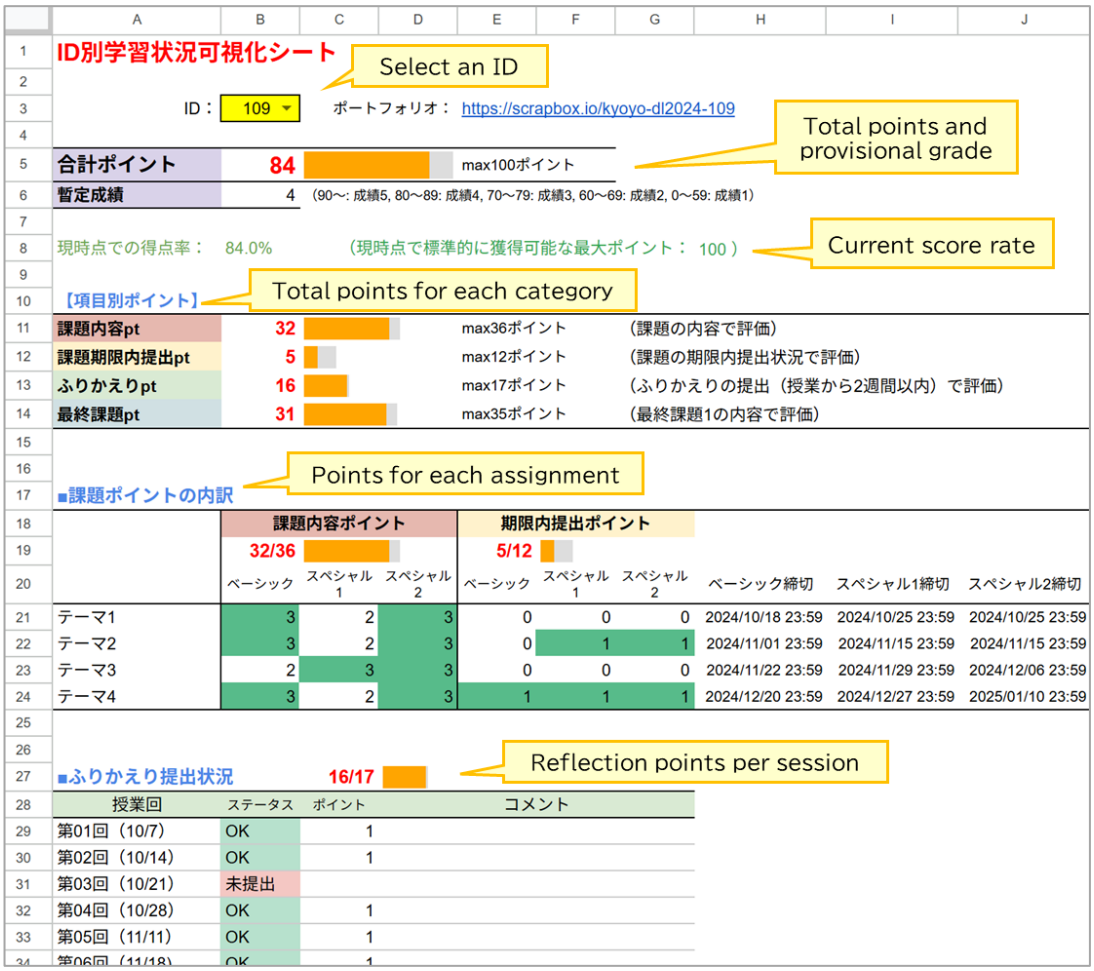

Figure 2: Dashboard View of Points by Student ID (Excerpt)

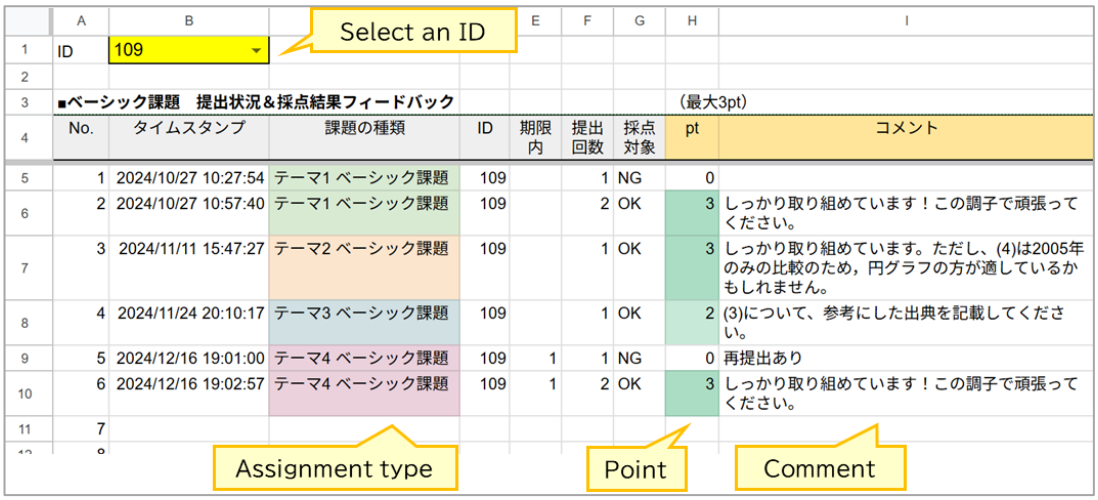

Figure 3: Assignment Grading Sheet With Feedback for Improvement

Figure 3 displays a sheet for viewing the grading results of individual assignments. When a student's score is not perfect, teaching assistants highlighted areas for improvement based on preliminary grading and provided them as feedback. All assignments can be revised and resubmitted based on feedback after the initial grading, thus allowing updates on students' points. Through these visualization sheets, students can review their learning status, evaluation, and specific feedback, while viewing similar information about other students, which can serve as a source of motivation. Instead of directly intervening by recommending specific learning actions based on students' learning status, this system is designed to encourage students to develop their learning plans based on visualized information. In this sense, it places strong emphasis on the promotion of autonomous learning.

3.3 Elements of Gamification in the System

The elements of the proposed system can be interpreted in terms of the gamification framework described in Section 2.2. For behavioral visualization, the system employs a point-based approach. From the perspective of rewards for behavior, the link between points and final grades serves as a form of monetary reward. Figures 1 and 2 display provisional grades. Regarding social interaction, the ability to view other students' points (Figure 1) could foster a sense of competition. Finally, in terms of visual feedback, Figures 1 and 2 incorporate features, such as color scales and graphical representations, to clearly visualize point acquisition status and support user understanding.

3.4 Results and Implications of Previous Implementations

The author in [7] summarized the results of the implementation in 2020. Analysis of responses to questionnaire survey conducted at the time provided the following insights:

- Appropriately visualizing learning assessments that are directly linked to students' goals (e.g., final grades) and sharing this information, including the status of other students, helps stimulate learning motivation. This corresponds to interest activation in the performance phase.
- Allowing students to monitor evaluation results relative to goals promotes self-regulated learning behaviors such as goal setting and strategic planning in the forethought phase, time management in the performance phase, and self-evaluation in the self-reflection phase.
- For students with low goal levels or tendencies toward procrastination, a system that clearly presents the learning behaviors and achievement levels required to earn course credit can encourage them to autonomously perform the minimum necessary learning activities.

4 Implementation Results (2021–2024)

This study presents and discusses the results of the course implementation from 2021 to 2024. In 2020, the author in [7] conducted and reported a multifaceted analysis based on various data sources, as partially excerpted in Section 3.4; readers are referred to [7] for further details. In addition, the author in [8] performed an analysis of implementation results up to academic year

Table 2: Cumulative Points and Points Rate by Student (2021)

index	Cumulative points													Cumulative points rate													
	w03	w04	w05	w06	w07	w08	w09	w10	w11	w12	w13	w14	w15	w03	w04	w05	w06	w07	w08	w09	w10	w11	w12	w13	w14	w15	**avg**
(max)	9	19	22	28	38	41	47	57	60	66	76	76	100														
ST.01	9	15	22	27	38	41	47	57	60	66	75	76	96	1.00	0.79	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.96	**0.98**
ST.02	9	19	22	28	38	40	46	56	57	63	73	73	93	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.98	0.95	0.95	0.96	0.96	0.93	**0.98**
ST.03	9	17	17	28	38	41	47	57	60	66	75	75	99	1.00	0.89	0.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	**0.97**
ST.04	9	15	21	28	38	41	47	57	59	66	76	76	90	1.00	0.79	0.95	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	0.90	**0.97**
ST.05	9	13	22	28	38	40	47	57	60	66	75	75	99	1.00	0.68	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	0.99	0.99	0.99	**0.97**
ST.06	9	17	21	27	38	38	47	57	58	65	76	76	93	1.00	0.89	0.95	0.96	1.00	0.93	1.00	1.00	0.97	0.98	1.00	1.00	0.93	**0.97**
ST.07	9	16	21	27	38	41	47	55	60	66	75	76	90	1.00	0.84	0.95	0.96	1.00	1.00	1.00	0.96	1.00	1.00	0.99	1.00	0.90	**0.97**
ST.08	9	17	19	28	38	38	47	57	60	66	75	75	95	1.00	0.89	0.86	1.00	1.00	0.93	1.00	1.00	1.00	1.00	0.99	0.99	0.95	**0.97**
ST.09	9	15	20	27	38	39	46	57	59	66	75	76	93	1.00	0.79	0.91	0.96	1.00	0.95	0.98	1.00	0.98	1.00	0.99	1.00	0.93	**0.96**
ST.10	9	19	21	25	37	37	45	55	57	63	73	73	100	1.00	1.00	0.95	0.89	0.97	0.90	0.96	0.96	0.95	0.95	0.96	0.96	1.00	**0.96**
ST.11	9	16	16	25	35	35	41	56	56	65	75	76	94	1.00	0.84	0.73	0.89	0.92	0.85	0.87	0.98	0.93	0.98	0.99	1.00	0.94	**0.92**
ST.12	7	17	19	25	36	36	45	55	58	64	69	73	92	0.78	0.89	0.86	0.89	0.95	0.88	0.96	0.96	0.97	0.97	0.91	0.96	0.92	**0.92**
ST.13	7	18	18	24	33	33	43	55	57	66	76	76	95	0.78	0.95	0.82	0.86	0.87	0.80	0.91	0.96	0.95	1.00	1.00	1.00	0.95	**0.91**
ST.14	3	16	19	23	36	39	47	56	60	66	76	76	100	0.33	0.84	0.86	0.82	0.95	0.95	1.00	0.98	1.00	1.00	1.00	1.00	1.00	**0.90**
ST.15	9	18	18	23	28	28	42	56	56	65	74	75	97	1.00	0.95	0.82	0.82	0.74	0.68	0.89	0.98	0.93	0.98	0.97	0.99	0.97	**0.90**
ST.16	9	15	19	26	35	35	39	53	53	59	73	73	90	1.00	0.79	0.86	0.93	0.92	0.85	0.83	0.93	0.88	0.89	0.96	0.96	0.90	**0.90**
ST.17	9	16	20	25	34	34	43	53	53	57	67	67	91	1.00	0.84	0.91	0.89	0.89	0.83	0.91	0.93	0.88	0.86	0.88	0.88	0.91	**0.89**
ST.18	9	17	19	28	30	30	36	45	51	64	74	74	98	1.00	0.89	0.86	1.00	0.79	0.73	0.77	0.79	0.85	0.97	0.97	0.97	0.98	**0.89**
ST.19	9	16	18	25	35	35	40	47	53	59	69	69	93	1.00	0.84	0.82	0.89	0.92	0.85	0.85	0.82	0.88	0.89	0.91	0.91	0.93	**0.89**
ST.20	9	13	15	22	34	34	42	56	60	66	71	71	80	1.00	0.68	0.68	0.79	0.89	0.83	0.89	0.98	1.00	1.00	0.93	0.93	0.80	**0.88**
ST.21	5	13	20	25	35	37	43	53	56	62	71	71	96	0.56	0.68	0.91	0.89	0.92	0.90	0.91	0.93	0.93	0.94	0.93	0.93	0.96	**0.88**
ST.22	8	17	19	26	35	35	41	50	50	56	66	66	82	0.89	0.89	0.86	0.93	0.92	0.85	0.87	0.88	0.83	0.85	0.87	0.87	0.82	**0.87**
ST.23	8	17	17	22	33	33	39	50	50	57	66	66	93	0.89	0.89	0.77	0.79	0.87	0.80	0.83	0.88	0.83	0.86	0.87	0.87	0.93	**0.85**
ST.24	7	13	17	23	31	31	39	50	50	56	65	65	93	0.78	0.68	0.77	0.82	0.82	0.76	0.83	0.88	0.83	0.85	0.86	0.86	0.93	**0.82**
ST.25	7	13	16	21	30	33	39	48	51	58	67	67	89	0.78	0.68	0.73	0.75	0.79	0.80	0.83	0.84	0.85	0.88	0.88	0.88	0.89	**0.81**
ST.26	8	11	11	20	30	30	36	51	56	62	74	74	89	0.89	0.58	0.50	0.71	0.79	0.73	0.77	0.89	0.93	0.94	0.97	0.97	0.89	**0.81**
ST.27	9	9	9	24	29	34	40	44	44	53	71	71	93	1.00	0.47	0.41	0.86	0.76	0.83	0.85	0.77	0.73	0.80	0.93	0.93	0.93	**0.79**
ST.28	9	13	13	18	21	21	23	46	57	66	75	75	99	1.00	0.68	0.59	0.64	0.55	0.51	0.49	0.81	0.95	1.00	0.99	0.99	0.99	**0.78**
ST.29	3	12	12	20	28	31	37	51	52	61	70	70	91	0.33	0.63	0.55	0.71	0.74	0.76	0.79	0.89	0.87	0.92	0.92	0.92	0.91	**0.76**
ST.30	5	17	17	19	29	29	34	44	44	52	62	62	90	0.56	0.89	0.77	0.68	0.76	0.71	0.72	0.77	0.73	0.79	0.82	0.82	0.90	**0.76**
ST.31	8	10	13	20	30	30	31	46	46	55	65	65	90	0.89	0.53	0.59	0.71	0.79	0.73	0.66	0.81	0.77	0.83	0.86	0.86	0.90	**0.76**
ST.32	8	15	16	16	26	26	32	44	46	52	61	62	95	0.89	0.79	0.73	0.57	0.68	0.63	0.68	0.77	0.77	0.79	0.80	0.82	0.95	**0.76**
ST.33	7	11	11	24	28	28	34	41	41	47	56	57	89	0.78	0.58	0.50	0.86	0.74	0.68	0.72	0.72	0.68	0.71	0.74	0.75	0.89	**0.72**
ST.34	7	12	14	20	25	27	33	38	41	47	60	60	75	0.78	0.63	0.64	0.71	0.66	0.66	0.70	0.67	0.68	0.71	0.79	0.79	0.75	**0.71**
ST.35	9	9	11	17	24	24	30	37	39	48	58	62	90	1.00	0.47	0.50	0.61	0.63	0.59	0.64	0.65	0.65	0.73	0.76	0.82	0.90	**0.69**
ST.36	7	11	11	16	25	25	31	43	44	51	56	56	60	0.78	0.58	0.50	0.57	0.66	0.61	0.66	0.75	0.73	0.77	0.74	0.74	0.60	**0.67**
ST.37	7	11	11	15	20	20	28	36	47	53	62	62	82	0.78	0.58	0.50	0.54	0.53	0.49	0.60	0.63	0.78	0.80	0.82	0.82	0.82	**0.67**
ST.38	4	11	15	20	20	20	26	43	43	45	56	63	92	0.44	0.58	0.68	0.71	0.53	0.49	0.55	0.75	0.72	0.68	0.74	0.83	0.92	**0.66**
ST.39	8	11	11	17	23	23	29	37	37	43	52	52	80	0.89	0.58	0.50	0.61	0.61	0.56	0.62	0.65	0.62	0.65	0.68	0.68	0.80	**0.65**
ST.40	2	19	21	21	21	21	21	21	29	48	58	59	74	0.22	1.00	0.95	0.75	0.55	0.51	0.45	0.37	0.48	0.73	0.76	0.78	0.74	**0.64**
ST.41	6	10	13	18	23	23	32	32	33	41	50	50	72	0.67	0.53	0.59	0.64	0.61	0.56	0.68	0.56	0.55	0.62	0.66	0.66	0.72	**0.62**
ST.42	3	5	6	12	25	25	31	42	42	51	61	61	96	0.33	0.26	0.27	0.43	0.66	0.61	0.66	0.74	0.70	0.77	0.80	0.80	0.96	**0.62**
ST.43	2	12	12	14	24	24	30	40	40	44	49	49	88	0.22	0.63	0.55	0.50	0.63	0.59	0.64	0.70	0.67	0.67	0.64	0.64	0.88	**0.61**
ST.44	8	10	10	15	20	21	26	36	36	42	50	51	68	0.89	0.53	0.45	0.54	0.53	0.51	0.55	0.63	0.60	0.64	0.66	0.67	0.68	**0.61**
ST.45	5	10	11	15	22	22	28	37	37	41	50	50	70	0.56	0.53	0.50	0.54	0.58	0.54	0.60	0.65	0.62	0.62	0.66	0.66	0.70	**0.59**
ST.46	9	9	9	19	23	23	29	36	36	36	36	36	65	1.00	0.47	0.41	0.68	0.61	0.56	0.62	0.63	0.60	0.55	0.47	0.47	0.65	**0.59**
ST.47	6	9	12	18	23	26	32	32	32	36	41	41	57	0.67	0.47	0.55	0.64	0.61	0.63	0.68	0.56	0.53	0.55	0.54	0.54	0.57	**0.58**
ST.48	7	10	11	19	20	21	28	28	28	34	42	42	61	0.78	0.53	0.50	0.68	0.53	0.51	0.60	0.49	0.47	0.52	0.55	0.55	0.61	**0.56**
ST.49	8	11	11	18	18	18	21	24	24	24	33	33	70	0.89	0.58	0.50	0.64	0.47	0.44	0.45	0.42	0.40	0.36	0.43	0.43	0.70	**0.52**
ST.50	8	8	8	14	14	17	24	24	27	35	45	45	61	0.89	0.42	0.36	0.50	0.37	0.41	0.51	0.42	0.45	0.53	0.59	0.59	0.61	**0.51**
ST.51	7	7	7	9	13	16	20	27	29	35	44	44	63	0.78	0.37	0.32	0.32	0.34	0.39	0.43	0.47	0.48	0.53	0.58	0.58	0.63	**0.48**
ST.52	3	8	8	12	19	19	22	22	22	28	37	37	69	0.33	0.42	0.36	0.43	0.50	0.46	0.47	0.39	0.37	0.42	0.49	0.49	0.69	**0.45**
ST.53	6	9	9	14	16	16	19	19	19	19	26	33	74	0.67	0.47	0.41	0.50	0.42	0.39	0.40	0.33	0.32	0.29	0.34	0.43	0.74	**0.44**
ST.54	3	4	4	10	18	19	20	29	32	34	43	43	53	0.33	0.21	0.18	0.36	0.47	0.46	0.43	0.51	0.53	0.52	0.57	0.57	0.53	**0.44**
ST.55	7	12	12	12	12	12	12	12	12	12	12	12	80	0.78	0.63	0.55	0.43	0.32	0.29	0.26	0.21	0.20	0.18	0.16	0.16	0.80	**0.38**
ST.56	2	7	7	12	15	15	15	15	15	21	33	33	77	0.22	0.37	0.32	0.43	0.39	0.37	0.32	0.26	0.25	0.32	0.43	0.43	0.77	**0.38**
ST.57	3	6	6	11	13	13	16	16	16	16	25	37	77	0.33	0.32	0.27	0.39	0.34	0.32	0.34	0.28	0.27	0.24	0.33	0.49	0.77	**0.36**
ST.58	6	6	6	10	16	16	16	16	16	16	16	16	63	0.67	0.32	0.27	0.36	0.42	0.39	0.34	0.28	0.27	0.24	0.21	0.21	0.63	**0.35**
ST.59	4	4	4	8	12	12	18	18	18	24	33	33	60	0.44	0.21	0.18	0.29	0.32	0.29	0.38	0.32	0.30	0.36	0.43	0.43	0.60	**0.35**
ST.60	4	6	6	8	15	15	15	15	15	15	24	24	49	0.44	0.32	0.27	0.29	0.39	0.37	0.32	0.26	0.25	0.23	0.32	0.32	0.49	**0.33**
ST.61	6	9	9	9	9	9	9	9	9	9	24	24	60	0.67	0.47	0.41	0.32	0.24	0.22	0.19	0.16	0.15	0.14	0.32	0.32	0.60	**0.32**
ST.62	4	6	6	6	6	6	6	12	12	18	40	40	72	0.44	0.32	0.27	0.21	0.16	0.15	0.13	0.21	0.20	0.27	0.53	0.53	0.72	**0.32**
ST.63	3	3	3	7	10	10	14	14	14	20	29	29	78	0.33	0.16	0.14	0.25	0.26	0.24	0.30	0.25	0.23	0.30	0.38	0.38	0.78	**0.31**
ST.64	2	2	2	4	4	6	17	18	18	25	35	36	77	0.22	0.11	0.09	0.14	0.11	0.15	0.36	0.32	0.30	0.38	0.46	0.47	0.77	**0.30**
ST.65	0	0	0	5	5	5	8	17	25	31	49	49	75	0.00	0.00	0.00	0.18	0.13	0.12	0.17	0.30	0.42	0.47	0.64	0.64	0.75	**0.29**
ST.66	4	6	6	12	12	12	12	12	10	15	17	17	39	0.44	0.32	0.27	0.43	0.32	0.29	0.26	0.21	0.17	0.23	0.22	0.22	0.39	**0.29**
ST.67	3	5	5	10	11	11	11	11	11	17	17	17	63	0.33	0.26	0.23	0.36	0.29	0.27	0.23	0.19	0.18	0.26	0.22	0.22	0.63	**0.28**
ST.68	6	8	8	8	8	8	12	12	12	12	12	12	30	0.67	0.42	0.36	0.29	0.21	0.20	0.26	0.21	0.20	0.18	0.16	0.16	0.30	**0.28**
ST.69	0	0	0	0	0	0	10	15	15	20	28	28	48	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.26	0.25	0.30	0.37	0.37	0.48	**0.17**

Table 3: Cumulative Points and Points Rate by Student (2022)

index	Cumulative points													Cumulative points rate													
	w03	w04	w05	w06	w07	w08	w09	w10	w11	w12	w13	w14	w15	w03	w04	w05	w06	w07	w08	w09	w10	w11	w12	w13	w14	w15	**avg**
(max)	9	19	22	28	38	41	47	57	60	66	76	76	100														
ST.01	7	19	22	28	38	38	41	47	57	60	66	76	100	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**0.98**
ST.02	7	19	22	27	38	38	41	47	57	60	66	76	95	0.78	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	**0.98**
ST.03	7	17	22	27	37	38	41	47	57	60	66	75	98	0.78	0.89	1.00	0.96	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.98	**0.97**
ST.04	6	17	22	27	38	38	41	47	57	60	66	76	100	0.67	0.89	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**0.96**
ST.05	8	19	21	28	38	38	38	46	56	57	63	72	92	0.89	1.00	0.95	1.00	1.00	1.00	0.93	0.98	0.98	0.95	0.95	0.95	0.92	**0.96**
ST.06	7	16	21	27	38	38	38	46	57	57	63	72	99	0.78	0.84	0.95	0.96	1.00	1.00	0.93	0.98	1.00	0.95	0.95	0.95	0.99	**0.95**
ST.07	7	15	22	27	38	38	38	43	54	60	66	76	95	0.78	0.79	1.00	0.96	1.00	1.00	0.93	0.91	0.95	1.00	1.00	1.00	0.95	**0.94**
ST.08	6	19	21	26	37	37	39	45	55	57	66	72	100	0.67	1.00	0.95	0.93	0.97	0.97	0.95	0.96	0.96	0.95	1.00	0.95	1.00	**0.94**
ST.09	6	16	21	27	36	37	40	46	56	59	66	76	98	0.67	0.84	0.95	0.96	0.95	0.97	0.98	0.98	0.98	0.98	1.00	1.00	0.98	**0.94**
ST.10	6	16	21	27	36	37	39	45	56	59	65	76	100	0.67	0.84	0.95	0.96	0.95	0.97	0.95	0.96	0.98	0.98	0.98	1.00	1.00	**0.94**
ST.11	8	15	19	27	38	38	38	43	53	58	64	74	98	0.89	0.79	0.86	0.96	1.00	1.00	0.93	0.91	0.93	0.97	0.97	0.97	0.98	**0.94**
ST.12	6	15	22	27	38	38	39	45	55	59	65	75	91	0.67	0.79	1.00	0.96	1.00	1.00	0.95	0.96	0.96	0.98	0.98	0.99	0.91	**0.94**
ST.13	9	16	18	23	38	38	39	45	53	55	64	73	94	1.00	0.84	0.82	0.82	1.00	1.00	0.95	0.96	0.93	0.92	0.97	0.96	0.94	**0.93**
ST.14	6	17	19	26	36	36	36	42	54	57	66	76	100	0.67	0.89	0.86	0.93	0.95	0.95	0.88	0.89	0.95	0.95	1.00	1.00	1.00	**0.92**
ST.15	8	13	19	26	34	35	35	45	55	56	65	74	99	0.89	0.68	0.86	0.93	0.89	0.92	0.85	0.96	0.96	0.93	0.98	0.97	0.99	**0.91**
ST.16	8	14	20	25	35	35	35	42	52	54	64	75	92	0.89	0.74	0.91	0.89	0.92	0.92	0.85	0.89	0.91	0.90	0.97	0.99	0.92	**0.90**
ST.17	6	16	18	25	35	35	38	43	55	58	64	74	81	0.67	0.84	0.82	0.89	0.92	0.92	0.93	0.91	0.96	0.97	0.97	0.97	0.81	**0.89**
ST.18	9	12	15	22	31	36	39	45	55	57	63	72	96	1.00	0.63	0.68	0.79	0.82	0.95	0.95	0.96	0.96	0.95	0.95	0.95	0.96	**0.89**
ST.19	9	19	22	28	33	33	33	39	44	50	56	56	63	1.00	1.00	1.00	1.00	0.87	0.87	0.80	0.83	0.77	0.83	0.85	0.74	0.63	**0.86**
ST.20	9	17	22	27	32	32	34	40	45	48	56	61	71	1.00	0.89	1.00	0.96	0.84	0.84	0.83	0.85	0.79	0.80	0.85	0.80	0.71	**0.86**
ST.21	7	16	18	25	33	35	35	41	46	51	57	66	91	0.78	0.84	0.82	0.89	0.87	0.92	0.85	0.87	0.81	0.85	0.86	0.87	0.91	**0.86**
ST.22	8	14	14	20	30	30	33	37	47	54	63	74	94	0.89	0.74	0.64	0.71	0.79	0.79	0.80	0.79	0.82	0.90	0.95	0.97	0.94	**0.83**
ST.23	7	9	16	17	30	34	34	43	53	56	62	72	96	0.78	0.47	0.73	0.61	0.79	0.89	0.83	0.91	0.93	0.93	0.94	0.95	0.96	**0.82**
ST.24	6	15	15	21	28	30	33	42	52	53	59	69	90	0.67	0.79	0.68	0.75	0.74	0.79	0.80	0.89	0.91	0.88	0.89	0.91	0.90	**0.82**
ST.25	9	14	17	23	28	28	31	36	42	45	51	56	74	1.00	0.74	0.77	0.82	0.74	0.74	0.76	0.77	0.74	0.75	0.77	0.74	0.74	**0.77**
ST.26	6	14	14	18	27	31	31	36	46	47	53	63	85	0.67	0.74	0.64	0.64	0.71	0.82	0.76	0.77	0.81	0.78	0.80	0.83	0.85	**0.75**
ST.27	8	8	14	19	28	28	30	34	44	48	56	65	80	0.89	0.42	0.64	0.68	0.74	0.74	0.73	0.72	0.77	0.80	0.85	0.86	0.80	**0.74**
ST.28	7	10	11	19	29	29	31	37	42	48	57	57	91	0.78	0.53	0.50	0.68	0.76	0.76	0.76	0.79	0.74	0.80	0.86	0.75	0.91	**0.74**
ST.29	6	14	14	18	27	27	27	34	44	47	54	63	78	0.67	0.74	0.64	0.64	0.71	0.71	0.66	0.72	0.77	0.78	0.82	0.83	0.78	**0.73**
ST.30	7	9	15	24	26	26	29	37	37	38	38	55	76	0.78	0.47	0.68	0.86	0.68	0.68	0.71	0.79	0.65	0.63	0.58	0.72	0.76	**0.69**
ST.31	6	11	15	21	25	25	28	34	39	42	46	50	79	0.67	0.58	0.68	0.75	0.66	0.66	0.68	0.72	0.68	0.70	0.70	0.66	0.79	**0.69**
ST.32	8	14	14	22	23	26	26	28	30	31	37	47	74	0.89	0.74	0.64	0.79	0.61	0.68	0.63	0.60	0.53	0.52	0.56	0.62	0.74	**0.66**
ST.33	8	14	15	23	23	23	25	25	25	31	39	45	77	0.89	0.74	0.68	0.82	0.61	0.61	0.61	0.53	0.44	0.52	0.59	0.59	0.77	**0.65**
ST.34	7	12	14	19	23	23	23	29	29	30	36	48	92	0.78	0.63	0.64	0.68	0.61	0.61	0.56	0.62	0.51	0.50	0.55	0.63	0.92	**0.63**
ST.35	7	7	7	15	20	21	21	30	39	43	51	65	90	0.78	0.37	0.32	0.54	0.53	0.55	0.51	0.64	0.68	0.72	0.77	0.86	0.90	**0.63**
ST.36	4	7	7	13	25	25	25	31	36	41	50	60	86	0.44	0.37	0.32	0.46	0.66	0.66	0.61	0.66	0.63	0.68	0.76	0.79	0.86	**0.61**
ST.37	4	10	10	15	18	18	18	22	22	48	63	73	95	0.44	0.53	0.45	0.54	0.47	0.47	0.44	0.47	0.39	0.80	0.95	0.96	0.95	**0.61**
ST.38	7	7	8	14	18	23	23	23	23	44	53	53	81	0.78	0.37	0.36	0.50	0.47	0.61	0.56	0.49	0.40	0.73	0.80	0.70	0.81	**0.58**
ST.39	8	10	14	18	18	20	20	26	26	30	34	34	91	0.89	0.53	0.64	0.64	0.47	0.53	0.49	0.55	0.46	0.50	0.52	0.45	0.91	**0.58**
ST.40	5	5	5	11	26	26	26	31	41	43	45	45	60	0.56	0.26	0.23	0.39	0.68	0.68	0.63	0.66	0.72	0.72	0.68	0.59	0.60	**0.57**
ST.41	7	8	8	14	18	19	19	28	33	33	42	42	67	0.78	0.42	0.36	0.50	0.47	0.50	0.46	0.60	0.58	0.55	0.64	0.55	0.67	**0.54**
ST.42	3	6	9	15	25	25	25	25	35	35	37	41	62	0.33	0.32	0.41	0.54	0.66	0.66	0.61	0.53	0.61	0.58	0.56	0.54	0.62	**0.54**
ST.43	6	7	7	12	20	20	20	24	29	29	35	50	73	0.67	0.37	0.32	0.43	0.53	0.53	0.49	0.51	0.51	0.48	0.53	0.66	0.73	**0.52**
ST.44	3	5	10	17	22	22	22	28	28	30	30	30	70	0.33	0.26	0.45	0.61	0.58	0.58	0.54	0.60	0.49	0.50	0.45	0.39	0.70	**0.50**
ST.45	6	9	9	15	17	17	17	23	23	25	31	36	80	0.67	0.47	0.41	0.54	0.45	0.45	0.41	0.49	0.40	0.42	0.47	0.47	0.80	**0.50**
ST.46	6	8	8	13	16	16	17	23	28	31	37	37	64	0.67	0.42	0.36	0.46	0.42	0.42	0.41	0.49	0.49	0.52	0.56	0.49	0.64	**0.49**
ST.47	0	0	2	8	17	18	19	26	36	42	54	70	93	0.00	0.00	0.09	0.29	0.45	0.47	0.46	0.55	0.63	0.70	0.82	0.92	0.93	**0.49**
ST.48	5	8	8	13	18	18	18	24	29	33	33	33	62	0.56	0.42	0.36	0.46	0.47	0.47	0.44	0.51	0.51	0.55	0.50	0.43	0.62	**0.49**
ST.49	6	6	9	15	15	15	17	24	24	24	32	49	67	0.67	0.32	0.41	0.54	0.39	0.39	0.41	0.51	0.42	0.40	0.48	0.64	0.67	**0.48**
ST.50	6	6	8	14	14	14	17	21	21	24	32	51	82	0.67	0.32	0.36	0.50	0.37	0.37	0.41	0.45	0.37	0.40	0.48	0.67	0.82	**0.48**
ST.51	5	10	10	11	15	15	15	15	15	17	34	58	84	0.56	0.53	0.45	0.39	0.39	0.39	0.37	0.32	0.26	0.28	0.52	0.76	0.84	**0.47**
ST.52	6	12	12	13	17	17	17	18	19	21	21	23	66	0.67	0.63	0.55	0.46	0.45	0.45	0.41	0.38	0.33	0.35	0.32	0.30	0.66	**0.46**
ST.53	7	7	7	14	21	21	21	21	21	23	23	23	38	0.78	0.37	0.32	0.50	0.55	0.55	0.51	0.45	0.37	0.38	0.35	0.30	0.38	**0.45**
ST.54	7	9	9	15	15	15	15	15	15	18	18	18	80	0.78	0.47	0.41	0.54	0.39	0.39	0.37	0.32	0.26	0.30	0.27	0.24	0.80	**0.43**
ST.55	4	4	4	4	12	12	12	18	23	25	38	51	78	0.44	0.21	0.18	0.14	0.32	0.32	0.29	0.38	0.40	0.42	0.58	0.67	0.78	**0.39**
ST.56	1	1	1	5	14	14	14	17	27	31	35	52	94	0.11	0.05	0.05	0.18	0.37	0.37	0.34	0.36	0.47	0.52	0.53	0.68	0.94	**0.38**
ST.57	5	5	7	12	12	12	12	18	18	20	28	28	61	0.56	0.26	0.32	0.43	0.32	0.32	0.29	0.38	0.32	0.33	0.42	0.37	0.61	**0.38**
ST.58	5	7	7	12	12	12	12	12	12	15	24	24	63	0.56	0.37	0.32	0.43	0.32	0.32	0.29	0.26	0.21	0.25	0.36	0.32	0.63	**0.36**
ST.59	5	7	7	10	10	10	10	10	10	13	13	26	85	0.56	0.37	0.32	0.36	0.26	0.26	0.24	0.21	0.18	0.22	0.20	0.34	0.85	**0.34**
ST.60	1	6	8	9	9	9	9	9	15	15	19	23	67	0.11	0.32	0.36	0.32	0.24	0.24	0.22	0.19	0.26	0.25	0.29	0.30	0.67	**0.29**
ST.61	6	6	6	6	6	6	6	6	6	8	8	8	33	0.67	0.32	0.27	0.21	0.16	0.16	0.15	0.13	0.11	0.13	0.12	0.11	0.33	**0.22**
ST.62	0	0	3	5	5	8	8	8	8	8	13	24	77	0.00	0.00	0.14	0.18	0.13	0.21	0.20	0.17	0.14	0.13	0.20	0.32	0.77	**0.20**
ST.63	0	0	0	0	0	0	0	0	0	4	15	45	82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.23	0.59	0.82	**0.13**
ST.64	2	2	2	2	2	2	2	2	2	2	2	2	60	0.22	0.11	0.09	0.07	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.03	0.60	**0.11**
ST.65	0	0	0	3	3	3	3	3	3	3	3	10	60	0.00	0.00	0.00	0.11	0.08	0.08	0.07	0.06	0.05	0.05	0.05	0.13	0.60	**0.10**
ST.66	0	0	0	0	0	0	0	2	2	4	4	4	52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.07	0.06	0.05	0.52	**0.06**

Table 4: Cumulative Points and Points Rate by Student (2023)

index	Cumulative points													Cumulative points rate													
	w03	w04	w05	w06	w07	w08	w09	w10	w11	w12	w13	w14	w15	w03	w04	w05	w06	w07	w08	w09	w10	w11	w12	w13	w14	w15	avg
(max)	9	19	22	28	38	41	47	57	60	66	76	76	100														
ST.01	8	17	20	25	34	37	42	51	54	59	69	70	90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.99
ST.02	8	17	19	25	34	36	41	51	53	59	69	70	100	1.00	1.00	0.95	1.00	1.00	0.97	0.98	1.00	0.98	1.00	1.00	1.00	1.00	0.99
ST.03	8	16	20	25	33	37	42	51	54	59	69	70	96	1.00	0.94	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.99
ST.04	8	16	20	25	33	37	42	51	54	59	69	70	93	1.00	0.94	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93	0.99
ST.05	7	17	20	22	34	37	42	51	54	59	68	70	100	0.88	1.00	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.98
ST.06	7	16	20	25	34	37	42	51	54	59	68	70	90	0.88	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.90	0.98
ST.07	6	17	20	25	34	37	42	51	54	59	69	70	92	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.97
ST.08	6	16	19	25	34	37	42	51	54	59	69	70	99	0.75	0.94	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.97
ST.09	6	16	20	25	34	37	42	51	54	59	68	70	95	0.75	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.95	0.97
ST.10	8	17	19	25	34	36	40	50	50	57	64	66	100	1.00	1.00	0.95	1.00	1.00	0.97	0.95	0.98	0.93	0.97	0.93	0.94	1.00	0.97
ST.11	8	16	19	24	32	36	41	49	53	58	66	69	100	1.00	0.94	0.95	0.96	0.94	0.97	0.98	0.96	0.98	0.98	0.96	0.99	1.00	0.97
ST.12	6	16	19	25	34	37	42	51	54	59	69	70	96	0.75	0.94	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.97
ST.13	7	16	20	22	34	36	42	51	54	59	69	70	93	0.88	0.94	1.00	0.88	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.93	0.97
ST.14	5	16	20	25	34	37	42	51	54	59	67	70	99	0.63	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	0.99	0.96
ST.15	6	17	20	25	33	35	39	49	53	58	69	70	100	0.75	1.00	1.00	1.00	0.97	0.95	0.93	0.96	0.98	0.98	1.00	1.00	1.00	0.96
ST.16	5	16	20	25	34	37	42	51	54	59	69	70	88	0.63	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	0.96
ST.17	6	14	19	25	34	37	42	51	54	59	68	70	92	0.75	0.82	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.92	0.96
ST.18	5	16	19	24	33	37	42	51	54	59	69	70	97	0.63	0.94	0.95	0.96	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.96
ST.19	4	17	20	25	33	36	41	50	54	59	68	70	100	0.50	1.00	1.00	1.00	0.97	0.97	0.98	0.98	1.00	1.00	0.99	1.00	1.00	0.95
ST.20	6	16	19	24	31	36	42	51	54	59	65	68	88	0.75	0.94	0.95	0.96	0.91	0.97	1.00	1.00	1.00	1.00	0.94	0.97	0.88	0.94
ST.21	5	13	20	23	31	37	42	51	54	59	69	70	98	0.63	0.76	1.00	0.92	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.94
ST.22	6	17	19	25	34	35	41	46	51	55	64	66	93	0.75	1.00	0.95	1.00	1.00	0.95	0.98	0.90	0.94	0.93	0.93	0.94	0.93	0.94
ST.23	7	16	18	23	31	37	40	50	52	56	66	66	90	0.88	0.94	0.90	0.92	0.91	1.00	0.95	0.98	0.96	0.95	0.96	0.94	0.90	0.94
ST.24	8	16	19	21	31	34	39	48	51	56	65	67	96	1.00	0.94	0.95	0.84	0.91	0.92	0.93	0.94	0.94	0.95	0.94	0.96	0.96	0.94
ST.25	6	16	19	25	34	37	37	49	52	56	62	66	81	0.75	0.94	0.95	1.00	1.00	1.00	0.88	0.96	0.96	0.95	0.90	0.94	0.81	0.93
ST.26	6	14	16	24	32	36	40	50	53	58	68	69	93	0.75	0.82	0.80	0.96	0.94	0.97	0.95	0.98	0.98	0.98	0.99	0.99	0.93	0.93
ST.27	6	16	19	22	31	33	39	48	50	56	65	66	92	0.75	0.94	0.95	0.88	0.91	0.89	0.93	0.94	0.93	0.95	0.94	0.94	0.92	0.91
ST.28	6	16	18	23	33	35	39	48	49	56	56	65	93	0.75	0.94	0.90	0.92	0.97	0.95	0.93	0.94	0.91	0.95	0.81	0.93	0.93	0.91
ST.29	5	15	18	23	32	34	40	49	52	57	65	65	92	0.63	0.88	0.90	0.92	0.94	0.92	0.95	0.96	0.96	0.97	0.94	0.93	0.92	0.91
ST.30	7	12	15	20	28	36	41	50	53	58	65	69	80	0.88	0.71	0.75	0.80	0.82	0.97	0.98	0.98	0.98	0.98	0.94	0.99	0.80	0.89
ST.31	4	15	18	21	27	30	41	51	54	59	65	70	90	0.50	0.88	0.90	0.84	0.79	0.81	0.98	1.00	1.00	1.00	0.94	1.00	0.90	0.89
ST.32	7	16	17	23	30	32	36	45	48	53	62	64	84	0.88	0.94	0.85	0.92	0.88	0.86	0.86	0.88	0.89	0.90	0.90	0.91	0.84	0.89
ST.33	6	16	19	23	30	33	37	42	48	52	62	63	84	0.75	0.94	0.95	0.92	0.88	0.89	0.88	0.82	0.89	0.88	0.90	0.90	0.84	0.88
ST.34	6	14	17	19	30	33	38	47	50	55	65	66	86	0.75	0.82	0.85	0.76	0.88	0.89	0.90	0.92	0.93	0.93	0.94	0.94	0.86	0.88
ST.35	8	13	15	17	28	31	38	47	49	55	68	69	89	1.00	0.76	0.75	0.68	0.82	0.84	0.90	0.92	0.91	0.93	0.99	0.99	0.89	0.88
ST.36	6	11	18	19	31	32	41	49	51	57	64	66	83	0.75	0.65	0.90	0.76	0.91	0.86	0.98	0.96	0.94	0.97	0.93	0.94	0.83	0.88
ST.37	6	16	19	21	28	34	40	45	50	55	61	62	69	0.75	0.94	0.95	0.84	0.82	0.92	0.95	0.88	0.93	0.93	0.88	0.89	0.69	0.88
ST.38	7	12	15	23	31	34	39	46	49	54	61	63	84	0.88	0.71	0.75	0.92	0.91	0.92	0.93	0.90	0.91	0.92	0.88	0.90	0.84	0.87
ST.39	6	15	18	21	32	35	40	47	50	51	51	61	81	0.75	0.88	0.90	0.84	0.94	0.95	0.95	0.92	0.93	0.86	0.74	0.87	0.81	0.87
ST.40	6	9	12	18	27	34	40	49	50	57	67	68	91	0.75	0.53	0.60	0.72	0.79	0.92	0.95	0.96	0.93	0.97	0.97	0.97	0.91	0.84
ST.41	6	13	18	24	29	31	36	38	43	52	61	62	83	0.75	0.76	0.90	0.96	0.85	0.84	0.86	0.75	0.80	0.88	0.88	0.89	0.83	0.84
ST.42	6	12	19	21	31	34	39	44	49	50	52	53	69	0.75	0.71	0.95	0.84	0.91	0.92	0.93	0.86	0.91	0.85	0.75	0.76	0.69	0.83
ST.43	5	14	16	21	28	31	36	45	48	48	54	59	62	0.63	0.82	0.80	0.84	0.82	0.84	0.86	0.88	0.89	0.81	0.78	0.84	0.62	0.80
ST.44	6	10	13	16	23	31	36	44	48	52	59	64	93	0.75	0.59	0.65	0.64	0.68	0.84	0.86	0.86	0.89	0.88	0.86	0.91	0.93	0.79
ST.45	3	11	18	19	29	31	34	38	39	54	64	66	77	0.38	0.65	0.90	0.76	0.85	0.84	0.81	0.75	0.72	0.92	0.93	0.94	0.77	0.79
ST.46	6	14	15	17	27	29	33	42	43	43	52	52	86	0.75	0.82	0.75	0.68	0.79	0.78	0.79	0.82	0.80	0.73	0.75	0.74	0.86	0.77
ST.47	6	15	17	18	29	31	35	36	38	38	38	38	72	0.75	0.88	0.85	0.72	0.85	0.84	0.83	0.71	0.70	0.64	0.55	0.54	0.72	0.74
ST.48	6	9	10	13	19	27	37	46	48	48	48	52	69	0.75	0.53	0.50	0.52	0.56	0.73	0.88	0.90	0.89	0.81	0.70	0.74	0.69	0.71
ST.49	5	7	11	15	22	24	29	40	43	43	51	54	78	0.63	0.41	0.55	0.60	0.65	0.65	0.69	0.78	0.80	0.73	0.74	0.77	0.78	0.67
ST.50	6	9	16	17	23	26	29	29	37	37	38	39	69	0.75	0.53	0.80	0.68	0.68	0.70	0.69	0.57	0.69	0.63	0.55	0.56	0.69	0.65
ST.51	5	11	11	11	20	24	24	38	38	42	53	53	73	0.63	0.65	0.55	0.44	0.59	0.65	0.57	0.75	0.70	0.71	0.77	0.76	0.73	0.65
ST.52	8	9	11	15	23	25	31	31	36	36	36	36	60	1.00	0.53	0.55	0.60	0.68	0.68	0.74	0.61	0.67	0.61	0.52	0.51	0.60	0.64
ST.53	5	5	5	12	22	27	32	38	39	41	52	53	73	0.63	0.29	0.25	0.48	0.65	0.73	0.76	0.75	0.72	0.69	0.75	0.76	0.73	0.63
ST.54	7	15	15	18	19	19	23	30	30	30	30	30	69	0.88	0.88	0.75	0.72	0.56	0.51	0.55	0.59	0.56	0.51	0.43	0.43	0.69	0.62
ST.55	4	12	14	15	21	22	26	34	34	36	39	42	60	0.50	0.71	0.70	0.60	0.62	0.59	0.62	0.67	0.63	0.61	0.57	0.60	0.60	0.62
ST.56	4	11	13	13	13	13	14	14	17	19	19	19	72	0.50	0.65	0.65	0.52	0.38	0.35	0.33	0.27	0.31	0.32	0.28	0.27	0.72	0.43
ST.57	4	8	8	11	18	18	18	19	20	20	20	20	56	0.50	0.47	0.40	0.44	0.53	0.49	0.43	0.37	0.37	0.34	0.29	0.29	0.56	0.42
ST.58	3	4	8	13	13	14	15	17	17	24	24	26	73	0.38	0.24	0.40	0.52	0.38	0.38	0.36	0.33	0.31	0.41	0.35	0.37	0.73	0.40
ST.59	5	5	5	8	9	10	10	12	12	15	16	17	72	0.63	0.29	0.25	0.32	0.26	0.27	0.24	0.24	0.22	0.25	0.23	0.24	0.72	0.32
ST.60	1	1	2	2	2	2	7	19	20	33	42	42	79	0.13	0.06	0.10	0.08	0.06	0.05	0.17	0.37	0.37	0.56	0.61	0.60	0.79	0.30
ST.61	3	4	5	6	6	6	7	8	9	10	17	24	67	0.38	0.24	0.25	0.24	0.18	0.16	0.17	0.16	0.17	0.17	0.25	0.34	0.67	0.26
ST.62	0	0	0	2	4	5	11	19	19	19	24	25	62	0.00	0.00	0.00	0.08	0.12	0.14	0.26	0.37	0.35	0.32	0.35	0.36	0.62	0.23
ST.63	1	1	1	1	4	4	5	6	6	14	14	14	71	0.13	0.06	0.05	0.04	0.12	0.11	0.12	0.12	0.11	0.24	0.20	0.20	0.71	0.17

Table 5: Cumulative Points and Points Rate by Student (2024)

index	Cumulative points													Cumulative points rate													
	w03	w04	w05	w06	w07	w08	w09	w10	w11	w12	w13	w14	w15	w03	w04	w05	w06	w07	w08	w09	w10	w11	w12	w13	w14	w15	avg
(max)	9	19	22	28	38	41	47	57	60	66	76	76	100														
ST.01	6	15	20	29	34	39	44	45	50	55	60	61	100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ST.02	6	15	20	29	34	39	44	45	50	55	60	61	99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00
ST.03	6	15	20	29	34	39	44	45	50	55	60	60	100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00
ST.04	6	15	20	29	34	39	44	45	50	55	60	61	97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00
ST.05	6	15	20	29	34	39	44	45	50	55	60	60	100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00
ST.06	6	15	20	29	34	39	44	44	50	55	60	61	98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	0.98	1.00
ST.07	6	15	20	29	34	39	44	45	50	55	60	60	97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.97	1.00
ST.08	6	15	20	29	34	39	44	45	50	55	60	61	95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
ST.09	6	15	20	29	34	39	44	45	50	55	60	61	93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00
ST.10	6	15	20	29	34	39	44	45	50	55	60	60	94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.94	0.99
ST.11	6	14	20	29	34	39	44	45	50	55	60	61	93	1.00	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93	0.99
ST.12	6	15	20	29	34	39	44	44	50	55	60	61	87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	0.87	0.99
ST.13	6	15	20	29	33	39	43	45	50	54	60	60	92	1.00	1.00	1.00	1.00	0.97	1.00	0.98	1.00	1.00	0.98	1.00	0.98	0.92	0.99
ST.14	6	15	20	28	33	38	43	44	49	54	60	60	97	1.00	1.00	1.00	0.97	0.97	0.97	0.98	0.98	0.98	0.98	1.00	0.98	0.97	0.98
ST.15	6	15	20	29	33	38	43	44	49	54	60	61	91	1.00	1.00	1.00	1.00	0.97	0.97	0.98	0.98	0.98	0.98	1.00	1.00	0.91	0.98
ST.16	6	13	20	29	34	39	43	44	49	55	60	60	100	1.00	0.87	1.00	1.00	1.00	1.00	0.98	0.98	0.98	1.00	1.00	0.98	1.00	0.98
ST.17	6	14	20	29	34	39	44	45	50	54	59	60	87	1.00	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.98	0.87	0.98
ST.18	6	15	20	29	33	39	44	45	50	55	59	59	83	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	0.98	0.97	0.83	0.98
ST.19	6	15	20	29	34	39	44	45	50	48	59	59	87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.87	0.98	0.97	0.87	0.98
ST.20	6	14	20	28	32	39	43	44	50	55	60	60	90	1.00	0.93	1.00	0.97	0.94	1.00	0.98	0.98	1.00	1.00	1.00	0.98	0.90	0.98
ST.21	5	15	19	29	33	39	44	45	50	55	60	60	93	0.83	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.93	0.98
ST.22	6	15	20	28	29	35	42	44	48	54	59	60	95	1.00	1.00	1.00	0.97	0.85	0.90	0.95	0.98	0.96	0.98	0.98	0.98	0.95	0.96
ST.23	6	14	19	28	32	39	43	45	49	54	60	60	76	1.00	0.93	0.95	0.97	0.94	1.00	0.98	1.00	0.98	0.98	1.00	0.98	0.76	0.96
ST.24	6	15	20	28	32	36	40	43	48	53	58	58	75	1.00	1.00	1.00	0.97	0.94	0.92	0.91	0.96	0.96	0.96	0.97	0.95	0.75	0.95
ST.25	5	14	19	28	32	37	43	42	48	53	58	58	96	0.83	0.93	0.95	0.97	0.94	0.95	0.98	0.93	0.96	0.96	0.97	0.95	0.96	0.95
ST.26	6	15	19	28	32	39	43	45	45	45	57	57	73	1.00	1.00	0.95	0.97	0.94	1.00	0.98	1.00	0.90	0.82	0.95	0.93	0.73	0.94
ST.27	6	14	19	28	31	36	40	40	48	53	58	59	64	1.00	0.93	0.95	0.97	0.91	0.92	0.91	0.89	0.96	0.96	0.97	0.97	0.64	0.92
ST.28	6	15	20	21	26	37	42	43	48	53	58	58	76	1.00	1.00	1.00	0.72	0.76	0.95	0.95	0.96	0.96	0.96	0.97	0.95	0.76	0.92
ST.29	6	13	18	27	31	36	41	43	48	48	56	57	82	1.00	0.87	0.90	0.93	0.91	0.92	0.93	0.96	0.96	0.87	0.93	0.93	0.82	0.92
ST.30	6	14	19	28	33	38	43	44	48	48	53	53	65	1.00	0.93	0.95	0.97	0.97	0.97	0.98	0.98	0.96	0.87	0.88	0.87	0.65	0.92
ST.31	6	14	14	26	30	35	39	40	45	50	55	59	87	1.00	0.93	0.70	0.90	0.88	0.90	0.89	0.89	0.90	0.91	0.92	0.97	0.87	0.90
ST.32	6	15	20	21	30	35	40	41	41	46	51	51	71	1.00	1.00	1.00	0.72	0.88	0.90	0.91	0.91	0.82	0.84	0.85	0.84	0.71	0.87
ST.33	6	10	14	24	29	34	39	40	45	50	55	55	86	1.00	0.67	0.70	0.83	0.85	0.87	0.89	0.89	0.90	0.91	0.92	0.90	0.86	0.86
ST.34	6	15	15	24	24	30	34	37	45	45	50	52	93	1.00	1.00	0.75	0.83	0.71	0.77	0.77	0.82	0.90	0.82	0.83	0.85	0.93	0.85
ST.35	1	14	19	27	33	34	37	42	42	51	56	56	60	0.17	0.93	0.95	0.93	0.97	0.87	0.84	0.93	0.84	0.93	0.93	0.92	0.60	0.84
ST.36	6	15	15	27	30	34	37	37	41	46	46	46	70	1.00	1.00	0.75	0.93	0.88	0.87	0.84	0.82	0.82	0.84	0.77	0.75	0.70	0.84
ST.37	5	9	15	27	32	37	41	41	47	47	47	47	65	0.83	0.60	0.75	0.93	0.94	0.95	0.93	0.91	0.94	0.85	0.78	0.77	0.65	0.83
ST.38	6	11	12	21	26	31	36	37	42	47	52	55	96	1.00	0.73	0.60	0.72	0.76	0.79	0.82	0.82	0.84	0.85	0.87	0.90	0.96	0.83
ST.39	6	15	20	21	27	30	30	34	40	44	49	49	84	1.00	1.00	1.00	0.72	0.79	0.77	0.68	0.76	0.80	0.80	0.82	0.80	0.84	0.83
ST.40	5	14	20	21	24	30	35	35	40	41	47	48	84	0.83	0.93	1.00	0.72	0.71	0.77	0.80	0.78	0.80	0.75	0.78	0.79	0.84	0.81
ST.41	1	13	18	27	27	36	41	41	41	41	51	51	67	0.17	0.87	0.90	0.93	0.79	0.92	0.93	0.91	0.82	0.75	0.85	0.84	0.67	0.80
ST.42	5	12	18	21	25	29	34	36	40	45	45	45	87	0.83	0.80	0.90	0.72	0.74	0.74	0.77	0.80	0.80	0.82	0.75	0.74	0.87	0.79
ST.43	6	15	20	20	26	31	36	36	41	41	41	41	52	1.00	1.00	1.00	0.69	0.76	0.79	0.82	0.80	0.82	0.75	0.68	0.67	0.52	0.78
ST.44	6	14	14	17	17	17	22	23	28	45	45	46	68	1.00	0.93	0.70	0.59	0.50	0.44	0.50	0.51	0.56	0.82	0.75	0.75	0.68	0.68
ST.45	2	2	10	22	23	26	27	34	39	43	48	48	84	0.33	0.13	0.50	0.76	0.68	0.67	0.61	0.76	0.78	0.78	0.80	0.79	0.84	0.66
ST.46	6	6	15	15	17	22	22	31	36	36	36	40	60	1.00	0.40	0.75	0.52	0.50	0.56	0.50	0.69	0.72	0.65	0.60	0.66	0.60	0.63
ST.47	1	1	10	13	13	14	17	18	20	21	22	22	63	0.17	0.07	0.50	0.45	0.38	0.36	0.39	0.40	0.40	0.38	0.37	0.36	0.63	0.37
ST.48	0	0	0	0	4	19	23	23	29	29	33	33	60	0.00	0.00	0.00	0.00	0.12	0.49	0.52	0.51	0.58	0.53	0.55	0.54	0.60	0.36
ST.49	2	7	7	7	7	8	13	13	13	17	23	24	37	0.33	0.47	0.35	0.24	0.21	0.21	0.30	0.29	0.26	0.31	0.38	0.39	0.37	0.33
ST.50	5	9	9	9	9	9	9	9	9	9	9	9	44	0.83	0.60	0.45	0.31	0.26	0.23	0.20	0.20	0.18	0.16	0.15	0.15	0.44	0.31

2023; building on those findings, the current study incorporates the results for 2024 and conducts analysis from a different perspective.

The current data include only students who were enrolled in the course and provided consent for the use of their data for research purposes. Specifically, analysis included data from 69 out of 110, 66 out of 89, 63 out of 97, and 50 out of 81 enrolled students in 2021–2024, respectively.

4.1 Status of Point Acquisition

Tables 2 to 5 present cumulative points and cumulative points rates per student at the end of each week (Weeks 3–15 [w03–w15, respectively]) for each academic year (2021–2024). Columns labeled "Cumulative points" displays total points accumulated per student up to the end of each week with color scales applied according to point values. Rows labeled "(max)" indicate the maximum points attainable by a certain week. Meanwhile, columns labeled "Cumulative points rate" represent the ratio of cumulative points to the maximum points attainable per week, which is calculated weekly. The rightmost column of each table presents average cumulative points rates across Weeks 3–15, and students are organized in descending order based on this average value. Considering the correspondence between points and grades, cumulative points rates are color-coded as follows: green for 90% or higher, blue for 80% to <90%, yellow for 70% to <80%, red for 60% to <70%, and gray for <60%. "w15" represents the state after the completion of evaluations for all assignments and corresponds to the classification of the final course grade.

Notably, this dataset includes only students who provided consent for the use of their data for research purposes. Given that students who did not provide consent include those with low performance or who failed to earn course credit, caution is required when interpreting the results. Nevertheless, despite this limitation, the majority of students at Week 15 (final grades) were classified under the category of a cumulative points rate of 90% or higher, which corresponds to the highest grade classification (Excellent). Observing the progression from Weeks 3 to 15, in all academic years, we generally noted a shift in the distribution toward higher cumulative point rates over time. As mentioned in Section 2.1, students are allowed to revise and resubmit assignments based on the feedback provided (Figures 1–3), thus giving them the opportunity to maximize points according to their level of motivation.

Focusing on the transition from Weeks 14 to 15, we observe that many students with a cumulative points rate less than 60% (gray) at Week 14 improved and met or exceeded the 60% threshold required for course credit by Week 15. A number of students even achieved rapid improvement, thus reaching a cumulative points rate of 70%–80% (yellow), 80%–90% (blue), or, in a few cases, 90% or higher (green) by the final week. This result indicates that a group of students each year consistently make significant *last-minute progress*. The course design, which clearly linked evaluation criteria to grade classifications, visualized evaluation results, and enabled resubmission and re-evaluation after initial grading, may have encouraged such behavior. Therefore, it enabled students to estimate "the extent of additional learning required to achieve their goals." The author in [6] conducted a qualitative analysis based on survey responses conducted for the 2020 implementation. The results indicated that the course structure contributed to the *strategic planning* and *outcome expectation* phases of the forethought stage of self-regulated learning as well as to the *self-evaluation* phase of the self-reflection stage. Therefore, these mechanisms may have likely also promoted the last-minute progress observed. The results of 2021 to 2024 demonstrated that this phenomenon consistently occurred across all years.

Conversely, the proportion of students with a cumulative points rate less than 60% (gray) per week was generally higher during academic years 2021 and 2022 but significantly decreased during 2023 and 2024, which indicates that more students maintained consistently high point acquisition rates. As previously mentioned, although the course was offered with the same overall

objectives and mainly the same structure across four years, the difficulty level of assignments and stringency of the grading criteria were slightly relaxed beginning in 2023. This aspect may be one of the factors that contributed to the observed changes. Table 1 indicates that the breakdown of points was also adjusted in 2023 and 2024. In particular, the total number of points with awarding deadlines increased from 16 in 2021–2022 to 29 in 2023–2024, which is nearly double the amount of *nonrecoverable* points. This change may have contributed to the higher proportion of students who dropped out at an early stage.

As previously demonstrated, striking a balance among assignment difficulty, grading strictness, and allocation of points seemingly influenced the distribution of point acquisition and its progression over time. As this system clearly defines the evaluation criteria and continuously visualizes the evaluation results, this study infers that the students perceived visualized outcomes as a form of *evaluation function* and adjusted their learning behaviors accordingly. In this sense, the strictness of evaluation and the allocation of points can be considered to form the evaluation function that generates the dynamics of student behavior.

4.2 Relationship Between System Use and Point Acquisition

In this practice, a survey was administered to students at the end of the course. This section examines the relationship between system use and point acquisition based on the results of this survey.

The following questions were included in the survey:

Q1: How did the establishment of the grading criteria in this course (correspondence between earned points and grades and rules for awarding points) influence your learning in this course?

Q2: How did the continuous availability of the points list via Google Sheets, which was enabled by the point-based system, influence your learning in this course?

Q3: Using the point-based system, the points list was continuously available via Google Sheets. How frequently did you check it? Please select the option that best applies to you.

Q4: For each reflection activity, you were encouraged (optionally) to review your point acquisition status based on the points table and to describe your self-assessment of your current learning status and your future learning plan. To what extent did you engage in this activity?

Items Q1 and Q2 were rated using a four-point scale with the following options: Had a positive impact/Had a somewhat positive impact/Had a somewhat negative impact/Had no noticeable impact. Item Q3 was rated using a three-point scale with the following options: Frequently (at least once a week)/Occasionally (every 2–3 weeks)/Rarely (2–3 times during the semester). Item Q4 was rated a four-point scale with the following options: Engaged in reflection every time/Engaged in reflection most of the time/Engaged in reflection occasionally/Did not engage in reflection.

Figures 4 to 7 present the results of responses for Q1 to Q4. Boxplots of average cumulative points rates are drawn for each response option. Q1 and Q2 asked students to self-evaluate the impact of the system on their own learning. Figures 4 and 5 indicate a trend toward higher average cumulative points rates for students who provided more positive responses. Q3 asked

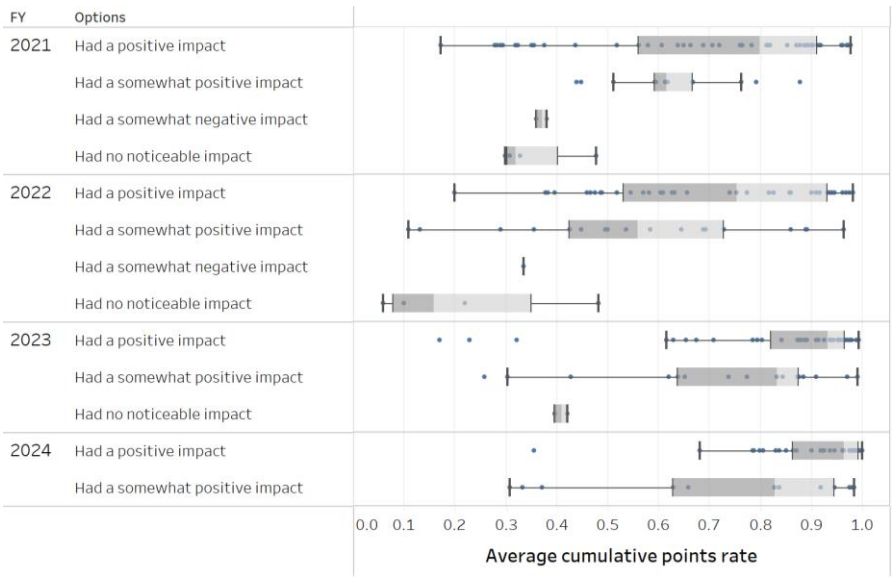

Figure 4: Boxplots of Average Cumulative Points Rate by Responses to Q1

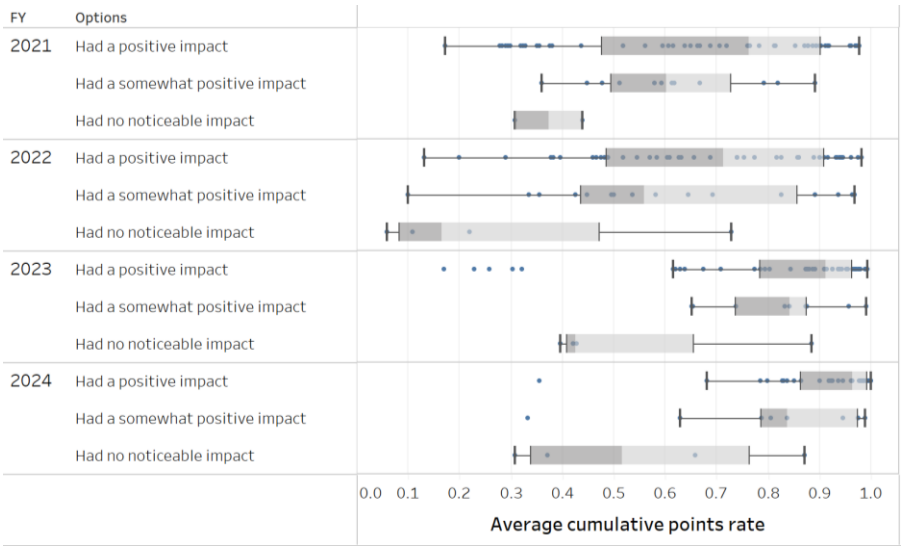

Figure 5: Boxplots of Average Cumulative Points Rate by Responses to Q2

students about the frequency of system use. Figure 6 points to a trend toward higher average cumulative points rates for students who used the system more frequently. Q4 pertains to an activity introduced since academic year 2023 onward. At the end of each class session, students were encouraged to reflect on their learning status by reviewing the points table to obtain an overall sense of their point acquisition and to describe their self-assessment and future learning plans. Although this reflection was optional, students who more actively engaged in this activity generally produced higher average cumulative points rates.

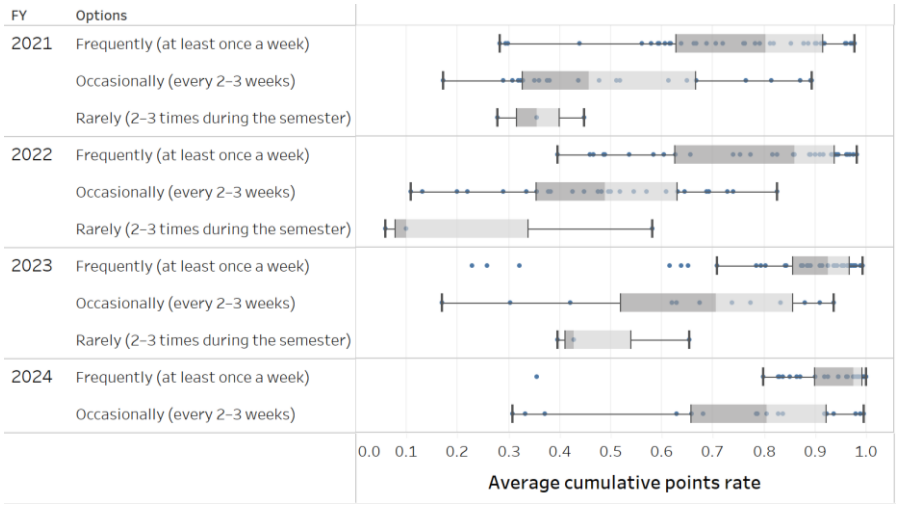

Figure 6: Boxplots of Average Cumulative Points Rate by Responses to Q3

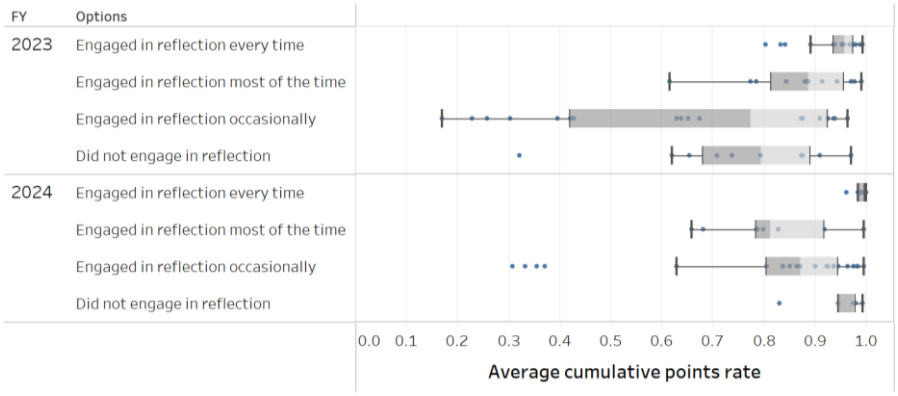

Figure 7: Boxplots of Average Cumulative Points Rate by Responses to Q4

These results indicate that students with higher average cumulative points rates tended to hold more positive feelings toward the system and more active engagement with it. Although this result does not confirm a causal relationship between the system and learning outcome, it proposes the possibility that active engagement with the system may exert a positive impact on learning. However, these are merely hypotheses based on descriptive trends, and further statistical analysis is needed. Moreover, as noted in Section 4.2, it is important to acknowledge the potential for selection bias. Careful examination, including qualitative analyses such as interviews, will be necessary.Thus, further in-depth analysis is required to examine the effects of the system on autonomous learning behaviors, while considering intervention strategies for enhancing students' engagement with the system.

5 Conclusion

This study proposed an instructional practice that aims to promote autonomous learning behavior by visualizing and sharing learning assessments and compared data across four years of course

implementation (2021–2024). The results indicated that visualizing and sharing learning assessments with clear links to learning goals can promote autonomous learning behavior. They also underscored that different strategies for setting the evaluation criteria may influence the engagement of students with learning activities. Furthermore, the findings implied that active engagement with the system may exert a positive impact on students' learning. Notably, however, the results are based on data collected only from students who consented to its use, thus introducing a potential bias. Future efforts will involve continuing the instructional practice and conducting further validation.

Acknowledgement

This work was supported by JSPS KAKENHI Grant Number JP19K03005, JP22K02832, and JP25K00843.

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