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Developing a Tutorial for SCOT Student Training with Automated Feedback Support

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Abstract

This study proposes a tutorial designed to support SCOT (Students Consulting On Teaching), a student-led class evaluation activity, by enhancing students' understanding of evaluation criteria key factors influencing the quality of evaluations. The tutorial incorporates a self-assessment rubric that allows students to monitor their own comprehension as they progress through the learning process. Feedback tailored to their rubric responses is generated by a system. An experiment was conducted to investigate the impact of system-generated feedback on evaluation activities within the tutorial. Additionally, this paper proposes a method for a future experiment to verify the effectiveness of the tutorial in actual SCOT implementations.

Keywords: SCOT, Education system, Class evaluation support, Feedback, Rubric

1 Introduction

SCOT is a classroom evaluation activity conducted by third-party students. In this activity, students participating in SCOT (hereafter referred to as "SCOT students") observe and record classes at the request of instructors as independent third parties. Based on their observations, they provide feedback and consulting to help improve the classes [1]. SCOT students do not enroll in the classes they evaluate, ensuring an independent perspective. Evaluation criteria are determined in advance through discussions with the instructors, and observations and recordings are conducted based on these criteria. With the expansion of Faculty Development (FD) initiatives in Japan, organized efforts by universities to support the improvement of teaching, SCOT activities have been implemented at institutions such as Shibaura Institute of Technology and Teikyo University. During classroom observations, SCOT students evaluate based on predetermined criteria. However, prior research by Fujimoto et al. [2] on SCOT activities suggested that not all SCOT students are able to observe and record according to the evaluation criteria, and that the quality of their records depends on their individual level of understanding of these criteria. To ensure the quality of SCOT activities, it is necessary to minimize such individual differences as much as possible. Therefore, this study proposes a tutorial to support the quality assurance of SCOT activities. The tutorial consists of practicing classroom observation, completing a self-assessment questionnaire, and receiving feedback. Through repeated practice of this cycle, students are expected to deepen their understanding of the evaluation criteria. The self-assessment questionnaire is introduced to help SCOT students monitor their understanding and autonomously advance their learning. A rubric, which provides clearly worded and specific standards for understanding [3], is adopted for this purpose. The experiment primarily investi-

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gates the impact of feedback on the practice of classroom observation. In addition, a further experimental design is proposed to evaluate the tutorial's contribution to actual SCOT activities

2 Related Works and Position of This Research

2.1 Evaluation of SCOT Support by Visualizing Speech Activities through Video Analysis of Class Archives

Fujimoto et al. (2023) addressed the heavy burden SCOT students face during online activities, especially when evaluating classes via archive videos [2]. They developed and evaluated a support system to ease this burden. The results showed that the system improved students' performance per unit time, though some students still performed well without it, highlighting the impact of individual differences. Based on these findings, this study aims to develop a tutorial that helps SCOT students perform consistently well, regardless of ability differences.

2.2 Students' Perceived Usefulness of Formative Feedback for a Computer-adaptive Test

Lilley et al. (2007) examined students' perceptions of formative feedback in computer-adaptive testing (CAT) [4]. Students rated automatic feedback highly for its speed, clarity, and usefulness in understanding their learning status, regardless of test results. These findings suggest that formative feedback can guide learners to the next stage. Building on this, the present study integrates system-delivered feedback into the tutorial to help SCOT students quickly gauge their understanding of evaluation criteria and advance in their learning.

2.3 To Rubric or Not to Rubric? The Effects of Self-assessment on Self-regulation, Performance, and Self-efficacy

Panadero et al. (2014) compared rubric-based self-assessment, where evaluation standards are clearly described by levels, with self-assessment without rubrics, examining effects on self-regulation, performance, and self-efficacy [5]. Students using rubrics showed better goal-oriented self-regulation, more effective learning plans, and significantly higher performance. Their self-assessments also aligned more closely with expert evaluations. Based on these findings, the present study incorporates rubric into the tutorial to support SCOT students in progress independently and effectively.

2.4 The Position of This Research

This study, built on the aforementioned related research, aims to develop a tutorial for training SCOT students using self-assessment rubric and automated feedback. A distinguishing feature of this tutorial compared to previous studies is the use of a low-code process automation platform,

which enables a prototype of an educational system where learners can complete the learning cycle independently. While rubric and automated feedback are commonly employed in educational settings, they are often not self-contained, in most cases, the final assessment or guidance for subsequent learning heavily relies on the instructor. In contrast, the tutorial in this study aims to allow the entire learning process to be carried out solely through interactions between the student and the system. In this respect, it presents a novel concept that also serves as a prototype of a new kind of educational system.

3 Tutorial Requirements

If SCOT students are able to understand the evaluation criteria and can observe during lessons through the tutorial developed in this study, it can be said that the tutorial successfully ensures the quality of SCOT activities. However, since classes vary widely in their implementation formats, each with its own set of evaluation criteria, it is difficult for a single tutorial to cover all possibilities. Therefore, this study focuses on the movements and verbal activities of both instructors and students and aims to support students in mastering three key evaluation criteria: "Instructor movement," "Instructor verbal activity," and "Student verbal activity." These aspects are considered fundamental indicators that can be observed and recorded regardless of the class format, as real-time lessons cannot proceed without verbal interaction between instructors and students. Furthermore, to facilitate observation within the tutorial, class sessions that incorporate group work, where instructor movement and verbal interaction are more frequent and thus easier to observe, are used. Video footage of such group work is employed as the core content of the tutorial.

4 Tutorial Structure and Operation

As shown in Figure 1, The tutorial consists of three main steps: class video observation, self-assessment, and feedback. By repeating this cycle, SCOT students can acquire a solid understanding of the evaluation criteria. In order to enable students to engage in this process independently, the post–self-assessment steps are automated using Power Automate [6], a process automation platform provided by Microsoft. Power Automate allows for integration with other Microsoft applications to automate workflows. Therefore, Microsoft Teams serves as the tutorial platform, where necessary contents such as class videos and self-assessment forms are provided. For the same reason, Microsoft Forms is used to collect and manage survey responses. After joining the designated team, SCOT students access the class videos and engage in observation and documentation. They then complete the self-assessment survey via the form. Once the form is submitted, Power Automate automatically evaluates the responses and returns feedback to each student, including scores for each evaluation criterion, written advice corresponding to the scores, and the next class video to observe. Each evaluation criterion is scored on a scale of 0 to 10 based on the submitted self-assessment. The content of the feedback is varied according to the number of criteria that meet the designated benchmark. Likewise, the subsequent class videos are selected from multiple patterns. In this study, the benchmark was set at 7 out of 10, and since there are three criteria, four combinations of feedback messages and class videos were prepared. By using the self-assessment rubric and automated feedback with Power Automate, SCOT students are able to concretely understand their level of comprehension

regarding the evaluation criteria and identify specific strategies for improvement. Additionally, by being guided to the next appropriate learning material, they are more likely to stay motivated and engaged in the learning process.

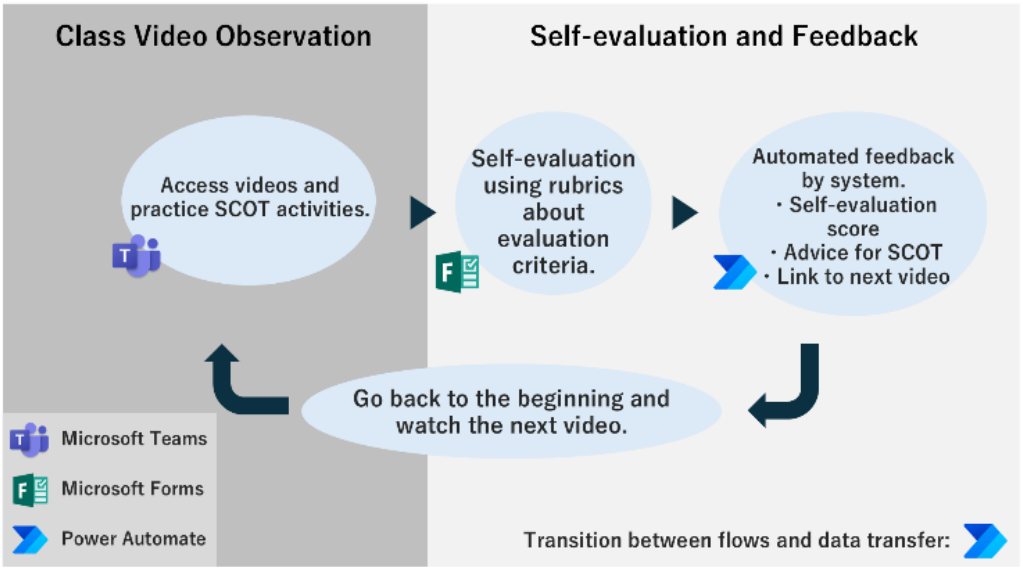

Figure 1: Tutorial Flow

5 Experiment

In this study, two experiments are currently planned. The first experiment (Experiment 1), which aims to verify the usefulness of automatic feedback provided by the system, has already been conducted. However, the second experiment (Experiment 2), which aims to investigate whether the learning from the tutorial can be effectively applied to actual SCOT activities, is still in the planning stage at the time of writing and has not yet been carried out. Accordingly, this section describes the outline, results, and discussion of Experiment 1, as well as the experimental plan for Experiment 2.

5.1 Experiment 1: Verifying the Usefulness of Automated Feedback

5.1.1 Experimental Overview

This study investigated the impact of system-generated feedback on the evaluation activities of students simulating SCOT roles. The participants were four undergraduate students from Kagawa University. The experiment was conducted face-to-face, during which the tutorial process and the evaluation criteria to be observed were explained orally to each participant. Following the explanation, each participant completed two sets of the tutorial. During the tutorial, participants recorded their observations on paper that had been distributed in advance. The class videos used in the tutorial were recordings of group work sessions conducted as part of the "Service Innovation Design Practicum" course offered in 2024 at the Faculty of Engineering and Design, Kagawa University. Since the original videos exceeded three hours in length and could pose a significant burden if watched repeatedly, shorter excerpt approximately 15 minutes each, were

selected based on segments with notable variations in spoken interactions to ensure ease of recording and engagement. After completing the two tutorial sets, participants were asked to complete a post-survey, which included questions regarding their understanding of the evaluation criteria, motivation for learning, and opinions on the tutorial system. The system-generated feedback, post-survey responses, and observation records were then analyzed to assess the effect of feedback on the participants' evaluation activities.

5.1.2 Results and Discussion

In the second set, the feedback scores improved for all participants compared to the first set. Additionally, two participants increased the number of evaluation criteria they successfully met, suggesting that the feedback provided by the system had a positive impact on their evaluation activities. Changes were observed in the recorded content for all participants before and after the feedback. Improvements included an increase in the amount of information recorded, more specific descriptions, and the appearance of comments and suggestions regarding the class, indicating an overall improvement in the quality of the records.

Figure 2 and Figure 3 show the changes in the recorded content of the participants whose improvements were particularly notable.

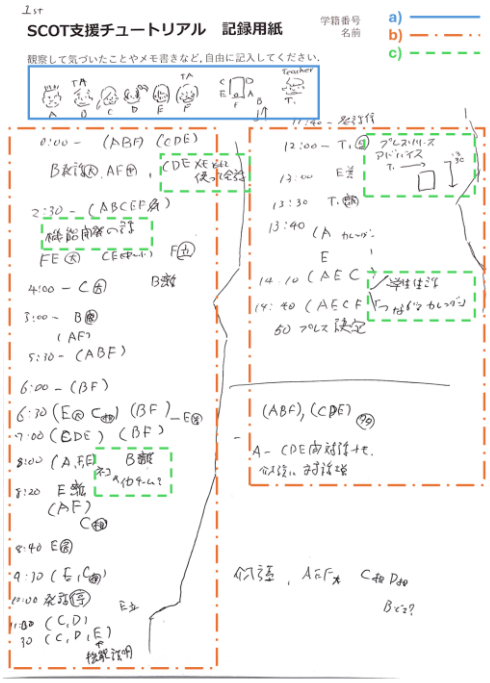

Figure 2: First Set of Records

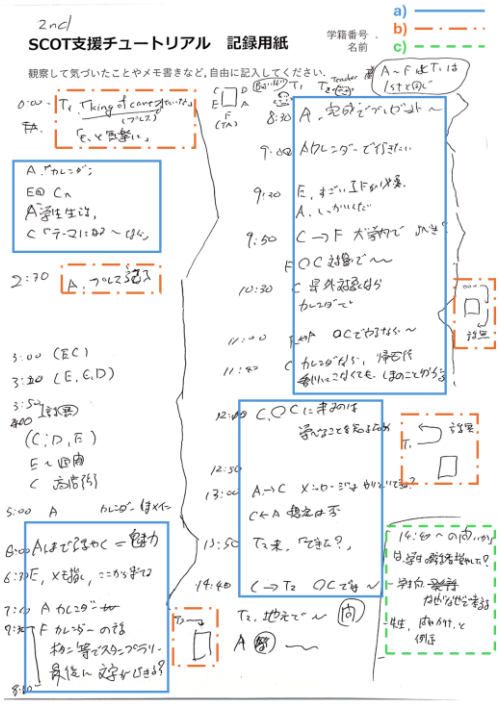

Figure 3: Second Set of Records

Since the records are written in Japanese, the contents of the first and second sets are summarized below:

(1) First Set (Figure 2):

a) Assigned alphabetical identifiers to the characters appearing in the video to make it easier to

distinguish.

b) Logged speaking events in a timestamp-like format.

c) Provided rough descriptions of the movements of the instructor and students.

(2) Second Set (Figure 3):

a) Since Added descriptions of not only the speaking events but also the contents of conversations.

b) Provided more detailed descriptions of movements.

c) Added suggestions for class improvement.

In the first set, this participant met the benchmark score of 7 out of 10 on only one evaluation criterion. Based on this, they received the following automated feedback: "You have demonstrated sufficient understanding for one of the evaluation criteria. Keep up the good work and continue deepening your understanding of the remaining criteria. When observing lessons, comparing the ideal form of a class with the one shown in the video can help you more easily identify strengths and areas for improvement." In the second set, the participant's record included a comment aimed at class improvement, such as "From the question at 14:40, it would be better if the number of student speakers could be increased." (Fig. 3.) This participant's score also improved, meeting the benchmark across all evaluation criteria. This suggests that the feedback provided by the system, in conjunction with the advice given, had a positive impact on the quality of this participant's SCOT activities. On the other hand, there were other participants who received similar advice but did not include any remarks related to class improvement in their records. This indicates that the current feedback may not be sufficient to accommodate differences in learner tendencies. Therefore, it is necessary to further enhance the feedback so that it can better support the individual differences among SCOT students.

5.2 Experiment 2: The Usefulness of Tutorials in Actual SCOT Activities

In the previous experiment, the tutorial enabled participants to learn how to observe lessons and understand the relevant evaluation criteria within the SCOT (Students Consulting On Teaching) framework. As the next step, a follow-up experiment is proposed to examine whether the knowledge and skills acquired through the tutorial can be effectively applied in an actual SCOT activity. In this follow-up experiment, participants will engage in classroom observations modeled after real SCOT activities, using the tutorial as a foundation. The participants will include not only the students who took part in the first experiment but also an additional group of Kagawa University students of a similar number who did not participate in the initial experiment. The aim is to compare observation content and understanding of evaluation criteria between those who experienced the tutorial and those who did not. For consistency and comparability, the evaluation criteria used in the classroom observations will remain the same: "Instructor's movement," "Students' movement," and "Students' verbal activity." Apart from the difference in tutorial experience, all other conditions in the experiment will remain uniform for all participants. In the first experiment, there were noticeable individual differences in participants' understanding of the evaluation criteria. However, judgments about their level of understanding

relied solely on self-assessments and subjective indicators. As a result, it was difficult for participants to grasp a clear target for their learning, and the tutorial's objective effectiveness was challenging to demonstrate. To address this issue, the current experiment introduces an objective evaluation framework based on the results of the first experiment. This framework will be shared with participants, and the degree to which they meet the criteria will serve as an indicator of the tutorial's effectiveness.

The evaluation framework consists of the following three levels:

- Level 1: The participant is able to describe observable aspects such as the instructor's and students' movements, attitudes, the amount and timing of verbal exchanges.
- Level 2: The participant is able to describe specific details of verbal exchanges and the changes in student behavior triggered by the instructor's actions.
- Level 3: In addition to the above, the participant is able to provide suggestions or opinions for improving the lesson.

These levels were derived from an analysis of observation records and scores from the first experiment: participants with lower scores tended to produce records corresponding to Level 1, while those with higher scores produced records aligned with Level 3. In this follow-up experiment, a higher achievement level will be interpreted as stronger understanding and practical application of the evaluation criteria. As in the first experiment, pre-recorded videos of group work sessions will be used for classroom observation. The tutorial environment will be largely consistent with the previous one. However, in this experiment, all participants will observe the same video, and the observation time will be extended to match typical university class lengths. Specifically, a 90-minute video will be used to simulate a full class session. After the observation, a questionnaire will be administered. The purpose of this survey is to more clearly distinguish between tutorial participants and non-participants. Since the background of this research lies in the individual differences among SCOT students, it is anticipated that even some students without tutorial experience may produce high-quality observation records. The questionnaire will focus on self-assessment of understanding and recording practices for each of the three evaluation criteria. By analyzing discrepancies between self-assessments and objective evaluations of the observation records, the study aims to verify the effectiveness of the tutorial.

6 Future Works

Moving forward, the proposed experiment will be conducted with a sufficient number of participants to ensure the reliability of the findings. Additionally, improvements to the tutorial itself will be pursued in parallel. One specific area of enhancement is the expansion of tutorial content. In the first experiment, the post-experiment questionnaire included an open-ended section for feedback on the tutorial. A common concern among participants was that the lesson videos used in the tutorial lacked sufficient contextual information. To address this issue, it is necessary to provide supplementary materials that explain the content and context of the lesson videos used in the tutorial. Furthermore, the feedback system will be refined by increasing the number of feedback patterns. This will allow the system to deliver more personalized advice and learning materials tailored to the individual abilities and progress of each student. By doing so, the tutorial

environment can be further enhanced to support effective and self-directed learning.

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