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Learning Support System to Understand Others Through Dramatic Script Reading and Its Evaluation

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Abstract: To form and maintain smooth interpersonal relationships in various situations in social life, the ability to appropriately understand the mental states of others, such as their intentions and feelings, is required. However, it is difficult to infer the unobservable mental states of others, and it is also difficult to learn from others how to perform inferring activities that are not externalized. In this study, we focus on "dramatic scripts" as a learning material that contributes to the training of the ability to understand others and propose a learning support system that aims to improve the ability to understand others and to cultivate an attitude of understanding others through inference activities about the emotions and conflicts of characters.

Keywords: Ability to understand others, dramatic scripts reading, learning support system

1. Introduction

It is required to form and maintain smooth interpersonal relationships in various situations in social life. For this purpose, it is necessary to appropriately understand the mental states of others, such as their intentions, beliefs, and feelings (Apperly, 2012; Epley & Caruso, 2012). An increased understanding of the mental states of others will lead to consideration for others and two-way communication, thereby promoting smooth interpersonal relationships. In addition, an attitude that strives to understand others who have different backgrounds from oneself is an important element forming the basis for understanding others (Shih et al., 2009; Stephan & Finlay, 1999).

On the other hand, it is not always easy to infer the mental states of others that cannot be explicitly captured because the intentions and emotions of others are not always expressed in everyday communication. When the actual feelings of others differ from their expressed behaviors, it is necessary to infer their emotions based on contextual factors other than facial expressions, such as the background situation in which they are placed. Since the mental states behind such utterances and actions are complex and chaotic (Berrios, 2019), there is no unique model for inference activities, and it is also difficult to learn from others such inference activities inside an individual.

In this study, we focus on the "dramatic scripts" as promising learning material for cultivating the skill of understanding others. In dramatic script reading, it is required to understand the mental states of others from the viewpoint of characters with different backgrounds from the reader by inferring the intentions and feelings of the characters based on the clues in the chain of utterances (dialogues) made by the characters. Such activities may contribute to the training of the inference activities.

Based on the above, this study sets the research question: "How can we realize a learning support system that improves the ability to recognize and infer the mental states of others?" More specifically, we are interested in the following two questions: "RQ1: Does understanding the characters in dramatic scripts from multiple viewpoints contribute to the improvement of the ability to understand others?" and "RQ2: Does broadening the learner's

thoughts based on the inferences results of others contribute to the improvement of understanding others?" In this paper, we propose a learning support system that aims to improve the ability to understand others and to cultivate an appropriate attitude toward understanding others through dramatic script reading.

2. Basic Philosophy of Fostering Ability to Understand Others

2.1 Difficulties in Understanding Others

In this study, the learning goal of the learners is to be able to appropriately recognize and infer the mental states, such as intentions and emotions, from others' utterances and actions and to be able to think based on the other's point of view. In order for learners to learn these skills and attitudes, the following learning difficulties need to be reduced:

- **Difficulty 1**: It is difficult to infer the mental states of others because they do not always express their emotions as they are but may intentionally control their emotions or express false emotions (Gross, 2002). It is also not easy to imagine the contextual factors that are not always expressed in the behavioral process of others because they may choose different behaviors from learners.
- **Difficulty 2**: It is not easy to consciously train oneself to acquire an attitude of trying to understand the other's point of view without immediately judging the beliefs and actions of those who are different from oneself.
- **Difficulty 3**: It is difficult to learn desirable inferential activities because people's mental states are complex (Berrios, 2019), and no unique inferential process can be used as a model. It is also difficult to learn from others how to perform the inference activities that take place inside a person's mind.

2.2 Dramatic Script Reading for Developing Ability to Understand Others

In this study, we focus on dramatic scripts as a learning material for developing the ability to understand others. The act of inferring the intentions and feelings of the characters in dramatic scripts from the chain of their utterances (dialogues) and deciphering the conflicts between them is an activity to understand the intentions, feelings, and thoughts of others from the viewpoint of the characters (others) who are placed in a different background from oneself. According to Ishino, acting in theater is putting oneself in the other's place and assuming the other's identity, which shifts one's point of view to the other's (Ishino, 2015). Watanabe and Kusumi also point out that actors have the experience of carefully inferring the beliefs, desires, and motives of the characters they play to perform them naturally (Watanabe & Kusumi, 2021).

2.3 System Design for Developing the Ability to Understand Others

As an approach to RQ1, we provide an inference activity support environment that allows learners to externalize the inference results of the characters' (others') mental states in dramatic scripts in mind map format as an opportunity to engage in inference activities about the mental states of others. In addition, we provide "inquiries" that encourage in-depth exploration of each viewpoint. The inquiries are intended to stimulate the learners' curiosity about the characters and further activate their critical reasoning.

The learner's unique way of inference results will be externalized in the mind map. Therefore, as an approach to RQ2, we develop a system that captures the differences on the map between different learners and provides information that stimulates each learner's inferential activities. This approach aims to promote learning from the inferences of others and to encourage more critical inference activities. More specifically, we aim to encourage new insights from learners by providing highlight and focus functions for each viewpoint so that learners can compare their own and others' ideas about each viewpoint on the map. In addition, we implement an advice presentation function based on the differences between the two maps.

Advice is offered to encourage awareness of viewpoints and inquiries that the other explores in depth but has not yet explored the learner's own and how others think about the same inquiries.

3. Learning Support System for Developing Ability to Understand Others

3.1 Environment to Support Inference Activities of Character's Mental State

Based on the system design described in Section 2.3, we implemented a learning support system for developing the ability to understand others as a web application. Figure 1 shows the interface of the developed system. The learner can confirm the dramatic script in Figure 1(a). Here, learners grasp the flow of the entire story. After reading through the story, learners select one character they want to understand more deeply and explore the character in depth.

In Figure 1(b), viewpoints for deciphering the mental states of others (e.g., the identities of characters) are displayed in a network structure. This network is a starting point to consider the character's mental state. The network is classified into two types: one for inferring the character's personality (Figure 1(i)) and the other for inferring the character's utterances and actions (Figure 1(ii)). The network for personality inference indicates stable elements related to the character's personality development as viewpoints. The network for utterance and action inference indicates elements related to utterances or actions of the character in advance as viewpoints. By developing these networks, the learner systematically infers the character.

The system displays inquiries that delve into the understanding of the character in Figure 1(c) by clicking on a viewpoint node. For example, when the learner clicks on the viewpoint "*unfulfilled desires*," adaptive inquiries (e.g., "*What are the character's unfulfilled desires?*" and "*Whom does the character admire?*"), that delve deeper into the viewpoints are displayed. This is intended to activate critical reasoning for each point of view and to stimulate the learner's curiosity about the character. Figure 1(d) shows a choice (e.g., 'causality') to consider the connection between what has been inferred under each viewpoint. This is intended to encourage reinterpreting a single interpretation from various perspectives through activities considering the connections between perspectives. In the same area, options are also displayed for a more profound investigation of the character's thoughts (e.g., 'reasons that led to the inference,' 'interpretation,' and 'utterances that show the interpretation'). This is intended to promote the externalization of the learner's inference activities process.

On the interface, clicking on any node and selecting an item from these options adds a node for entering the answer below the node. The selected choice is displayed on the link, and the node can be filled in with the learner's inferences and interpretations from the drama script. In addition, a link is created between the nodes by selecting any two nodes and

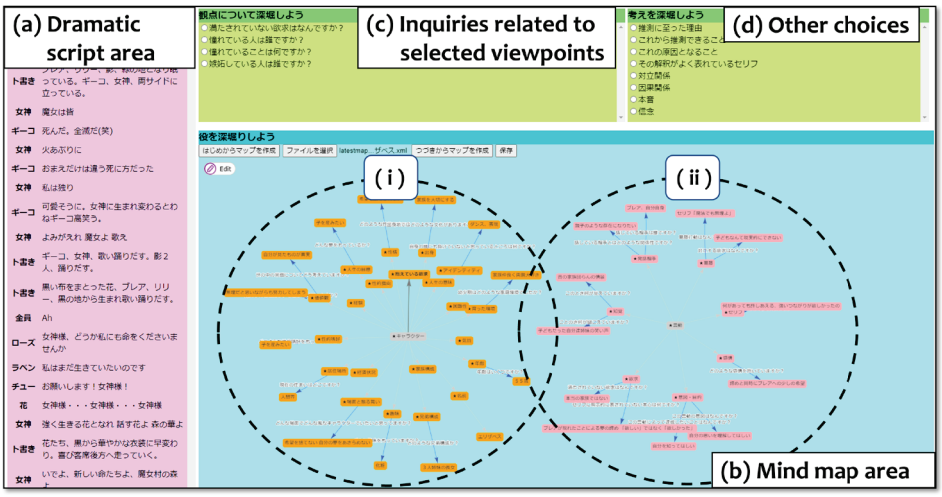

Figure 1. Interface for Inference Activities of Character's Mental State.

choosing one of the options (e.g., causality). The inquiry associated with a viewpoint is displayed in a blue link, while others are in gray.

The above functions are intended to externalize the results of inferences about the mental states of characters (others) made inside the learner's mind and the viewpoints that led to such inferences and to task the learner with critically digging into them. Currently, we set 21 viewpoints and related 42 inquiries for personality inference and 7 viewpoints and related 19 inquiries for deepening into the character from the viewpoints of the utterances and actions of characters based on the related research (Aikawa, 2015; Murayama, 1975) to personality development, human behavior, etc.

3.2 Environment to Compare Inference Activities That Differ from Learners' Own

By selecting the other learner's map, the learner's and the other's maps are displayed, as shown in Figure 2. By comparing their own and others' maps, learners gain new viewpoints on understanding others and engage in activities to broaden their thoughts.

In the interface, when a learner clicks on a viewpoint node on his/her map, a node of the same viewpoint on another learner's map is enlarged and highlighted in the center of the area. In the example shown in Figure 2(e), the learner selects "desire (red frame)." In addition, by selecting an utterance in the dramatic script from the area shown in Figure 1(a), the node corresponding to that line is enlarged and highlighted in the center of each map.

In addition to the visual support, the system is equipped with a function for presenting feedback (advice) focusing on the differences between the two externalized maps, as shown in Figure 2(g). The following three types of advice are generated and presented based on a template as clues to expand their thoughts by relativizing the different results of others' reasoning activities:

- **Advice that captures differences in viewpoint**: The advice that captures the difference between the viewpoint nodes used by other learners and not by the learner. e.g., "*The X (other) is deepening his/her thoughts about the character "Elizabeth's experience" (viewpoint), but you have not yet done it. Think about the viewpoint in your way*".
- **Advice that captures differences in inquiries**: The advice that captures the differences in inquiries used by other learners and not by the learner. e.g., *The X (other) has been deepening his thoughts about the inquiry: "What are the character's unfulfilled desires?" but you have not yet done it. Think about the inquiry in your way.*
- **Advice that captures the same inquiries**: The advice that captures inquiries and their interpretations used by both learner and the other. e.g., *The X (other) gave an interpretation as "disappointment in myself" to the inquiry: "What emotions does the character have?" Do you have any new thoughts about this?*

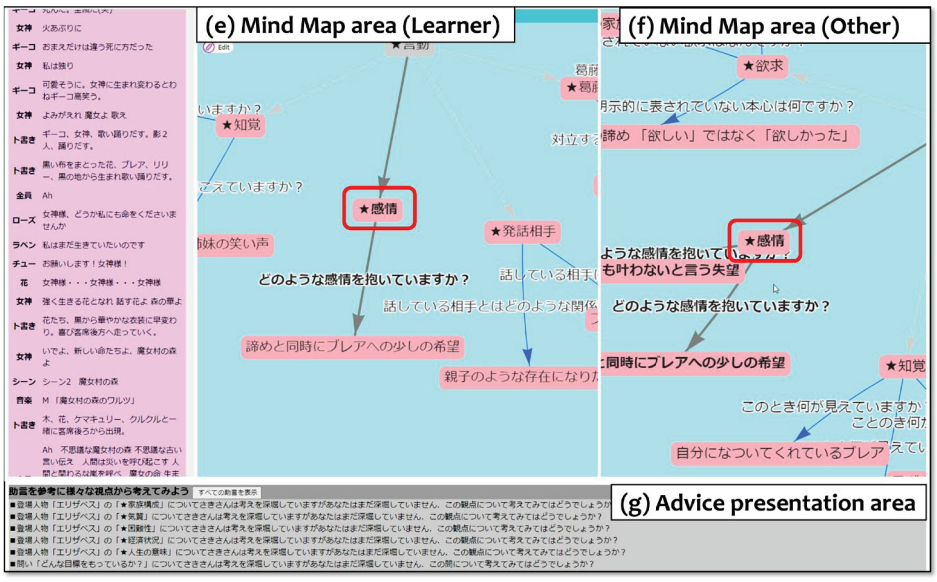

Figure 2. Interface for Inference Activities of Character's Mental State.

4. Evaluation

4.1 Experimental Setting and Procedure

An evaluation experiment was conducted to verify the usefulness of the developed system. In this evaluation, we report on the effects of the developed system on dramatic script reading toward understanding others (i.e., RQ1 and RQ2), as well as on the effects of the system on theatrical activities. Four adult members of a theater troupe and one acting instructor participated in this evaluation. The dramatic script used in the experiment was “Witch Village Forest,” written by Miki Kimito. The script is 20 pages long (about 600 lines), and the screening time is about one hour.

First, the troupe members were asked to read through the script to understand the contents before using the system. No intervention, such as time control, was used here. Each member was cast with the expectation that they would play one or two characters. In order to practice map comparison activities and acting instructions after using the system, one utterance of a particular scene was designated as the target of inference activity. Then, the members were asked to conduct the inference activity (Section 3.1) of the mental state of two or three characters’ personalities (the character played by each member and the character of the dialogue partner in the dramatic script) using the system until they were satisfied with their performance. After finishing the inference activity, they were asked to conduct a comparison activity (Section 3.2) with maps created by different troupe members. The maps to be compared were the inferences of the same utterances of the same character, and they were asked to reflect on their inference results while using support functions. If any new findings emerged, they were reflected in the map.

After completing the map, the troupe members practiced acting with an acting instructor. Each member was asked to perform a part of a pre-designated scene, and the instructor was asked to guide the performance while checking the map created by the members. Finally, a questionnaire survey on a 5-point scale (Table 1) and an interview-style discussion were conducted. Here, we asked each participant to share his or her opinions on each question and asked them to share their various insights about the system.

4.2 Results

The results of the questionnaire (N=4) are shown in Table 1. Questions (A) to (D) were asked to evaluate the support function of RQ1, which aims to capture characters from multiple perspectives, and questions (E), (F), and (G) were asked to evaluate the support function of RQ2, which aims to learn from the insights of others and to broaden one’s thoughts. The results showed that all questions were generally evaluated positively, confirming that the environment for inference activities of the character’s mental state and the presentation of viewpoints and inquiries helped encourage the members to dig deeper into their characters and to perceive others from various angles.

Table 1. *Questionnaire Survey*

	Question	Average
(A)	Did “viewpoints” for personality and utterance/action inferences help you better understand the character from various angles?	4.75
(B)	Did “questions” for each viewpoint make the activities to understand the character more active?	4.25
(C)	Did the support function in the mind map interface help you to organize and infer the character’s mental state?	5.00
(D)	Did a series of inferential activities help you better understand the character’s mental state?	4.25
(E)	Did the highlighting function help you compare your thoughts with others?	4.25
(F)	Did the advice provided by the system lead you to interpretations or insights that you had not thought of on your own?	4.00
(G)	Did a series of activities comparing thoughts with others broaden your thoughts?	4.75

In an interview-style discussion, in response to the question to the instructor, “How has the use of the maps created by the troupe members affected your instruction?” the instructor commented that “Although I found it somewhat difficult to use in the field, it was easy to advise because I knew the actor’s thoughts in advance.” In the discussion, many members stated that using the system helped them expand their thoughts, such as “Comparing inference results of myself with the other made my thoughts more flexible” and “It became easier to revise my thoughts.” It was also commented that the system was effective in motivating the members to dig deeper into their characters, such as “I wanted to think about what others have inferred” and “Since others were able to infer more viewpoints than I could, I thought I would consider them more myself.”

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5. Concluded Remarks

In this study, we developed a learning support system that aims to improve the ability to understand others and to cultivate an appropriate attitude toward understanding others by using dramatic scripts as learning materials. Experimental results show that the system has the potential to facilitate inference activities that contributed to understanding others, as well as activities to infer the mental states of others from multiple viewpoints.

Future issues include improving the system’s usability and confirming its usefulness through long-term practice.

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