

Exploring Socially Shared Regulation Processes in Peer Tutoring: Focusing on the Functions of Tutor Utterances

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Received: November 1, 2020 Accepted: November 26, 2021 Online Published: December 3, 2021

doi:10.5539/jedp.v12n1p1

URL: <http://doi.org/10.5539/jedp.v12n1p1>

Abstract

This study quantitatively and qualitatively examined socially shared regulation processes in peer tutoring. Participants were 22 teacher-candidate university students assigned to 11 peer-tutoring pairs. Peer tutoring included two sessions, in which one student was the tutor and another the tutee. Participants completed a socially shared regulation of learning (SSRL) scale before peer tutoring and an academic engagement measurement afterward. Moreover, peer tutoring sessions were videotaped. Students were divided into two groups, based on high and low SSRL scores, and verbal protocols were analyzed. Tutoring utterances were analyzed and categorized by the following social regulation functions, namely “orientation,” “monitoring,” and “evaluation,” while distinguishing between deep- or surface-level. Tutors in high-SSRL groups adopted deep-level orientation more than low-SSRL groups. Qualitative analysis indicated deep-level orientation played a key role in peer tutoring. Additionally, regarding motivational factors, high-SSRL groups showed stronger agentic and cognitive engagement than low-SSRL groups. The implications for teacher-candidate university education are discussed.

Keywords: socially shared regulation of learning; self-regulated learning; peer tutoring; tutor utterances.

1. Introduction

Recently, higher education has emphasized the introduction of collaborative and cooperative learning into courses to enhance university students' *self-regulated learning* (SRL) and improve students' efficient regulation of collaboration through classroom learning (Griffin, McGaw, & Care, 2012; Splichal, Oshima, & Oshima, 2018). SRL refers to the capability to engage in appropriate thoughts, feelings, and behaviors in order to pursue valuable academic goals (cf., Zimmerman, 2000). Teacher-candidate university students are required to be self-regulated learners (e.g., Daloglu & Vural, 2013), as well as have a responsibility to cultivate elementary and junior high school students' competence in regulating their own learning and collaborations with others. Teacher education programs should thus help teacher-candidate students effectively regulate learning for themselves and others through discourse.

1.1 Self-Regulation and Social Regulation Processes through Peer Learning

SRL has been studied and theorized about by several scholars (e.g., Schunk & Greene, 2018; Zimmerman, 1986, 1989). Zimmerman's social cognitive theory has led this field; however, research focused on social aspects of SRL has recently increased. *Socially shared regulation of learning* (SSRL) is a prospective theoretical framework to explain the regulation process of collaboration with others. This theory hypothesizes three social levels in this regulation process (Hadwin, Järvelä, & Miller, 2011, 2018; Järvelä & Hadwin, 2013; Järvelä, Järvenoja, & Malmberg, 2019). At the first level, learners regulate their own learning by applying their learning strategies. Self-regulated learners can adaptively monitor and evaluate their cognitive activities. At the second level, one peer learner either guides or is supported by another peer in what is called *co-regulation of learning* (CoRL). At the third level, multiple peers independently regulate the collaborative learning process and jointly regulate their own learning processes through social interaction. SSRL is considered an important mode of social regulation. Although researchers' interest in SRL, CoRL, and SSRL has increased, it is still in its early stages (cf., Järvelä et al., 2019). Examining regulation processes more in-depth requires triangulation to clarify the regulation process of corroborative learning through quantitative and qualitative research methods (e.g., Zimmerman & Schunk, 2011);

however, there are few studies that present evidence based on multimodal data (Järvelä et al., 2019). To understanding the complexity of phenomena such as the corroborative learning process, multimodal data is needed. Specifically, data collected through video recordings, learning traces, and self-report (Bernacki, 2018) are crucial to quantitatively and qualitatively analyze socially shared regulation processes on the basis of both self-evaluation and other-evaluation.

The present study focused on collaborative and cooperative learning through peer tutoring and examined regulation processes of learning from the perspective of SSRL theory. Peer tutoring is characterized by active academic help and support between student pairs (Topping, 2005; Topping & Ehly, 1998). One peer, called the “tutor,” takes direct pedagogical responsibility. The other peer, called the “tutee,” receives academic support from the tutor. Both students are able to experience the benefits of providing and receiving academic guidance (Topping, 1996, 2005; Topping & Ehly, 1998). Recently, many teachers in higher education have started trying peer tutoring practices that can easily and efficiently be introduced into one class, either lecture or seminar style. Generally, the instructional design of peer tutoring is more controllable and easier to manage in practice compared with collaborative learning. Therefore, peer tutoring usually takes less time and requires fewer group members than collaborative learning. Empirical research (e.g., De Backer, Van Keer, & Valcke, 2012, 2015a, 2015b) has indicated that peer tutoring can affect academic performance and SSRL. The present study focused on peer tutoring with university students in a teacher-training course, as teacher-candidate students’ abilities to practice tutoring and fulfill their responsibilities as tutors are extremely important. These are essential skills for teacher candidates and are closely associated with teacher quality and competencies.

1.2 Importance of Socially Shared Regulation of Metacognition in the Learning Process

Although there is little empirical research on the regulation processes of peer tutoring, De Backer et al. (2012, 2015a, 2015b) verified the SSRL process of peer tutoring. SRL studies have hypothesized that metacognition plays a central role in expanding and deepening learning. Metacognition refers to learners’ psychological functions that actively control and coordinate their cognitive activities when engaged in learning or academic problem-solving (Pintrich, 2004). Similarly, collaborative metacognition could be a key factor in peer-learning processes. A series of studies by De Backer et al. (2012, 2015a, 2015b) examined the regulation processes of learning in peer tutoring, specifically focusing on *socially shared regulation of metacognition* (SSRM). For example, by adopting a quasi-experimental design, De Backer et al. (2015a) examined changes in university students’ metacognition regulation after participating in peer tutoring. Through statistical analysis, peer tutoring was found to promote deep-level orientation, monitoring, and evaluation. Similarly, De Backer et al. (2012) introduced peer tutoring into an instructional science course and, based on comparison with a control group, the peer tutoring intervention was found to promote deep-level orientation, monitoring, and evaluation. Additionally, De Backer et al. (2015b) conducted a semester-long peer tutoring intervention, lasting from the start to the end of the semester, to identify time-bound evolutions in peer tutoring groups’ SSRM. These research findings showed that students’ involvement in deep-level orientation and monitoring increased from the starting to closing phases. Although these pioneering studies revealed the possibility that deep-level orientation, monitoring, and evaluation are especially important for SSRM, researchers should approach the essentials of social regulation in collaborative learning through methodical triangulation with multi-dimensional measurements (i.e., quantitative and qualitative verification).

The present study investigated the social regulation processes of tutors and tutees, first by quantitative measurements using SSRL scales, then by dividing them into high and low groups based on SSRL scale scores. Further, we analyzed the verbal protocol of peer tutoring quantitatively and qualitatively by examining differences in the tutoring discourse and social regulation processes of both groups. As a further qualitative analysis, the present study also aimed to extract a critical episode and clarify the social regulation functions of each utterance in the context of real peer tutoring.

As mentioned above, previous research (e.g., De Backer et al., 2015; Pintrich, 2004) distinguished orientation, monitoring, and evaluation as key regulation processes. *Orientation* means students engage in task analysis and become acquainted with learning objectives and each other’s initial understanding (Pintrich, 2004). *Monitoring* involves adaptive control of learning or problem-solving and is aimed at identifying inconsistencies and optimizing task execution (Meijer, Veenman, & van Hout-Wolters, 2006). *Evaluation* encompasses learners’ self-judgments of their performance (Veenman, Elshout, & Meijer, 1997) as they evaluate their learning outcomes and processes during problem-solving tasks.

Additionally, De Backer et al. (2015) distinguished surface-level and deep-level metacognitive regulation using verbal protocol analysis. Surface-level orientation aims only to explore task demands. Contrastingly, deep-level orientation is directed at processing task demands and activating prior knowledge (De Backer et al., 2012). Thus,

surface-level monitoring means only checking comprehension and progress, whereas deep-level monitoring implies elaborative, thought-provoking inquiries (Chin & Brown, 2000). Furthermore, surface-level evaluation encompasses checking and commenting on either learning outcomes or process factors, whereas deep-level evaluation involves reflection on both learning outcomes and learning processes (Veenman et al., 1997).

Based on the above research, the present study distinguished between surface-level and deep-level SSRM and empirically revealed three utterance functions: orientation, monitoring, and evaluation. We conducted an experiment in which participants discussed in pairs, through peer tutoring, a topic related to social development in educational psychology. Participants were teacher education students taking a course on educational psychology, which included “gang age” in late childhood. Gang age is a pre-adolescent developmental stage between approximately 7 and 11 years of age. In this period, the focus of children’s interest shifts from family to friends, and most children usually form intimate, closed groups that play together. Gang age can provide a good opportunity for children to experience interpersonal relationships and is a significant theme for teacher candidates to understand. This study aimed to find theoretical and practical implications through clarifying which regulation functions are key factors in teacher education students’ meaningful learning by peer tutoring. We hypothesized that high-SSRL tutors would show high levels of all three social regulation functions in actual discourse. After quantitative analysis, we aimed to provide specific and detailed clarification of discourses, focusing on utterance content.

1.3 Significant Role of Engagement as a Motivational Factor

The present study aimed to verify the SSRL processes of peer tutoring by focusing on one’s motivational factor. In SRL and SSRL research, motivational constructs are positioned as essential and important factors underlying the learning process (Hadwin et al., 2011, 2018; Panadero & Järvelä, 2015; Zimmerman & Schunk, 2001, 2011). Although there are various motivational factors, in this study we focused on engagement, which is deeply associated with the situational level of motivation (cf., Vallerand, 1997).

Students’ engagement during learning activities is an important educational construct (Christenson, Reschly, & Wylie, 2012). It is a motivational factor that strongly predicts academic achievement (Ladd & Dinella, 2009). Previous research (Fredricks, Blumenfeld, & Paris, 2004) characterized it as a three-component construct including behavioral (e.g., effort and persistence), emotional (e.g., interest and boredom), and cognitive (e.g., use of learning strategies) aspects.

Reeve and Tseng (2011) further proposed the concept of “agentic engagement.” It is the fourth aspect of engagement and is defined as students’ constructive contribution to the flow of the instruction they receive. For example, agentic students might offer a suggestion or express a preference during learning activities. Students’ agentic engagement provides constructive contributions to their learning and instruction.

We hypothesized that the engagement of high-level SSRL pairs would be stronger than low-level SSRL pairs. Until now, few studies have focused on agentic engagement; thus, the present study investigated all four aspects of engagement, including agentic engagement. We aimed to determine whether the four aspects of engagement of high-level SSRL pairs would be stronger than those of low-level SSRL pairs after peer tutoring practice.

1.4 The Current Study

First, we asked teacher education students to answer a self-report SSRL questionnaire and divided them into high- and low-SSRL groups, based on the results. Next, teacher candidates participated in peer tutoring on the theme of gang age. We analyzed different social regulation functions of tutors’ utterances in the actual situation of instruction and learning through peer tutoring and examined the differences of SSRM between high- and low-SSRL groups. Specifically, this study focused on the quantity and quality of tutors’ utterances in SSRM (i.e., deep- and surface-level orientation, monitoring, and evaluation).

We hypothesized that high-SSRL tutors would show deep levels of all three social regulation functions during the actual discourse. Further, as a result of verifying the motivational factor, we hypothesized that the engagement of high-level SSRL pairs would be stronger than low-level SSRL pairs. As a further qualitative analysis, we illustrated critical episodes including deep-level utterances and clarified the social regulation functions of each in the actual context of peer tutoring. Finally, the present study aimed to examine the implications for university-level teacher education to adequately enhance students’ regulation through peer tutoring.

2. Materials and Methods

2.1 Participants

Participants included 22 teacher-candidate students (17 women and 5 men) at a university of education. They were

randomly divided into 11 pairs. Their ages ranged from 19 to 22 years, with an average age of 20.27 years. After we explained there would be no disadvantages if they declined, we asked them to participate. Informed consent was obtained from all participants, and they participated in this study voluntarily. All data were processed and analyzed anonymously, and personal information was thoroughly protected.

2.2 Instruments

First, participants completed a questionnaire regarding SSRL. Following the survey, a peer tutoring intervention was conducted for 15 minutes. After peer tutoring, all participants completed a questionnaire regarding academic engagement.

2.2.1 Socially Shared Learning Strategy Scale

Ito (2015) developed a “Socially shared learning strategy scale,” which includes three subscales: “socially shared cognition,” “socially shared monitoring,” and “socially shared effort regulation.” These scales require participants to assess how often they engaged in socially shared learning during group work in their usual classes. Socially shared cognition consists of four items (e.g., “When we solve problems, we use our knowledge and information together”). Socially shared monitoring consists of four items (e.g., “When we solve problems, we monitor our thoughts and ideas together”). Socially shared effort regulation consists of five items (e.g., “We encourage each other and try to study hard”). The questionnaire was administered before peer tutoring, and items were rated on a 6-point scale: (1) strongly disagree, (2) disagree, (3) rather disagree, (4) rather agree, (5) disagree, and (6) strongly agree. Responses were scored based on this scale. The scale’s reliability was previously confirmed by Ito (2015). Internal consistency coefficients were as follows: socially shared cognition, Cronbach’s $\alpha = .72$; socially shared monitoring, $\alpha = .76$; and socially shared effort regulation, $\alpha = .78$, total items of subscales, $\alpha = .90$.

2.2.2 Items to Assess Academic Engagement

Reeve and Tseng (2011) developed questionnaire items to assess the four aspects of student engagement. We used one item for each of the four aspects of engagement (i.e., behavioral, cognitive, emotional, and agentic engagement), which were previously validated by Reeve and Tseng (2011). After peer tutoring, participants reflected on their own experiences and responded to four items, based on whether they had been the tutor or the tutee. Tutors responded to “I could concentrate on peer tutoring” (behavioral); “I could relate what I am learning to my experience” (cognitive); “I could feel interested” (emotional); and “I could offer suggestions” (agentic). Tutees responded to “I could concentrate on peer tutoring” (behavioral); “I could relate what I am learning to my experience” (cognitive); “I could feel interested” (emotional); and “I could express my opinions” (agentic). These items were rated on a 6-point scale: (1) strongly disagree, (2) disagree, (3) rather disagree, (4) rather agree, (5) disagree, and (6) strongly agree. Responses were scored based on this scale.

2.3 Procedure

The study was conducted in individual laboratories at the university. Peer tutoring consisted of two sessions, with the first session lasting approximately 5 minutes and the second session lasting approximately 10 minutes. Each student was chosen to be a tutor or tutee at random. To prepare themselves for their role, tutor students received guidance for 5 minutes before the first session. They read a brief explanation of the topic titled “Gang age and child development of their sociality.” Tutors were asked to encourage tutees to think deeply about the subject. Tutee students waited in another room for the first session.

During the second session, one student took the role of tutor, and another student took the role of the tutee. Through peer tutoring, each tutor instructed a tutee on ideas of educational psychology related to gang age. Assessment of students’ SSRM was based on verbal protocol analysis. All peer tutoring sessions were videotaped. The total recording time of all pairs was 110 minutes.

2.4 Coding

To analyze students’ verbal protocols, we adopted coding categories of social and metacognitive regulation (De Backer et al., 2012), including orientation, monitoring, and evaluation. Each category had two dimensions: surface-level and deep-level. Verbal protocols of all pairs were transcribed verbatim and coded by two coders. Each protocol was segmented according to changes in verbalization focus, which formed independent episodes (Chi, Siler, Jeong, Yamauchi, & Hausmann, 2001). The total number of segments was 235. The concordance rate of each category was calculated to determine inter-rater reliability, which was 94.47%. The categories of non-concordant segments were determined through discussion. The frequency at which each type of socially shared learning statement occurred was calculated, based on the number of segments in each protocol, per pair.

3. Results

3.1 Division of High- and Low-SSRL Groups

Total scores for all 13 items of the socially shared learning strategy scales were calculated for each participant ($n = 22$). Scores ranged from 13–78. The total mean score was 58.82, with a standard deviation (SD) of 5.37 ($Min = 51$, $Max = 71$). To divide participants into high- and low-SSRL groups, the three highest-scoring pairs and three lowest-scoring pairs were identified based on the maximum and minimum of the range. The mean score in the low-SSRL group ($n = 6$) was 54.17 ($SD = 2.11$). The mean score in the high-SSRL group ($n = 6$) was 63.50 ($SD = 5.32$). Significant differences in the high- and low-SSRL groups were analyzed using t -tests. The results showed significant differences ($t(6) = 3.65, p = .01$), with a large effect size (Cohen's $d = 2.31$).

3.2 Differences in Social Regulation Functions of Tutoring Utterances between Groups

The frequency of tutoring utterances was analyzed to clarify different social regulation functions, according to the three categories of orientation, monitoring, and evaluation. Based on the criteria of De Backer et al. (2012), we continued to analyze data while distinguishing between surface-level and deep-level functions.

First, a χ^2 test was conducted to investigate differences in the frequency of utterances regarding surface-level orientation function. The results did not show a significant difference ($\chi^2 = 0.03, df = 1, p = .85$). Next, a χ^2 test was conducted to investigate differences in the frequency of utterances regarding surface-level monitoring function. The results did not show a significant difference ($\chi^2 = 0.00, df = 1, p = 1.00$). Finally, a χ^2 test was conducted to investigate differences in the frequency of utterances regarding surface-level evaluation function. The result showed a marginally significant difference ($\chi^2 = 3.33, df = 1, p = .07$). Table 1 and Figure 1 show these results.

Table 1. Frequency of Tutoring Utterances in High- and Low-SSRL Groups at the Surface Level

Surface-level regulation	High-SSRL Group	Low-SSRL Group
	Freq.	Freq.
Orientation	15	14
Monitoring	4	4
Evaluation	20 [†]	10

Note. [†] $p < .10$

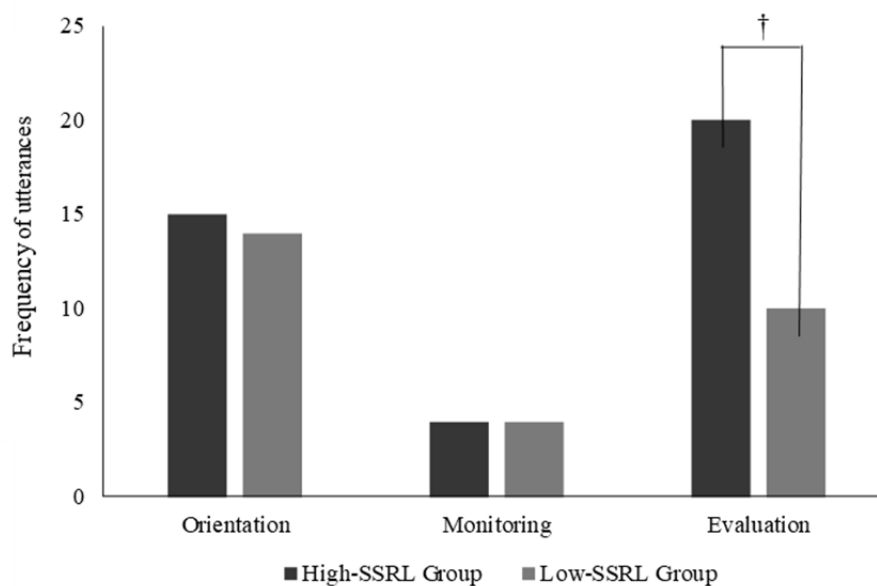


Figure 1. Frequency of Tutoring Utterances in High- and Low-SSRL Groups at the Surface Level

Subsequently, a χ^2 test was conducted to investigate differences in the frequency of utterances regarding deep-level orientation function. The results showed a significant difference ($\chi^2 = 4.48$, $df = 1$, $p = .03$). Next, a χ^2 test was conducted to investigate differences in the frequency of utterances regarding deep-level monitoring function. The results did not show a significant difference ($\chi^2 = 1.00$, $df = 1$, $p = .32$). Then, a χ^2 test was conducted to investigate differences in the frequency of utterances regarding deep-level evaluation function. The results did not show a significant difference ($\chi^2 = 1.14$, $df = 1$, $p = .29$). Table 2 and Figure 2 show these results.

Table 2. Frequency of Tutoring Utterances in High- and Low-SSRL Groups at the Deep Level

Deep-level regulation	High-SSRL group	Low-SSRL group
	Freq.	Freq.
Orientation	19*	8
Monitoring	3	1
Evaluation	9	5

Note. * $p < .05$.

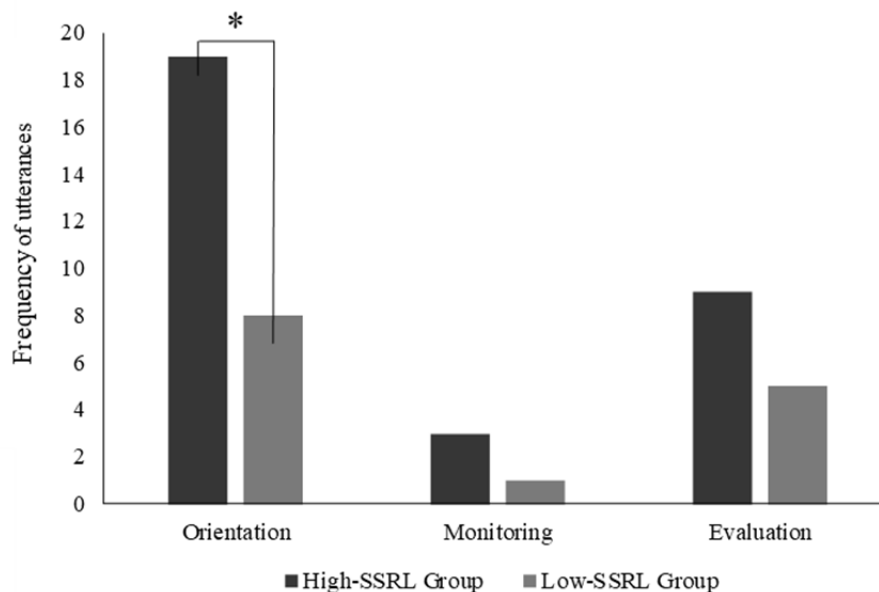


Figure 2. Frequency of Tutoring Utterances in High- and Low-SSRL Groups at the Deep Level

Tutors in high-SSRL pairs adopted deep-level orientation significantly more than low-SSRL pairs. Deep-level orientation is used to process task demands and activate prior knowledge (De Backer et al., 2012). In the situation used in the present study, in which tutors taught tutees about a construct of developmental psychology, deep-level orientation was the most important for regulatory utterances. Though the p -value was .07, tutors in the high-SSRL groups tended to adopt surface-level evaluations. Surface-level evaluations consist of checking and commenting on either learning outcomes or process factors (De Backer et al., 2012). Tutors in high-SSRL groups tended to frequently confirm tutees were able to adequately understand the construct.

3.3 Differences in Academic Engagement

To investigate academic engagement after peer tutoring, mean scores for the four types of engagement in the high- and low-SSRL groups were analyzed using t -tests. The results are shown in Table 3. Significant differences were confirmed for both cognitive and agentic engagement, and the effect sizes were large. The high-SSRL group showed higher cognitive and agentic engagement than the low-SSRL group.

Table 3. Results of *t*-Tests on Mean Scores of Four Aspects of Engagement Between High- and Low-SSRL Groups

Academic engagement	High-SSRL group		Low-SSRL group		<i>t</i> (<i>df</i>)	<i>p</i> -value	<i>Cohen's d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Behavioral	4.83	0.98	4.50	0.55	0.73(10)	.48	0.42
Cognitive	5.17	0.75	4.00	1.41	1.78(10)	.10	1.03
Emotional	5.17	1.33	4.83	0.75	0.53(10)	.60	0.31
Agentic	5.00	0.89	3.83	0.75	2.44(10)	.03	1.41

3.4 Interpretative Analysis of Peer Tutoring Utterances

Additionally, we interpretatively analyzed a typical episode, including critical content in the discourse. As a result of analyzing the social regulation functions of tutoring utterances between the high- and low-SSRL groups, we clarified that deep-level orientation had a significant role. As shown in Tables 4 and 5, we extracted the two episodes in which utterances of deep-level orientation occurred most successively. Table 4 presents the best episode, and Table 5 presents the second-best episode regarding the number of successive occurrences of deep-level orientation. We elaborate on an episode in Table 4 and provide a supplementary explanation with an episode in Table 5.

3.4.1 Description of the Scene in Table 4

Two female students (one tutor and one tutee) sat in front of each other and discussed the concept of gang age. During ten minutes of discourse, the utterance protocol was started one minute after the tutoring session began. They remembered their own childhoods and discussed the lives of children today, with discourse meant to deepen their thinking. The volume of their voices became louder, and each nodded repeatedly. An atmosphere of strong agreement could be observed. The tempo of their voices increased, and the discussion seemed to be arriving at the most important part.

3.4.2 Interpretative Analysis in Table 4

Next, we interpretatively analyzed the regulation of utterances in the tutor role (see Table 4). Segment 1 was the first utterance of deep-level orientation in the series. After this utterance, deep-level orientation continued successively. By adding explanations such as “other ethnic groups” and “like family” for the “we-ness” aspect of gang age, the tutor tried to concretely describe the topic and approach the demands of this task. Segment 3 was a surface-level evaluation. The tutor did not evaluate the learning outcome or process deeply. However, at the same time, this utterance affirmed the tutee’s understanding, based on her memory of her own childhood; thus, the tutor seemed to encourage this discourse. Segment 5 was also a surface-level evaluation; however, soon after that, deep-level orientation occurred. In Segment 6, the tutor stated gang age is an opportunity to acquire social and leadership skills. This utterance analyzed the task more deeply and more closely approached the demands. Then, the tutor referred to problems experienced by children today to activate the tutee’s knowledge through discourse. Further, by discussing a case they experienced during on-site teacher training and connecting it to their past experiences, the tutor oriented the tutee’s thinking.

Segment 8 was deep-level monitoring. The tutor repeated phrases used by children they met during previous on-site training. By doing so, the tutor provided more precise and concrete explanations to stimulate the tutee’s thoughts. Following the tutor’s utterance, the tutee’s utterance in Segment 9 was “they had ‘four’ after-school activities every week!” The tutee was able to recognize the problems of children today and attain a deeper understanding. In Segment 10, the tutor confirmed the issues children currently experience by asking, “What do you think of gang age?” In this utterance, the tutor presented the demands of this task once more, and the tutee repeated the same phrase while thinking about it further. In Segment 12, the tutor emphasized the characteristics of gang age again and asked what kinds of problems faced by children today were related to the topic. This oriented the tutee toward processing the task. Following this discourse, in Segment 13, the tutee showed awareness of the central issue of gang age itself, and widen her thinking to include deeper social problems in modern society. This referred to the difficulties of Japanese children today in constructing the social groups necessary during gang age because birth rates in Japan are declining. This utterance referred to “gang group loss theory,” which developmental psychologists continue to dispute. This episode could be interpreted as the tutor’s orientation utterances leading the tutee toward the core issue.

Table 4. Qualitative Analysis of Best Episode with Deep-Level Orientation

Segment No.	Tutoring role	Verbal protocol excerpt	Segment coding	Level
1	Tutor	It wasn't good to say, "Nonsense," though. It's like we-consciousness. That's related to only themselves. So, it seems like the same ethnic group. "Another peer group is a different ethnic group." It's like "All the world is only our outgroup." Speaking another way, they are like a kind of family, the second family...	Orientation	Deep
2	Tutee	It's "Family!"		
3	Tutor	Yeah, "Family!"	Evaluation	Surface
4	Tutee	Is that called "Fam" ¹ something?		
5	Tutor	Yes. Yes.	Evaluation	Surface
6	Tutor	It's something like that... Adolescent period... One of their friends becomes their best friend when they grow up. They learn various social skills from experiences with friends during this period. For example, how to take leadership, negotiate and solve their conflicts, and help each other when they get in trouble. Well, as it were, it's pretty precious and an important opportunity for children. That's "gang group." But recently, "nuclear families," or families without brothers and sisters, are increasing. Children are very busy because they have to go to cram school or after school activities. Students at ○○○ ² elementary school were really busy.	Orientation	Deep
7	Tutee	Extremely busy.		
8	Tutor	One child said "Today I have to go to English class after school."	Monitoring	Deep
9	Tutee	Yeah, they said "They had 'four' after school activities every week!"		
10	Tutor	That's right. The number of children playing outside has decreased, and they enjoy using smartphones and playing video games at home, more and more... There could be the possibility that opportunities to experience "gang age" become fewer than the past. Then, what do you think of "gang group?"	Orientation	Deep
11	Tutee	Did you say, "What do you think of gang group?"		
12	Tutor	Yes! It's very important, though... These groups are really close. One of its features is closeness. So, the number of children involved with gang groups become less and less...	Orientation	Deep
13	Tutee	Yeah, however, both after-school activities and playing outside are decreasing. These are not something related with gang group. How should I say... There are children who can't have groups of "gang age" to belong to. That's a big issue!		

Note. ¹"Fam" is an English abbreviation that some cohorts use in Japan. This pair had used this term to refer to "their own unique group which they belonged to in their childhood." It just means "gang group."

²○○○ is the name of a Japanese elementary school at which this pair had on-site training for teacher candidates.

3.4.3 Interpretative Analysis in Table 5

We illustrate one more critical supplementary episode in Table 5. This utterance was started soon after the tutoring session began. Segment 1 was the first utterance of surface-level orientation in the series, and after this utterance, surface-level orientation continued successively. The tutor asked the tutee directly if she knew about gang age. Segment 3 was an utterance of a surface-level evaluation. The tutor affirmed the tutee's understanding. This utterance seemed to have an enhancing effect on the tutee's motivation. Segments 6 and 8 were successive utterances of deep-level orientation, which activated and extracted the tutee's prior knowledge. After that, the tutor

provided a brief explanation of gang age (i.e., the following omission in Table 5). Segment 11 was an utterance of deep-level orientation, which tried to process task demands and approach the core issue.

Table 5. Qualitative Analysis of Second-Best Episode with Deep-Level Orientation

Segment No.	Tutoring role	Verbal protocol excerpt	Segment coding	Level
1	Tutor	Do you know what “gang age” is? We learned about this in a lecture at the university.	Orientation	Surface
2	Tutee	We already learned it, but I can’t remember it in detail.		
3	Tutor	Hahaha! Really? Have you heard of gang age?	Orientation	Surface
4	Tutee	Yeah. It is some period, isn’t it?		
5	Tutor	That is right!	Evaluation	Surface
6	Tutor	It’s elementary school, or junior high school? High school? Or kindergarten?	Orientation	Deep
7	Tutee	Elementary school!		
8	Tutor	Well, when is it during elementary school? Lower grade? Middle grade? Higher grade? ¹	Orientation	Deep
9	Tutee	Middle grade.		
10	Tutor	Yeah. Yeah. Yeah. Right! —— the following omission ——	Evaluation	Surface
11	Tutor	Yeah, although, what do you think this experience brings about?	Orientation	Deep

Note. ¹Lower grade means the first and second grades in Japanese elementary school. Middle grade is the third and fourth grades. Higher grade is the fifth and sixth grades.

4. Discussion

4.1 Analysis of the Social Regulation Functions of Utterances in Peer Tutoring

The high-SSRL groups showed a strong tendency to engage in SSRL during their usual learning activities. Our findings showed that tutors focused on deep-level orientation to promote tutees’ understanding through peer tutoring. Orientations support tutees’ learning, providing cognitive scaffolds and knowledge-building explanations (cf., De Backer et al., 2015a, 2015b). Particularly, the social-regulation function of deep-level orientation allows students to engage in task analysis and become acquainted with learning objectives or task demands and each other’s initial understanding (cf., Pintrich, 2004). This helps to increase their understanding both in the initial stage of the learning process and first phase of self-regulation, as shown in the present study through dialog analysis of peer tutoring. De Backer et al. (2012) implied that thought-provoking questions and explanations positively influence students’ awareness of the necessity of monitoring and controlling one’s understanding. Interpretative analysis of the episode shown in Table 4 implicated that thought-provoking orientation could promote a tutee’s understanding and thinking. Similarly, the episode shown in Table 5 implied that the tutor invited the tutee to engage in deeper reflective thinking.

However, the results of the present study indicated that deep-level monitoring and evaluation did not show any significant differences. Previous research by De Backer et al. (2012) indicated that long-term experience over a full semester manifested three regulation functions of orientation, monitoring, and evaluation. If peer tutoring sessions were for longer periods of time, it is possible it could be better clarified how deep-level monitoring and evaluation work. Through longer peer tutoring practice, the orientation would have brought about deeper monitoring, which would have subsequently led to deeper evaluation. When tutoring practice profoundly evolves with different deep-level regulation strategies, cyclic phases of the regulation (i.e., orientation, monitoring, and evaluation) become prominent (De Backer et al., 2015a, 2015b). When learning experiences become deeper, more socio-cognitive conflicts will occur because the tutor and tutee may begin to have diverse ideas and opinions. Mutual negotiations in peer tutoring will become more necessary, and these processes would bring about more deep-level monitoring and evaluation. Learning through profound reflection and reciprocal peer discussion is

called “higher-order learning” (cf., Rogat & Linnenbrink-Garcia, 2011; Volet, Summers, & Thurman, 2009). Future research should further elucidate how higher-order learning is constructed during peer tutoring.

Due to its implications for teacher education, peer tutoring as a teaching practice plays an important role in the acquisition of teaching skills (Tok, 2010). If peer tutoring sessions are introduced into a higher-education course for teacher candidates, course instructors should pay the utmost attention to the social regulation functions of tutoring utterances. Based on our results, deep-level orientation is the most significant phase of regulation. Instructors in teacher education should encourage tutors to ask critical questions and provide knowledge-building explanations, and assess their utterances to enhance reflective thinking in tutees. Additionally, surface-level evaluation is also important, especially in the initial phase of peer tutoring. Finally, long-term instruction and support would provide cyclic phases of regulation function (i.e., deep-level orientation, monitoring, and evaluation), which works effectively (cf., De Backer et al., 2015a, 2015b). Instructors should be mindful of these factors when designing teacher education programs and improving the quality and competency of teacher candidates.

4.2 Results of Analysis Regarding Academic Engagement

As shown in Table 3, each significant difference in cognitive and agentic engagement was confirmed, and the high-SSRL group showed higher cognitive and agentic aspects of academic engagement. As research on agentic engagement is in its early stages, there are few previous research findings on the topic. Thus, our findings could provide new evidence regarding the importance of agentic engagement in peer tutoring. Participants in high-SSRL groups were shown to have a sense of agency in peer tutoring and constructed their own knowledge and concepts. Additionally, our findings on cognitive engagement implied that these students were actively engaged in deepening their thinking and understanding. As seen in the qualitative analysis of tutoring utterances, both the tutor and tutee connected their past experiences to the theme, thus gaining a deeper understanding. The utterance protocol shown in Table 4 describes how the tutor and tutee expressed their own ideas and connected their own experiences through intensive discourse, indicating the deep understanding process necessary to become actively engaged in learning. These findings indicate teacher educators need to consider improving teacher candidates’ abilities to promote cognitive and agentic engagement of school students through peer tutoring experiences. Thus, peer tutoring practice in teacher education would connect acquiring teaching skills to motivating students in the classroom.

4.3 Limitations and Future Research Directions

Although this study adds valuable findings to emerging research on SSRL, some limitations should be acknowledged. First, the sample size was small, and the teacher candidates only attended one university; therefore, the findings should be generalized with caution. Second, this study lacked performance indicators, such as test scores, evaluations of essays, and measurements to assess comprehension and knowledge. Although previous research on corroborative learning showed how SSRL influenced performance (e.g., Malmberg, Järvelä, Järvenoja, & Panadero, 2015), our results could not clarify how SSRL through peer tutoring determined learning outcomes. Further research should examine and elaborate on the processes and functions of SSRL that lead to various learning outcomes by analyzing the influence on performance indicators. Third, peer tutoring discourse is generally influenced by characteristics of interpersonal relationships. For instance, intimate interpersonal relationships would be able to bring about good communication, thus having positive effects on socially shared regulation and academic engagement. In future research, quantitative and qualitative analysis, including more variables related to interpersonal relationships, should be adopted.

There will be a lot of directions for future research since the study of SSRL is still in its infancy. Particularly, there is little empirical research on the regulation processes of teacher candidates’ peer tutoring. In general, SSRL research has hypothesized that collaborative learning situations involve processes that allow members to regulate and share their own learning experiences. There are three modes of regulation: self-regulation, co-regulation, and socially shared regulation (Hadwin et al., 2011, 2018; Järvelä & Hadwin, 2013). Co-regulation of learning is the temporary coordination of self-regulation among oneself and others. Learners mediate regulation activities, such as planning, monitoring, evaluation, goal setting, and motivation. This is assumed to be a transitional process from self-regulation to socially shared regulation. A recent study indicated that co-regulation is an umbrella term; thus, it has different modes of regulation, such as other-regulation and directive-regulation (Schoor, Narciss, & Körndle, 2015). Although the present study can provide some insight into socially shared regulation in peer tutoring through quantitative and qualitative research methods, future research needs to further examine how each different regulation mode functions in peer tutoring practice for teaching students at universities.

Moreover, this study has implications for teacher education. If teacher educators introduce peer tutoring into their

teacher-training courses, they should emphasize deep-level orientation, especially during the initial learning stage. Peer tutoring is an efficient and controllable practice, which can be completed in a short time. It is highly convenient because it does not need to consider group membership as opposed to usual corroborative learning, which requires two or more people. Future teacher educators and researchers should examine methods for introducing peer tutoring into university-level courses in order to promote SSRL. Additionally, they could consider if they should introduce it into one unit or into a whole course. Further research on curriculum design that incorporates peer tutoring for teacher candidates in higher education will be required in the future.

Collaborative learning ability is a key competency for success in 21st-century society. Global educational research, such as Assessment and Teaching in 21st Century Skills (ATC21s), considers productive and efficient collaboration to be a necessary skill (Griffin et al., 2012). Higher education has placed increasing importance on introducing collaborative learning into university courses. Teacher candidates need to acquire 21st-century skills and become self-regulated learners who are able to appropriately regulate their learning partners. In this new era, teacher education curriculum needs to develop teacher candidates' teaching skills that can develop elementary and junior high school students' promising 21st century skills to live in a rapidly changing society.

Declarations

Funding

This work was supported by JSPS KAKENHI Grant Numbers 26380881, 17K04352.

Conflicts of Interest

The authors declare no conflicts of interest associated with this manuscript.

Acknowledgments

We would like to express our gratitude to all the university students who cooperated in our research.

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