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The effect of video-based tool approach on facilitating socioemotional regulation skills in CSCL environments

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Abstract: This study aimed to design, develop and evaluate a video-based tool to facilitate socioemotional regulation in Computer-Supported Collaborative Learning (CSCL) environments. Drawing upon the theoretical framework of socially shared regulation of learning, with a specific focus on socioemotional regulation, the study investigated the major socioemotional regulation components in challenging situations within CSCL. The research questions examined the socioemotional challenges that occur, how students implemented socioemotional regulation strategies during these challenges, and how the video-based tool facilitated the recognition of socioemotional challenges and the need for regulation. The study involved data from text and video activities collected from 40 students from one university in Iran during three phases of experimental session to assess their reasoning skills regarding components of socioemotional regulation in terms of regulating challenges in online environment. The study employed a mixed-methods approach, utilising rating-scaled items and qualitative data collection methods. The findings contributed to the understanding of effective strategies for supporting socioemotional regulation in CSCL, provide insights into students' awareness and regulation of socioemotional challenges, and inform the design of interventions and tools for promoting positive collaboration.

Keywords: CSCL; reasoning ability; regulated learning; socioemotional challenges; socioemotional strategies.

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Biographical notes: Tayebeh Sadegh is currently working in educational department of Fasa University of Medical Sciences with research interest in CSCL, regulated learning and feedback literacy.

1 Introduction

Prior research has demonstrated that collaborative learning can be advantageous to students' learning through high quality engagement, deeper conceptual understanding and knowledge (co-)construction (Cohen and Lotan, 2014; Sadegh, 2022; Sinha et al.,

2015). Collaborative learning provides opportunities for peer feedback and multiple viewpoints to reach a more complete understanding of the content. However, it's also been confirmed that collaborative learning and especially Computer-Supported Collaborative Learning (CSCL) can be challenging (Isohätälä et al., 2021; Järvelä et al., 2010). Challenges in collaborative learning can be related to a lack of interest to the task or to collaborative learning in general (Järvelä et al., 2008, 2010), different understandings of the task or content at the interpersonal level among group members (Khosa and Volet, 2014) or to the negative activating emotions or the lack of proper affective reaction within the group (i.e., feeling tired and tense) (Mänty et al., 2023; Zschocke et al., 2016). Prior research has evidence that in successful collaboration, group members need to recognise each other's cognitive, metacognitive, emotional and motivational challenges and support how to face them collectively (Bakhtiar et al., 2018; Isohätälä et al., 2020; Näykki et al., 2021). The process of recognising challenges and resolving them has been highlighted as a central part of socially shared regulation of learning (Bakhtiar and Hadwin, 2020; Hadwin et al., 2018; Järvelä and Hadwin, 2013). Näykki et al. (2014) shown that unresolved challenges in groups can hinder effective collaboration and therefore challenges need to be addressed and regulated (Järvenoja et al., 2015).

The core theoretical concept of this study is *socially shared regulation of learning*, focusing particularly on *socioemotional regulation* (Järvelä et al., 2023; Järvenoja and Järvelä, 2009; Näykki et al., 2014). Regulated learning refers to students' ability to negotiate task goals intentionally, to optimise task learning by strategically adapting tools and strategies, to monitor progress and just-in-time adaptive intervention, and to cope with different challenges (Schunk and Zimmerman, 1994; Winne and Hadwin, 1998; Zimmerman, 1989). Besides, encountering challenges or possibly even failures during collaborative learning, regulation means a process for optimising progress toward personal and/or collective goals and standards.

Regulated learning is an essential 21st century skill and improving the ways of supporting regulation skills individually and collaboratively is paramount (Miller and Hadwin, 2015; Silva et al., 2023). Hadwin et al. (2018) categorised five regulation skills needed for students to participate in effective collaboration situations: motivational, socioemotional, cognitive, metacognitive and environmental. Among regulation skills, socioemotional regulation is considered as crucial for respectful and cohesive collaboration and without that students may struggle to work together. Socioemotional regulation as crucial element for successful collaboration serves the purpose of addressing the emotions of the group members, resolving the group challenges, or sustaining group members' engagement in learning and group working. Specifically, socioemotional regulation reflects the ability to regulate positive or negative emotions in collaborative environment and to support positive interactions between group members in order to resolve group challenges (Näykki et al., 2021). Collaboration can bring about positive interactions and feelings of excitement (Järvelä et al., 2016; Volet et al., 2009), as well as negative emotions such as anger and boredom (Näykki et al., 2014; Rogat and Adams-Wiggins, 2015), all of which could potentially interfere with task completion (e.g., excitement about an off-task topic or boredom can lead to reduced attention for the task (Pekrun et al., 2002). Therefore, socioemotional regulation is important and requires special consideration in academic settings (Dang et al., 2024).

In addition, video-assisted authentic learning environments are improved in order to help students to facilitate shared understanding of the socioemotional challenges in the group and help learners to be aware of each other's feelings and thoughts to benefit negative challenges and activate regulation toward productive collaboration (Järvenoja et al., 2019; Lobczowski et al., 2021). Researchers argue that video-based simulations are realistic representations of actual practice, which can aid learners in developing their diagnostic skills even in collaborative learning environments (Ramos et al., 2022; Sommerhoff et al., 2023). Van Alten et al. (2020) reported that integrating SRL prompts within instructional videos alongside explicit SRL instruction notably improved learning outcomes in flipped classroom. For example, prompting students to rewind videos when they did not understand the content increased SRL activities. But in most of the prior studies, negative kinds of challenges were addressed by students or challenge regulation did not occur at group level. These kinds of issues can be explained by Järvelä et al. (2016) remarked that groups aren't always able to recognise their need for regulation. Thus, students need to be apprised of this need to avoid hindering groups' activation of strategic adaption (Rogat and Adams-Wiggins, 2015). Other scientific evidences also reveal that engaging in video-assisted activities results in significant changes and improvement in the learning skills (Santaga et al., 2021) and increase our understanding of 'how students think by video-recording teachers' lessons' (Richards et al., 2020, 2021). Among these, of specific interest are to build a pedagogical knowledge based on video-assisted CSCL environments as a support for regulating socioemotional challenges collaboratively. Accordingly, this study aimed to explore the potential of video-assisted CSCL environment for supporting students to efficiently regulate the socioemotional challenges in CSCL groups.

In sum, by integrating socioemotional regulation strategies into video-based simulations, learners can see the direct application of these skills in realistic scenarios. In fact, the visual and interactive nature of video simulations provides an authentic approximation of real-world practice, as highlighted by Sommerhoff et al. (2023). This not only aids in the understanding and development of socioemotional competencies but also reinforces the importance of reasoning and critical thinking. As students observe, analyse and discuss the socioemotional interactions depicted in the videos, they build a deeper understanding of how to apply these strategies in their own collaborative learning experiences.

2 Background

Isohätälä et al. (2017); Rogat and Adams-Wiggins, (2015) and Sharma et al. (2024) believed that positive socioemotional interaction provokes high quality collaborative learning and more adaptive group regulation. Adaptive group regulation may serve as a tool to learn how to regulate learning in the forthcoming encounters (Isohätälä et al., 2017). Järvenoja et al., (2019) categorised four socioemotional regulation strategies, including: increasing awareness, encouragement, social reinforcement and task structuring. Another categorisation of socioemotional regulation strategies by Lobczowski et al. (2021) placed the strategies into five themes of behavioural, interpersonal, cognitive, motivational and a combination of motivational and cognitive. On the other hand, for a long time, regulation has been seen as a skill that characterises high performer students (Hadwin and Winne, 2001; Rogat and Linnenbrink-Garcia,

2011). Thus, this question of whether initial regulation skills can be supported by specific intervention arises. Hadwin et al. (2018); Järvelä et al. (2016); Järvenoja et al. (2020a, 2020b); Molenaar et al. (2020) and Näykki et al. (2021) explored how socioemotional regulation skills can be enhanced with awareness tools, scripting and adaptive pedagogical tools. Järvenoja et al. (2020a, 2020b) succeeded to support regulative learning skills among participants by promoting their self-awareness skills via their designed regulation tool. They proposed that deep understanding of emotion and motivation regulation and supporting their processes are essential in productive collaboration. Following these attempts to support the regulation skills and increasing participants' awareness of regulation challenges toward productive collaboration, Näykki et al, (2021) leveraged macro-scripts to help students to express their actions and emotions and consequently increase awareness of each other's thoughts and feeling. This way even negative challenges leveraged toward shared task understating and task completion. Furthermore, Azevedo and Cromely (2004) demonstrated positive effect of training in applying SRL processes and developing mental models. But no general conclusion can be drawn about the improvement of regulation skills over period of time. Overall, up to now the research that investigates the role of facilitating socioemotional regulation in computer-supported collaborative learning and its effect on overcoming challenges in collaborative learning is scarce.

As mentioned earlier, individual and group regulation skills regarded as an essential 21st century skills and in the last decade, the concept of regulation has attracted more and more attention in CSCL environments (Järvelä et al., 2008, 2016; Malmberg et al., 2015). Regulation concept refers to student's ability to identify what is crucial activity within the complex CSCL environment, and then make a connection between the identified events and their strategy repertoire by reasoning about what is the best activity in the environment. As a matter of fact, reasoning is one of the main aspects in education. Reasoning is composed of three subskills of description, explanation and predication that refers to different levels of cognitive processes (Berliner, 2001) and can be easily differentiated in students (Seidel and Stürmer, 2014). Description refers to the necessary skill to distinguish between socioemotional regulation components (e.g., stating that students are struggling to be aware of each other's feeling). Explanation illustrate students' skill in linking the observed challenge with appropriate strategy to overcome it. Prediction reflects student's ability to predict the consequences of challenge situation in terms of students learning. For instance, student by referring to their knowledge about socioemotional challenge strategies like encouragement and its' effect on student's motivation predict the possible consequences of enacting this strategy.

Thus, the main aim of the present study was to develop ways of facilitating socioemotional regulation in computer-supported collaborative learning. This was done by designing a video-assisted CSCL environment implemented in online text-based and video-conferencing environment to assess the conditions that are required to promote regulation skills and collaboration. In this regard, the focus was also on utilising the reasoning ability of regulated learning, and its' three aspects including, description, explanation and prediction (Van Es and Sherin, 2008).

Correspondingly, the overall aim was to design, develop and evaluate video-assisted CSCL environment to facilitate socioemotional regulation in computer-supported collaborative learning. The research questions are:

1) To what extent does the video-assisted CSCL environments affect students in groups implementing socioemotional regulation strategies during socio-emotional challenges?
2) To what extent does the video-assisted CSCL environments affect students' ability to respond the challenges with different levels of reasoning skills in video-assisted CSCL groups?

3 Methods

3.1 Participants and context

This study employed a mixed-methods approach to investigate the facilitation of socioemotional regulation in computer-supported collaborative learning. The participants were 40 master students ($N = 40$; 31 females and 9 males; 23–26-years-old) from one of the Universities in Iran majoring educational sciences who were invited to participate in synchronous online text-based and video-conferencing individual and collaborative tasks. They were assigned to ten mixed-gender groups of four.

The experimental session was consisted of three phases. First, students attended an introduction phase to get familiar with components of socioemotional regulation. Then, they were asked to fill out Social Emotional Competence Questionnaire (SECQ) developed by Zhou and Ee (2012) to acquire declarative knowledge about their socioemotional skills. The reliability and validity of this 25-item self-reporting scale was supported by many researchers. The Cronbach's alpha for the 25-item SECQ in this study is 0.86. Students were assigned into groups based on their score in this phase as high, medium and low skilled to make sure their proficiency in socioemotional were controlled in video-assisted CSCL groups and CSCL groups based on this scale. Precisely, in group clustering, we made sure that students with a diversity in their socioemotional skills were assigned into different groups. After that, five out of the ten groups, each consisting of four members, were assigned to a video course (the video-assisted CSCL group) to learn about the socioemotional challenges students face during collaborative work and the socioemotional strategies they use. This group also assessed reasoning skills related to socioemotional regulation. The remaining five groups were assigned to a control group that immediately began their collaborative task. The experimental condition (video-assisted CSCL groups) differed from the control group (CSCL groups) only with respect to the presence of video-clips that were implemented in the online environment before starting the collaborative tasks (see Table 1). The collaborative tasks were creating a lesson plan for teaching regulated learning to bachelor students majoring educational sciences. The course design consisted of eight weeks 1.5 hour online collaborative learning phase (text-based and video-conferencing) to set forth their ideas in the groups and to create the plan collaboratively. Since the course was part of the master studies it took eight weeks 1.5 hour to fulfil the requirement of university curriculum.

Table 1 Overview of the procedure of experimental condition

Phase		*Video-assisted CSCL group*	*CSCL group*
1)	Introduction phase	×	×
2)	Assessment of personal socioemotional skills (Social Emotional Competence Questionnaire)	×	×
3)	Individual task (familiarising with socioemotional challenges and strategies and assessing the reasoning skills through video clips)	×	–
4)	Collaborative learning task (online text-based and video-conferencing discussions)	×	×

Video assessment in video-assisted CSCL groups involved students in watching video clips individually and identifying or interpreting socioemotional challenge situations or regulating those challenges (Jamil et al., 2015; Kersting et al., 2010; Mathers, 2021). This enables assessment, not just of what participants know, but of the knowledge they are able to access, activate and use in a classroom situation – their 'useable knowledge' (Kersting et al., 2012). After this individual task, video-assisted CSCL groups attended the collaborative main task to measure the effect of training sessions in authentic challenge situation in CSCL environment among students.

3.2 Data collection and analysis

The data were collected from collaborative online chat and video discussions in university online environment consisted of log files, including traces from individual students' activities and students' collaborative chat discussions recorded by available online learning environments and verbal and non-verbal activities during video conferencing. Collaborative chat discussions helped to identify when and how challenges occurred and responded. In other words, the log files were assessed to determine what kinds of socioemotional regulation challenges occurred and responded among students. These activities, consisted of regulation strategies utilised by each student to regulate the socioemotional challenges, were coded through qualitative content analysis technique. Moreover, students were asked to attend the video-conferencing class for at least 3 sessions. However, some groups attended video-meeting class more than 3 sessions. These video-conferencing sessions were performed to assess the non-verbal activities of students.

In this respect, reasoning ability was assessed qualitatively by open questions in video-assisted CSCL environment with regard to knowledge about socioemotional regulation skills. The criteria for video-selection was to classify them based on socioemotional regulation skills. Each 4 to 6-minute clip depicted three socioemotional challenges and three socioemotional strategies. Participants were shown 6 out of 12 available clips, which served as item prompts. The students' abilities to describe, explain, and predict relevant classroom interactions and outcomes were measured by six items per ability (18 items per component and 36 items per clip). These video clips, along with their ratings, were embedded into a collaborative online environment where students first watched a clip. It is noteworthy that students could watch the clips again before rating the items. These responses were compared with experts' answers and recoded into 0= miss expert rating and 1= hit expert rating.

The analysis of data was conducted in two phases. The first phase was qualitative analysis where we scored students' qualitative data collected through regulating challenges in both video-assisted CSCL groups and CSCL groups based on the coding scheme (see Tables 2 and 3). For coding the socioemotional challenges, Lobczowski et al. (2021) used in order to assess how students responded verbally and non-verbally (e.g., facial expression, body language, voice tone) to these challenges in the socioemotional interaction (see Table 2). For coding socioemotional regulation strategies, all the text-based and video-conferencing activities were coded. The unit of the analysis was the emergence of regulation in response to the socioemotional challenges, such as, disengaging, encouragement, task structuring and … (see Table 3) (Järvenoja et. al., 2019; Lobczowski et. al., 2021). In this way, with the help of Lobczowski et al. (2021) coding procedure, a codebook of the key elements of socioemotional regulation strategies in groups were developed. We also had the willingness to extend our codebook if any extra emotions had been discovered in our data, but no extra emotions appeared. Our coding protocol was based on a meaningful episode (Järvelä et al., 2016), which is defined as a regulation emerging from an emotional experience. Accordingly, we developed a codebook that captured the key elements of socioemotional regulation in groups, including regulation strategies.

Table 2 Coding scheme for positive and negative socioemotional challenges

Variables/positive and negative socioemotional challenges	*Definition*
Excitement/enjoyment	Expressing enthusiasm in an activity
	Expressing delight or contentment
Humour	Expressing good-natured joking, showing amusement, laughing
Confidence	Expressing sureness of success, referring to past performance
Hopefulness/optimism	Expressing hopefulness of success, referring to future performance
Relief	Being glad that something negative turned out positive
Lack of interest and energy	Expressing no enthusiasm for the task
Boredom	Expressing signs of disengagement
Annoyance/frustration/anger	Expressing great dissatisfaction
Disappointment/sadness	Expressing mild dissatisfaction
Dread/worry/anxiety	Expressing concern or nervousness for future events
Embarrassment/shame	Judging failure as caused by oneself
Hopelessness	A certainty of failure or undesirable outcomes
Shock/surprise	A startled response due to an unforeseen event
Stress	Expressing concern about past/present events

Table 3 Coding scheme for students' socioemotional regulation strategies

Socioemotional regulation strategies	*Definition*
Increasing awareness	Addressing and dealing with the emotional state and negative feelings of group members
Social reinforcement	Creating a supportive emotional atmosphere by emphasising the positives of the difficult situation, such as recognising the efforts of other members and expressing remorse.
Disengaging	Being isolated, giving space, letting go
Seeking help	Asking for support, searching for approval, talking with dear ones, using a buffer
Showing empathy	Soothing, inspiring people, offering to assist, highlighting qualities, offering assurance, acknowledging distress, expressing compassion, confirming others
Using humour	Joking, making fun of oneself, telling funny story
Venting/ complaining	Sympathising, detailing the grievances of others, expressing discontent
Addressing understanding	Correcting misunderstanding, seeking facts, explaining
Adopting a new tactic	Staying away, changing the subject, offering advice, exploring a different approach
Reframing	It's not so bad; normalising, creating a view, justifying, reevaluating
Looking ahead	Delegating to future self, concentrating on the future, keep progressing, making a plan, planning to celebrate
Restructuring task	Breaking down the problem, Prioritising, Procrastinating, Setting manageable expectations
Promoting collaboration	Positive gestures such as smile
Using harsh language	Insulting or dismissive language
Overruling	undermining others' opinions and expertise, Rushing the other

Two coders coded the verbal and non-verbal socioemotional regulation situations and applied strategies by students. Cohen's Kappa was utilised to assess the reliability of the coding which showed a reliable agreement between the coders for both socioemotional regulation (0.67) and socioemotional strategies (0.71). While these values do not indicate very high agreement, they are within the acceptable range for exploratory research in complex social science contexts.

In the second phase, quantitative analysis was adopted. In this phase, first descriptive statistics were performed to report mean and standard deviation for the variables. To answer the research questions, one-way ANOVA was used to compare the conditions in term of students' quality of socioemotional regulation strategies implementation. Following Järvenoja et al.'s (2020a) studies, socioemotional episodes refers to statements about motivation and emotions connected to individuals, a group of individuals, task components, progress, or output. For instance, the start of a challenge episode is indicated by statements that resulted in the rise of emotional issues or similar dilemmas (e.g., difficulty in task understanding with low excitement), and the termination of a challenge episode is manifested by statements that led to the dissolving of a challenge or changing the conversions. Then, we investigated how these challenges were responded by other groupmates, whether socioemotional strategies were emerged or not. To be

more precise, the episodes were coded based on the codebook for challenges and strategies to assess whether they met the criteria for the code or not (see Tables 2 and 3).

The language of the task was Persian and in order to take into account the ethical requirements, the data was pseudonymised in all groups.

3.3 Instruments

To measure the socioemotional competence of the students, the study employed the Social Emotional Competence Questionnaire (SECQ) formulated by Zhou and Ee (2012). This questionnaire was selected due to its applicability across multiple languages and settings, and the students were asked to reply to 25 questions measured on a five-point Likert scale.

Our assumption was that although this questionnaire is expected to provide useful information on the participants' ability to support the socioemotional regulation, it does not cover all aspects of the participants' abilities and their learning during their program, since it only measures the participants' general tendency towards emotional. For this purpose, in the video-assisted CSCL groups, an open-ended questionnaire was embedded after each video-clip to supplement the general questionnaire. This questionnaire investigates how the participants interpret real interactions in terms of emotions, emotional regulation and emotion regulation support and help us to gain more information regarding students' skills compared to ordinary questionnaires (Mänty et al., 2022). Therefore, the data obtained from this questionnaire could be deemed sensitive for examining intra-individual distinctions in the transformation of their socioemotional skills.

The developed video tool inspired from the works of Seidel et al. (2010) included short through-clips (approximately 6 min each) and rating-scaled items (refer to the skills of description, explanation and prediction of the situation in the clips). These were used to assess participants' reasoning skills with regard to their knowledge of the socioemotional regulation components. The responses were analysed on a 4-point Likert scale (1=disagree to 4=agree) and were compared with a criterion norm using expert judgments. Based on the obtained score in three subskills of reasoning ability, we categorised the students to high, medium and low in reasoning ability whom scoring high in prediction, explanation and description, respectively. In designing these video clips, supportive socioemotional regulation strategies which were supposed to be beneficial for learning of regulating socioemotional challenges based on Näykki et al. (2021) and Kurki et al. (2016) were utilised such as helping students communicating issues, broadening students' understanding of socioemotional challenges and deal with them, strategies of calming and soothing. In the video clips, students faced socioemotional challenges, and received different types of support from fellow group members. However, some challenges were left unaddressed and unresolved.

Rating items examples (here we refer to Järvenoja et al., 2019 and Lobczowski et al., 2021) socioemotional regulation strategies:

1st component: increasing awareness of group members' emotional states and creating opportunities to regulate

In the video that you saw:

Description:

- *student X asks whether the other students were annoyed or frustrated*
- *student X provokes other students to express their emotions*
- *student X emphasises the importance of expressing the feeling*

Explanation:

- *the students have this chance to express their emotions*
- *the students notice the importance of feeling expression*
- *the students have the opportunity to work collaboratively eliminate or decrease the reason of the negative feeling*

Prediction:

- *the students will be able to overcome the socioemotional challenge by regulating the emotion*
- *the students will be able to get familiar with socioemotional challenges and how to regulate them*
- *the students will be able to advantage the socioemotional challenges by joint effort*

2nd component: encouragement (showing empathy)

Description:

- *student Y spurs other students on by stating that they can get through this task*
- *student Y supports the weak students to understand the task*
- *student Y is really helpful*

Explanation:

- *the students feel they can be supported by high achiever students rather than ignored*
- *the students feel valued by receiving support from other students*
- *the students aren't afraid of expressing their feelings and viewpoints*

Prediction:

- *the students will feel motivated*
- *the students feel engaged during the task*
- *the students will eagerly engage in collaborative activities in the future*

Results for RQ1: This section presents findings for the effects of video-assisted CSCL environment on enacting students' socioemotional regulation strategies. The results showed a significant difference between the video-assisted CSCL groups and CSCL groups in terms of enacting socioemotional regulation strategies in challenging situations, F=52.71, $p < 0.01$, $\eta^2 = 0.40$. Specifically, the mean score for students in the control groups (M = 15. 61, SD = 6.14) was significantly lower than students in the video-assisted CSCL groups (M = 20.24, SD = 6.34). Table 4 shows the students' mean and standard deviation scores for quality of enacting socioemotional regulation strategies in both conditions.

Table 4 Students' mean scores for enacting socioemotional regulation strategies

	Groups				
	Video-assisted CSCL groups		*CSCL groups*		*Differences in enacting socioemotional regulation strategies*
Socioemotional regulation strategies	*Mean*	*SD*	*Mean*	*SD*	
Increasing awareness	1.70	0.33	0.78	0.39	F=0.98, p<0.05*
Social reinforcement	1.71	0.41	0.83	0.54	F=4.68, p<0.01**
Disengaging	1.21	0.47	1.72	0.48	F=1.24, p=0.28
Seeking help	1.60	0.55	1.09	0.25	F=2.86, p<0.05*
Showing empathy	1.81	0.39	0.89	0.35	F=5/01, p<0.01**
Using humour	1.40	0.49	1.55	0.50	F=0.73, p=0.39
Venting/ complaining	0.92	0.61	1.53	0.51	F=0.96, p<0.05*
Addressing understanding	1.57	0.52	0.92	0.62	F=6.36, p<0.05*
Adopting a new tactic	1.33	0.46	0.87	0.34	F=9.02, p<0.01**
Reframing	0.87	0.37	1.02	0.15	F=5.49, p<0.05*
Looking ahead	1.25	0.50	0.85	0.36	F=7.52, p<0.01**
Restructuring task	1.72	0.42	0.86	0.33	F=5.71, p<0.05*
Promoting collaboration	2.25	0.30	0.71	0.24	F=11.01, p<0.01**
Using harsh language	0.40	0.22	0.98	0.47	F=0.98, p<0.05*
overruling	0.50	0.30	1.01	0.61	F=9.72, p<0.05*
Total	20.24	6.34	15.61	6.14	F=52.71, p<0.01

Results for RQ2: In order to answer the second research question, the video-assisted CSCL groups were analysed. The students in this environment demonstrated no significant differences with respect to regulating both positive and negative challenges as a whole, F=0.45, p>0.2, just accuracy and depth of regulation showed slight differences.

Based on strategies enacted by each group members, the findings conveyed that all students with different levels of reasoning ability (scored from the video-clips analysis) succeeded in enacting appropriate socioemotional strategies and regulating both positive and negative challenges (see Table 5 and Table 6), just accuracy and depth of regulation showed slight differences.

Table 5 Qualitative description of students with different reasoning ability

Socioemotional regulation strategies	*Students with high reasoning ability*		*Students with medium reasoning ability*		*Students with low reasoning ability*	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
Increasing awareness	0.68	0.08	0.62	0.14	0.40	0.11
Social reinforcement	0.63	0.17	0.53	0.10	0.54	0.19
Disengaging	0.33	0.14	0.39	0.16	0.49	0.18
Seeking help	0.51	0.15	0.54	0.10	0.55	0.29
Showing empathy	0.80	0.13	0.51	0.9	0.49	0.17
Using humour	0.43	0.19	0.49	0.17	0.47	0.13
Venting/ complaining	0.19	0.12	0.20	0.23	0.53	0.26
Addressing understanding	0.55	0.16	0.60	0.15	0.42	0.21
Adopting a new tactic	0.54	0.15	0.46	0.16	0.30	0.14
Reframing	0.33	0.10	0.41	0.11	0.13	0.16
Looking ahead	0.32	0.18	0.42	0.19	0.51	0.13
Restructuring task	0.69	0.14	0.56	0.13	0.47	0.15
Promoting collaboration	0.77	0.09	0.73	0.12	0.75	0.09
Using harsh language	0.10	0.06	0.13	0.9	0.17	0.07
Overruling	0.15	0.08	0.14	0.10	0.21	0.12
Total	7.02	1.94	6.73	3.66	6.43	2.4

Table 6 One-way ANOVA results for video-assisted CSCL groups

Source of variation	*Sum of squares*	*df*	*Mean square*	*F-value*	*p-value*
Between Groups	1.772	2	0.886	0.45	>0.20
Within Groups	82.32	42	1.96		
Total	84.092	44			

4 Results and discussion

Fostering beneficial socioemotional regulation strategies can enhance students' ability to identify appropriate socioemotional expressions when confronted with hindering affects (Salo et al., 2022). Additionally, the learning program has emphasised that students have limited capacity to use various socioemotional regulation strategies and possess a narrower perspective on understanding emotionally complex situations or identifying their own and others' emotions (Cole et al., 2009; Dang et al., 2024; Kurki, 2017; Richard et al., 2020; Ruba and Pollack, 2020). This underscores the importance of supporting the development of students' skills and perspectives in emotionally triggering situations.

Regarding first research question, Borko et al. (2008) stated that video-clips offer the benefit of allowing students to observe classroom interactions without needing to participate directly. Our findings for the first research question confirmed this statement, revealing that the quality of enacting socioemotional regulation strategies was higher in

all video-assisted CSCL groups who attended the video-courses compared to control groups. This suggests that the video-assisted CSCL environment enabled students to implement effective socioemotional regulation strategies for upcoming socioemotional challenges in the group, thereby improving their regulation quality. This improvement was significant for all on-task elements of the socioemotional regulation strategies in the video-assisted CSCL groups (e.g., restructuring task, adopting a new tactic and addressing understanding). In fact, negative and off-task challenges were reported less frequently in the video-assisted CSCL groups than in the control groups, implying that informing students about the different perceptions held by the group, i.e., through a video-assisted CSCL environment, can prevent emotional disputes and effectively address any issues that arise (Järvenoja and Järvelä, 2009; Kazemitabar et al., 2023, 2024; Zheng et al., 2023).

In that sense, our results align with prior studies confirming the impact of training regulation skills via hypermedia (Azevedo and Cromley, 2004; Jansen et al., 2020; Sommerhoff et al., 2023; Van Alten et al., 2020). The primary focus of utilising simulations in learning is to give learners the opportunity to practice analysing and diagnosing scenarios that closely resemble those they encounter in their professional lives (Chernikova et al., 2022). Thus, through video clips as a tool, students can develop their regulation and strategy enactment skills by recognising the adverse effects of certain emotions on work quality. This recognition can help them to enhance their reasoning about the need for regulation in authentic learning situations, guiding them to be more dynamic in their learning (Jansen et al., 2020; Min and Nasir, 2020). Acknowledging this, students in video-assisted CSCL groups, by referring to their knowledge about socioemotional challenge strategies like encouragement and its effect on motivation, were able to predict the possible consequences of enacting the strategy. In contrast, control group members who failed to encourage each other experienced decreased motivation, leading to withdrawal from learning activities.

The findings also indicated that students in video-assisted CSCL groups enacted socioemotional regulation strategies such as establishing supportive learning environment by showing empathy, encouragement and praising each other. They also promoted self/co awareness and reflection through brain-storming solutions, negotiating differences to overcome socioemotional challenges and obstacles. These strategies fostered a sense of shared responsibility, collective problem solving, better understating of their own emotional states, better recognition of the time others are experiencing difficulty or distress and better collaborative interactions. Moreover, developing empathy and perspective-taking skills helped foster supportive and collaborative interactions within the group. Since perspective-taking involves understanding the reasons behind another person's actions, students who scored higher in prediction utilised this strategy more efficiently. This helped them engage in social conversations in a friendly manner and generate more innovative ideas in complex tasks (Grant and Berry, 2011). In fact, encouraging words, acknowledging effort and offering assistance helped individuals navigate challenging situations and maintain motivation.

Regarding control groups, the majority of students barely engaged in regulating socioemotional challenges. This lack of engagement appears to be related to a deficiency in knowledge about how to transfer individual priorities to collaborative priorities, consistent with prior findings by Järvenoja and Järvelä's (2009). As conveyed in Table 2 and qualitative content analysis, the most commonly used strategies were disengagement such as expressing a lack of interest and frustration, and using humour, followed by

complaining and seeking help. Notably, the seeking help strategy often manifested as asking for answers rather than genuine assistance. In some cases, this excessive seeking of help irritated other group members, particularly those with low reasoning ability, causing them to lose patience. However, this situation prompted groupmates with high reasoning ability to develop adaptive socioemotional strategies. Initially, groupmates provided help, but as the constant desire for assistance persisted, they adapted their behaviour by setting manageable expectations. Observations in groups where seeking help was prevalent indicated that members who scored high in reasoning ability on the SECQ questionnaire rarely exhibited social loafing and were primarily devoted to collaborative group work. This suggests that students in these groups shared a common understanding of the task and collaboration.

Moreover, as we mentioned earlier, regulation concept refers to student's ability to identify what is crucial activity within the complex CSCL environment, and then make a connection between the identified events and their strategy repertoire by reasoning about what is the best activity in the environment. As a matter of fact, reasoning is one of the main aspects in education. Dewey (1965) believed if people know what to look for and how to interpret the situation, they can be categorised as experts. Experts' well-organised cognitive structure allows them to identify the challenges and by reasoning about the situation apply the appropriate strategy in the task. Results of second research question demonstrated that, despite the video-based course helped students to develop their regulation and strategy enactment skills by recognising the adverse effect of some emotions on work quality in the authentic learning situations, not all students fully regulated socio-emotional challenges. These findings aligns with Oshima et al. (2018) that can be referred to the level of reasoning skills of students. Since prediction is the highest level of reasoning ability, it was confirmed that students who showed higher prediction score were more helpful in regulating challenges by enacting more suitable socioemotional strategies collaboratively. In contrast, students lacking proficiency in prediction skills tended to choose strategies individually to address upcoming socio-emotional issues.

Although students with low-level in reasoning ability were aware of the existence of socioemotional challenges and the need for regulation, they did not respond the challenges in a timely and accurate manner. For instance, in group 6 consisted of one high and 3 low level students in reasoning ability, the high-level student expressed optimism about their progress 'Now it's time to move forward to our next plan'. In response, one of students suddenly started to make fun of the other groupmates 'Hey, do you remember when we planned to gather contents for the task, you did not know how to search the relevant sources and mention the references. You really slow down the work. I hope our next step doesn't confuse you again.' This statement created a chaos and wasted a significant amount of the group's time. In this example, it's evident that positive statement by one of the groupmates lead to a negative socioemotional challenge, which took time to regulate the issue and return to on-task activities. Moreover, this group mostly ignored the positive socioemotional challenges and when attempting to resolve these challenges, they became more involved in off-task activities and almost forgot the upcoming challenge.

Students with medium ability in reasoning demonstrated more diverse challenges. For instance, in group 2, which included two medium-level and two low-level students in reasoning ability, when one of low-level students expressed frustration, the two medium level students dealt with the issue differently. One utilised looking ahead strategy and

presented an interesting idea to make the work more interesting, while the other medium-level student started to complain, saying, 'we haven't done anything yet to make you upset and bored. We still have long way ahead and with these enthusiasm, we will lead to nowhere.' In contrast, students with high level of reasoning ability succeeded to regulate both positive and negative socioemotional challenges timely and accurately.

However, an interesting finding was observed among students proficient only in descriptive skills. Although these students couldn't explain or predict the situation in the clips, their performance in overcoming the negative challenges within the groups improved tremendously. For example, in group 1, when one of the medium-level students expressed anxiety about falling terribly behind schedule compared to other groups, a low-level student referred to the quality of work and stated that good job takes time. Frijda (2005) and Järvenoja and Järvelä (2009) illustrated that exposure to a particular situation can enhance the performance every time you encounter the same situation. Correspondingly, students in the video-assisted CSCL groups, who experienced an authentic situation with socioemotional challenges, performed better than students with the same score from SECQ questionnaire in the control groups that did not receive any training.

Overall, the most featured characteristics of these students were recognising the need for regulation, sharing responsibilities for regulation, and sharing manageable expectations with slighter differences in depth and types of strategies. It was also revealed that students who scored higher in predicting initiate regulation activities with students with higher scores in explanation contributed them in enacting regulation strategies.

5 Conclusions, limitations, and suggestions for future research

This study was conducted to investigate the impacts of video-assisted CSCL environment and the role of students' reasoning ability in regulating socioemotional challenges. The findings demonstrated that a video-assisted CSCL environment can be beneficial in enacting effective socioemotional regulation strategies for the upcoming socioemotional challenges in the group. The implementation of such regulation strategies improved students' overall regulation quality. On the other hand, as pointed out by Törmänen et al. (2021), intra-individual differences can cause diverse socioemotional regulation activities. Accordingly, not all students might benefit the same support in the same way (Strauß and Rummel, 2021). Therefore, by comparing the reasoning ability of students during video-based courses and their collaborative activities, this study attempted to address the complex interactions between socioemotional challenges and regulation at both individual and group levels, exploring the differing socioemotional state among students.

Several limitations can be addressed in future research. First, analysing the extent to which learners identify relevant case information (description skills) can help identify individual prerequisites for this skill. The same procedure should be applied to explanation skills (e.g., linking socio-emotional challenge components with the challenge situation) and prediction skills (predicting the consequences of observed situations in terms of productive collaboration). By recognising these prerequisites, researchers can identify the conditions and materials that may enhance student performance.

Another limitation is the lack of investigation into the effect of different level of reasoning ability on types of regulation (self-, other-, shared-regulation). It would be interesting to determine whether having high reasoning ability leads to specific modes of regulation. Additionally, we also did not assess students' satisfaction with the collaborative task. In the control groups, although the groups completed the task, but not all of them did it collaboratively and in the preferred format we expected. We can define this situation as 'collaborative isolation' where goals and tasks are achieved successfully without collaboration and challenges regulated based solely on each individuals' own perspective. Therefore, it is important to assess whether students enjoy these kinds of activities or not.

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