



Nascimento Pineli Ana Luiza

“CSCL in social media: how learners demonstrate Socially Shared Regulations of Learning?”

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CSCL in social media: how learners demonstrate Socially Shared Regulations of Learning? (Ana Luiza Nascimento Pineli)

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### Abstract

This research has the purpose to identify how the international higher education students regulate their learning in group level in a CSCL course held in 2015 through Facebook group page. CSCL is one of the latest practices in distance education that supports knowledge co-construction. To achieve productive discussions in collaborative tasks, students must regulate their learning, having a script or guidelines that also stimulates learners to reflect and construct better outcomes (Kirschner & Erkens, 2013). No studies analyse the use of social media as the principal tool for collaborative learning activities and associates them to the SSRL method were found. The participants are 12 international higher education students, who were randomly divided into three different Facebook group pages, with the objective of responding to questions accordingly with the scripts provided. This research is an explanatory case study, in which results revealed that it is possible to demonstrate SSRL in social media, and suggest that SSRL strategies have heterogeneous effects on how learners constructed new knowledge and behaved on the social media in a CSCL course. Future educational researchers should design more effective scripts that are necessary for students to progress and accomplish tasks successfully that achieve new knowledge, predicting all aspects of deviation from the objectives of the task.

*Keywords:* Facebook, distance education, on-line learning environment, script.

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### **1. CSCL in social media: how learners demonstrate socially shared regulations of learning?**

Technology has been used more and more in education in various forms, either to enhance learning through technological tools or a form to provide distance education. Nowadays, technology has been widely used as a provider for distance education, due to the fact of a pandemic situation with COVID-19, where people are being advised to be physically isolated around the globe with the purpose of slowing down the speed with which the virus spreads. The lockdown situation occurred all over the world, obligating learners to study at home since schools and universities have been closed, independently of age or educational level, hence the only way for continuing curricula is through on-line environments. Although it is a terrible situation, the positive side is that the world will gain a lot with distance education, which in students can actually learn if they make enough efforts to regulate themselves into learning supported by technological tools, and having both teachers' and colleagues' support and guidance.

Technology has been largely used among different aged learners to support knowledge co-construction. One of the latest practices of using technology in educational environments for higher education is through computer supported collaborative learning (CSCL), where learners can discuss tasks, share and construct new knowledge in various ways, such as text-based forms or even with video-calls meetings. Independently of the format, it is essential that technological and interactive tools be provided, so students can exchange knowledge and have productive discussions.

To achieve productive discussions in collaborative tasks, students must regulate their learning, either through regulating themselves using strategies to learn better, helping a peer to understand the task, conducting a better learning or negotiating goals, sharing responsibilities,

and adapting strategies to motivate group members to achieve the learning objectives (Järvelä & Hadwin, 2013). Thereunto, having a script or guidelines also stimulates learners to reflect and construct better outcomes (Kirschner & Erkens, 2013), which the lack of them might provoke shallow discussions, unequal participation of the group members in the task, and inferior results (Malmberg, Järvelä, & Järvenoja, 2017).

Previous research has focused on studying methods of scripting and guidelines that enhance learning processes in technological environments (Clark, Sampson, Weinberger, & Erkens, 2007; Weinberger & Fischer, 2006), or tried to understand better strategies of regulating learning through technological tools (Järvelä et al., 2016). Nonetheless, there are not many studies surrounding the use of social media as a tool for distance education, especially for collaborative learning activities, and associating them to the socially shared regulations of learning (SSRL) method.

Another interesting perspective is that many students that are having their master's degree nowadays are already digital natives and spend eight hours per day on their mobile devices at least (Gatignol, 2016). According to Alice Gatignol (2016, p. 504), “social media is classified as a participative web which contains interactive and iterative content and involves action and reaction simultaneously”, meaning that the process of collaborative learning can be facilitated when individuals are reading and responding on others’ post or comments in various ways of digital communication such as text and audio messages, videos from other platforms (e.g., YouTube), and memes and gifs, for example. In that sense, learning in social media can act as an agent, connect people and their ideas, taking communication and collaboration to a different level (Gatignol, 2016).

In a learning context, on-line environments enable students to interact and exchange ideas, enriching practices in higher education to an asynchronous structure, in which individuals can create, modify, transmit and share information. In addition, learning in on-line environments is preparing students for a competitive future, and to enter the workforce, due to the fact that they will achieve and embrace social interaction, technology and information literacy, critical thinking, communication and collaboration, that is all the required abilities of the 21<sup>st</sup> Century skills (Gatignol, 2016).

For the present study, a range of academic articles from 2016 with peer review has been searched in digital databases, with the following keywords combined: CSCL (computer supported collaborative learning); SSRL (socially shared regulations of learning), and "social media" (between quotation), resulting in only four papers. Chaker and Impedovo (2021) investigated the relationship between regulations of learning, social interactions, and learning in a Massive Open On-line Courses (MOOCs) context. Their results suggest that regulations of learning strategies have heterogeneous effects on MOOC final score when combined with social capital, which co-regulated strategies affects more positively in comparison with Self-Regulated Learning (SRL) or SSRL. Lim, Shelley, & Heo (2019) sought how learners construct new knowledge and behaved using mobile instant messages applications as an interactive tool to learn and share processes, and found that social media stimulates and improves learning experiences when interaction is well designed. In this sense, Häkkinen et al. (2017) have presented their pedagogical design in another study that improves teachers' efficiency for the 21<sup>st</sup> Century skills, which integrates learning competences, collaborative problem-solving skills and the ability to use Information and Communication Technologies (ICT). On the other hand, Järvelä et al. (2016) concentrated on how SSRL contributes positively in CSCL, and which tools, prompts,

and scaffolds are needed and are indicated for collaborative learning processes. However, social media was merely mentioned as a supporting tool to engage learners on tasks.

These findings indicate an expansive gap of research in analysing how students demonstrate SSRL in CSCL held through social media to achieve effectively new knowledge. Therefore, researchers have an enormous opportunity to discover how social media can be efficaciously used in distance learning, and what type of guidance is needed to assist and encourage both teachers and students to use free social platforms that are massively used to enhance learning.

## **2. Theoretical framework**

This study has the purpose to identify how the international higher education students regulate group members' learning through the lenses of SSRL theory in a CSCL course held in 2015 in a social media (Facebook group page).

### **2.1 Social media in supporting learning**

Various studies had shown some positive evidence for the use of social media as an additional learning tool in collaborative activities or face-to-face classes. The studies indicated that the use of social media can provide deeper and effective communication and collaborative skills (Stathopoulou, Siamagka, & Christodoulides, 2019) due to the fact that is an on-line environment that learners are comfortable and familiar with (Hong & Gardner, 2018). However, it is extremely important for teachers to scaffold, to guide and to support learning in addition to have better learning outcomes (Barrot, 2018; Matzat & Vrieling, 2016; Voivonta & Avraamidou, 2018), increasing the interest and motivation of students to perform more wisely in an on-line setting (Dabbagh & Kitsantas, 2012).

## **2.2 Collaboration vs. Collaborative Learning vs. CSCL**

Collaboration involves group members being engaged to share understanding and goals with the objective to solve a problem together working synchronously in the activity through interaction: the more they equally share information and make efforts, the more successful they will achieve the goal (Dillenbourg, Baker, & Malley, 1995; Järvelä et al., 2015).

Collaborative learning is usually described as a process that promotes various types of interaction between learners “that lead to significant advancement of shared ideas to solve learning problems” (Gutiérrez-Braojos, Montejo-Gamez, Marin-Jimenez, & Campaña, 2019, p. 412), while teachers’ role is to facilitate the process (Chen, Wang, Kirschner, & Tsai, 2018). Two examples of collaborative learning processes that increases the possibility of gain new knowledge and have greater learning outcomes are described next on this paper according to Beers, Boshuizen, Kirschner, & Gijsselaers (2005), and Vuopala, Näykki, Isohätälä, & Järvelä (2019).

According to Beers et al. (2005), to achieve new knowledge, learners will pass through four main phases: (1) externalization, where group members present their ideas, share opinions and show some prior knowledge about the content; (2) internalization, where group members can explain and share to others their point of view, which might change their prior knowledge; (3) negotiation, where group members give arguments and discuss all perspectives; and (4) integration, where group members combine different perspectives to achieve new knowledge.

Additionally, Vuopala et al. (2019) focused on outcomes of the problem solving, in which learners must have four essential skills to accomplish the task: Self-Regulated Learning, including keeping motivated and regulating emotions; Coordination, which involves being aware and control actions to work as a group; Communication, meaning the active listening to the



other's point of view, providing feedbacks that analyses, and suggests ways of development of the thinking; Argumentation, that is, to hear, to compare, and to compel different points of view using abundantly empathy, that is to put oneself in another's perspective; and Theoretical knowledge that supports oneself understanding of the subject.

Finally, CSCL is also a process of knowledge co-construction, however supported by ICT, which is a more challenging environment due to the fact that students take active control of learning and interaction, and involves multiple elements (Chen et al., 2018), not excluding the fact that guidance and scaffold along with well-based design courses are needed, not only to accomplish the collaborative task and have victorious learning results, but to maintain high levels of motivation, quality of interactions, and performance of learners (Järvelä et al., 2016).

CSCL is being implemented in all levels of education, especially because students can be geographically apart from each other. Nevertheless, it does not guarantee that learners will work effectively together, unless pedagogical tools support them, meaning that some type of script or guidelines is needed to follow instructions correctly, which motivate teams to engage in the task. Thus, it is fundamental that students have some knowledge about regulating learning to achieve greater outcomes (Kirschner & Erkens, 2013).

### **2.3 Regulations of Learning (SRL, Co-RL, SSRL)**

Whenever there are or there are no guidelines to follow, how are students regulating group learning in on-line settings, specifically through collaborative tasks? In general, regulation of learning occurs in three main phases: orientation, execution, and evaluation, and in an "I", "You" and "We" perspectives, named respectively as Self-Regulated Learning (SRL), Co-Regulated Learning (CoRL) and Socially Shared Regulations of Learning (SSRL). SSRL is a theory where

“group members work together to complement and negotiate shared perceptions and goals for the task” (Malmberg et al., 2017, p.162).

According to Hadwin, Järvelä, & Miller (2015), regulation of learning happens in three forms, where individuals, peers or group members take metacognitive control of cognitive, behavioural, motivational and emotional conditions/states through iterative processes of planning, monitoring, evaluation and adaptation, to achieve the following learning goals: (1) Self-Regulated Learning (SRL), an individual process; (2) Co-Regulation of Learning (CoRL), where peers regulate each other; and (3) Socially Shared Regulation of Learning (SSRL) where group members regulate themselves and each other's. All of them can happen in a collaborative task at the same time, depending on if it is an individual, peer or group perspective towards the common learning goal.

This study will focus on socially shared regulation of learning, which is more complex than the other two theories, since it involves more than one learner, where each one of those carries unique traits and characteristics. During this metacognitive process, individual learners accordingly act towards monitoring and evaluating as a group to reach a negotiated adaptation. In addition, group members equally strive for collective agency, where they effectively communicate their emotions, perceptions, motivation and goals, prior to starting to work on the task. This enables learners to monitor and evaluate as a group while they are working towards the completion of their learning goals. Hence, they are all equally able to monitor and to evaluate the group progress. Finally, individual and collective beliefs and experiences inside and outside of the group interact with the learners, forming and being formed by joint task engagement. This factor makes the co-construction of knowledge even more challenging, whereas learners are asked to regulate their learning within the group characteristics as well as the surroundings of the learning environment (Kirschner & Erkens, 2013).

## **2.4 Communication in social media**

Another important factor that this paper must clarify is the use of emojis in writing upon Facebook group pages (collected data) to reinforce one's state of mind, such as positive or negative emotions, opinions, judgment or attitude (Danesi, 2016). According to Danesi, M. (2016), emoji is a Japanese word for "picture-word" (*e* for picture and *moji* for letter, character) and can be connected to a "new kind of universal internet language", which can correspond in graphic punctuation or throughout figures for facial expressions that is usually used in face-to-face meetings and highlight one's perspective and decrease ambiguities.

## **3. The aim of the study and the research questions**

The aim of this study is to investigate how group members demonstrate forms of Socially Shared Regulation of Learning (SSRL) theory in a Computer Supported Collaborative Learning (CSCL) course held in a social media (Facebook group page). The reasons that author have chosen this type of approach are (1) there are little written peer review articles relating CSCL with SSRL in social media as shown before in this paper, and (2) this analysis shall contribute with the evolution of regulations of learning through on-line environments.

Specific research questions are:








1. How did the groups achieve a mutual understanding of the task and common goal?
2. How did group members plan, monitor, and adapt strategies while performing a task in an on-line environment?
3. How did learners adapt and evaluate their work?

## **4. Research design, methods and analysis**

#### 4.1 Context and participants

The participants of this research are 12 international higher education students (7 female and 5 male) that took an on-line course named Computer Supported Collaborative Learning (CSCL) provided by the University of Oulu (Finland) in 2015. Eight of the students (66.7%) are from University of Saarland, one (25%) is from University of Turku, and three of the learners (8.3%) are from the University of Oulu. Learners were randomly divided into three different Facebook group pages. The CSCL course had three main tasks: the first one had an argumentative script; the second one had a non-argumentative script; the third one had no external script. In the first and second tasks, students had to play one of the four roles (captain, contributor, critic, and composer), which author will appropriately describe later in this paper.

#### 4.2 Data collection

Data was collected through an on-line course held in a Facebook group page named Computer Supported Collaborative Learning (CSCL) in 2015, provided by the University of Oulu. Students discussed and shared knowledge through writing, and shared images and videos, using features of the tool to describe feelings (the current examples of reactions are: like , love , care , haha , wow , sad , and angry ) or using other emojis or memes/images to express emotions.

Groups were randomly formed, and members were from different universities, such as University of Oulu (Finland), University of Turku (Finland), and Saarland University (Germany), and the language used for written communication was English. Ten Facebook group pages were formed and each one of them had four to six members. The participants were involved in a collaborative task in three phases: (1<sup>st</sup> task) they started the task with roles and

argumentation script; (2<sup>nd</sup> task) they had roles, however non-argumentation script; and (3<sup>rd</sup> task) they did not have any external script nor played any roles. Each task had a specific subject: (1) Scripting, (2) Motivation and Emotions, and (3) Metacognition. Each group member had to play one of the four roles in the first and second tasks: (1) captain (motivates the group members' participation), (2) contributor (identifies and elaborates pro-arguments), (3) critic (identifies and elaborates counterarguments), and (4) composer (constructs a synthesis of the pro- and counter-arguments).

After reading all 10 groups on Facebook group pages which were part of the CSCL course, the chosen groups for the analysis were numbers four, eight and nine, due to the fact they demonstrated more deeper and richer discussions, higher number of discussion notes, compared to other groups.

This research is an explanatory case study, using both quantitative and qualitative methods approach. An explanatory case study is an observation of real-life experiences which provides examples for future researchers to understand a correspondent phenomena (Cohen, Manion, & Morrison, 2020), testing SSRL theory behind in this paper. A quantitative review will be provided to show who the participants are (gender and location), using IBM<sup>®</sup> SPSS<sup>®</sup> software version 26, and a qualitative analysis to describe a phenomena, using lag sequencing on nVivo software version 1.4 to recognize SSRL processes in three mainly phases: (1) orientation (sub phases: task understanding and setting goals); (2) execution (sub phases: monitoring strategies, discussion about the articles, behaviour/emotions); (3) evaluation (sub phases: adaptation and evaluation). That is, connecting findings with the Cyclical Phases Model (Zimmerman & Moylan, 2009), independently of the task or role played by the participants.

The entire process for collecting and analysing data involved nine steps as Figure 01 presents below:

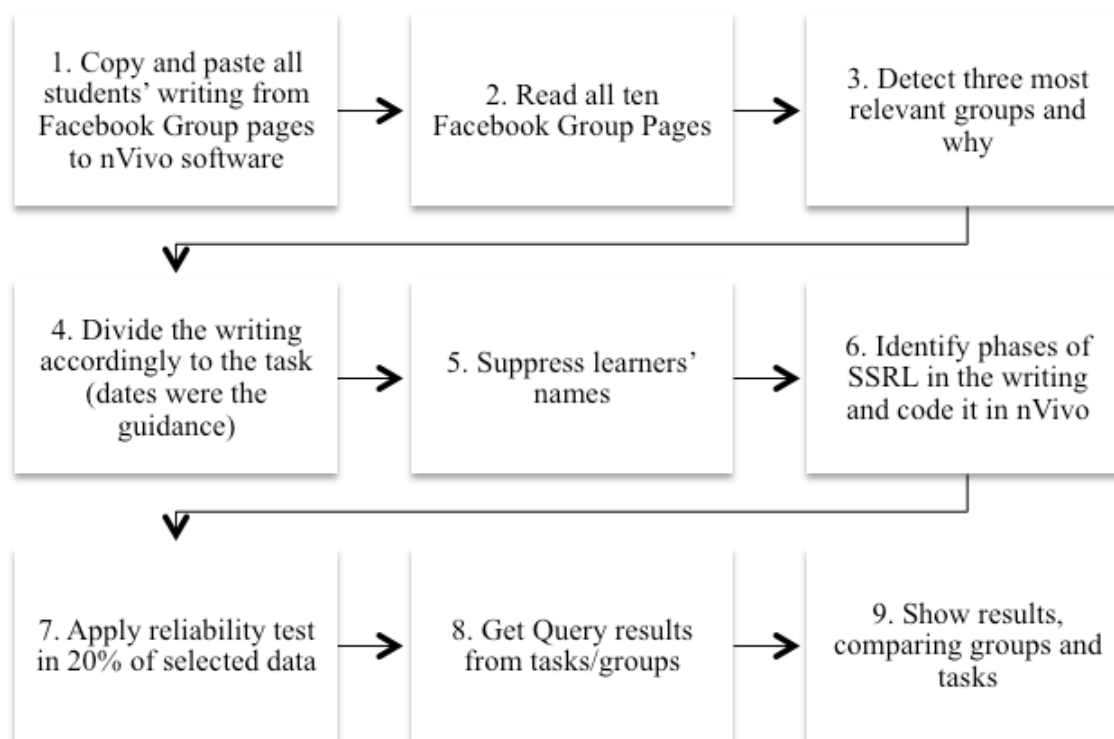


Figure 01: Steps of collecting and analysing data.

### 4.3 Coding schemes

Coding schemes were elaborated by the author, inspired by Zimmerman and Moylan's Cyclical Phase Model (2009) cited before in this paper. Main categories are Orientation, Execution and Evaluation, and coding criteria were defined according to what was relevant in the writing on Facebook group pages.

Category	Subcategory	Coding criteria	Indicators	Example
Orientation	Task	Discussing how	Agreement	"...do you think
	understanding	group members		if we can discuss
		understood the		and agree some

Category	Subcategory	Coding criteria	Indicators	Example
		task		<i>general rules</i>
				<i>before starting</i>
				<i>actual</i>
				<i>assignments?”</i>
	Setting goals	Scheduling	Timing	<i>“I appreciate</i>
		deadlines	(tomorrow)	<i>that you will</i>
				<i>share with us</i>
				<i>your counter-</i>
				<i>arguments</i>
				<i>tomorrow.”</i>
		Suggesting how	Way of doing	<i>“What if we</i>
		to discuss the		<i>start...?”</i>
		content		
		Intentions on	Action verbs	<i>“I will now take</i>
		how to	followed by	<i>time to</i>
		participate on	what type of	<i>concentrate...”</i>
		discussion	plan	
<b>Execution</b>	Discussion about	Writing/	Quotations/Citati	<i>“According</i>
	articles	summing up or	ons/ Cognition	<i>to...”</i>
		making		
		references to		
		articles or videos		

Category	Subcategory	Coding criteria suggested in the course according to their role	Indicators	Example
	Monitoring strategies	Describing about how to use time properly	Time-management	<i>"Hence it is necessary that we use our time wisely."</i>
		Showing understanding of the articles	Metacognition/ Expressing opinion	<i>"In my view..."</i>
	Behaviour/ Emotions	Starting conversation with affection or respect for others or express gratitude	Being polite	<i>"thank you for your response"</i>
		Demonstrating preoccupation about another member	Showing empathy	<i>"I do understand that you must be overloaded with other courses"</i>
		Using characters	Emojis/Memes	<i>":)"</i>



Category	Subcategory	Coding criteria	Indicators	Example	
		or figures to express feelings	Using	Laughing	<i>“Hahaha”</i>
		onomatopoeia to express feelings	Writing what are their own	Describing feelings	<i>“I was surprised”</i>
<b>Evaluation</b>	Evaluation	emotions Summing up or analysing what other’ wrote (synthesis of discussion)	Evaluating their task		<i>“Conclusion is...”</i>
	Adaptation	Claiming other perspectives on how to do or analyse the articles	Adapting knowledge		<i>“I would add...”</i>

Table 01: Coding scheme.

#### 4.4 Data analysis

The CSCL course was divided into three main tasks, which students had played roles (captain, contributor, critic, and composer) in first task supported by argumentation script; second task had

non-argumentation script with learners playing the same roles; and third task had non external scripts nor played roles (Figure 02).

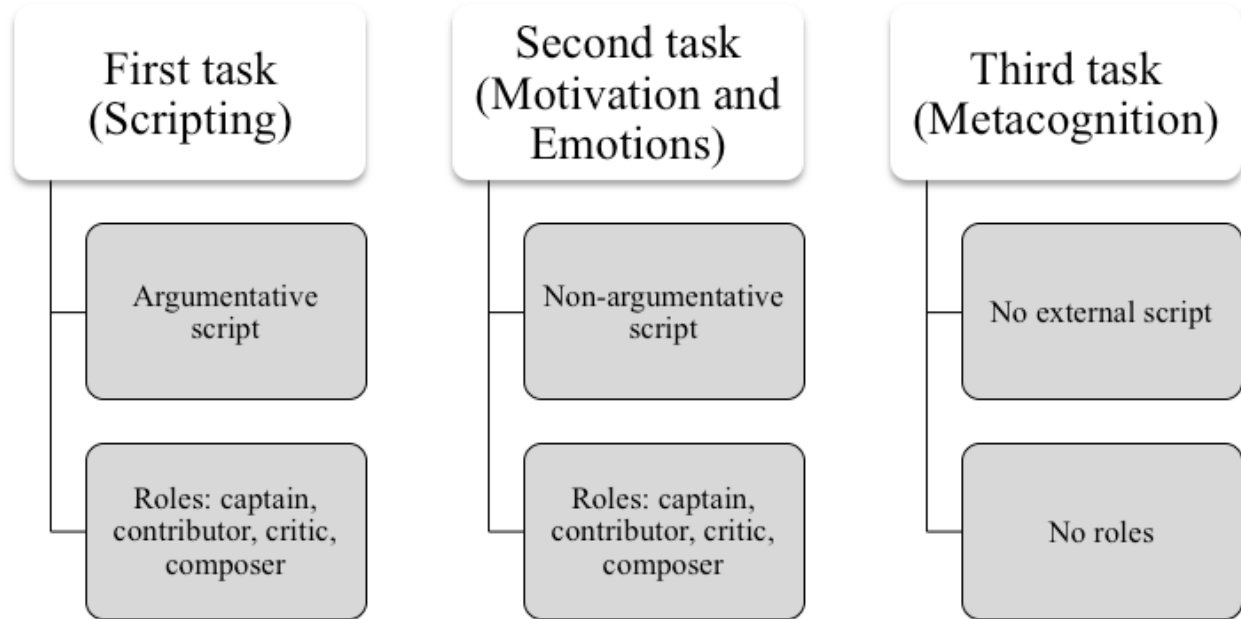


Figure 02: CSCL course guidelines.

Any interaction between learners and tutors or professors of the course was suppressed from the analysis, as well as any reactions on posts and comments from the teachers.

## 5. Results

In general, results revealed that learners demonstrated SSRL in a CSCL course held in social media, especially when students had scripting guidance and roles to play while performing in a collaborative task held in an on-line environment.

Table 02 shows results of seven stated coding schemes: orientation (A. Setting goals and B. Task understanding); execution (C. Behaviour-Emotions, D. Discussion about articles, and E. Monitoring strategies); and evaluation (F. Adaptation and G. Evaluation).

	<b>A: Setting goals</b>	<b>B: Task understanding</b>	<b>C: Behaviour- emotions</b>	<b>D: Discussion about articles</b>	<b>E: Monitoring strategies</b>	<b>F: Adaptation</b>	<b>G: Evaluation</b>
1: Group 4 – task 1	11	10	45	42	81	16	42
2: Group 4 – task 2	2	7	37	11	54	15	11
3: Group 4 – task 3	7	4	13	3	11	0	1
4: Group 8 – task 1	9	13	30	2	50	0	0
5: Group 8 – task 2	6	14	53	14	51	3	13
6: Group 8 – task 3	3	3	16	9	51	0	2
7: Group 9 – task 1	16	12	44	14	78	0	1
8: Group 9 – task 2	3	2	25	7	32	0	4
9: Group 9 – task 3	3	2	16	2	17	0	4

Table 02: How students demonstrate SSRL phases in each task of CSCL course in terms of discussion notes.

### **5.1 RQ1: How did the groups achieve a mutual understanding of the task and common goal?**

In the orientation phase, the first task—which is supported by argumentation script—presented the highest frequencies in terms of discussion notes, followed by tasks number two and three consequently, as shown in Table 03.

Results show that students of group nine dedicated more writing to setting goals and understanding the task in the first activity, in comparison with other tasks and groups. However, group nine also presented lower values in the same issues for tasks number two and three.

	Group 4		Group 8		Group 9	
	A:	B:	A:	B:	A:	B:
<b>Task 1</b>	11	10	9	13	16	12
<b>Task 2</b>	2	7	6	14	3	2
<b>Task 3</b>	7	4	3	3	3	2

Table 03: Frequencies in terms of discussion notes in the orientation phase | A: Setting goals; B:

Task understanding

Figure 03 presents below a comparison between groups and tasks on setting goals, in which results have heterogeneous percentages.

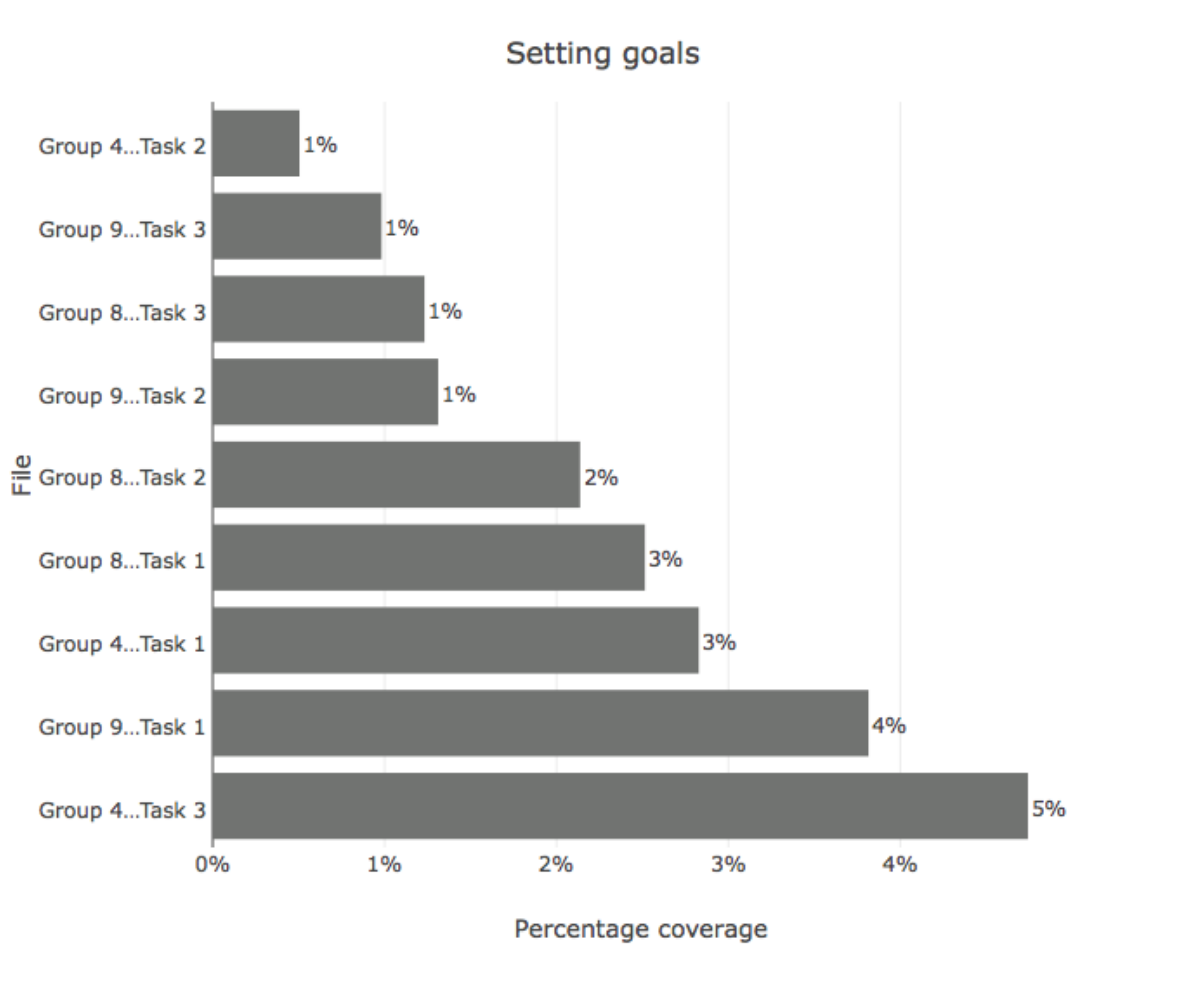


Figure 03: Comparing tasks and groups percentages on setting goals.

Figure 04 presents below a comparison between groups and tasks on task understanding, in which results have heterogeneous percentages.

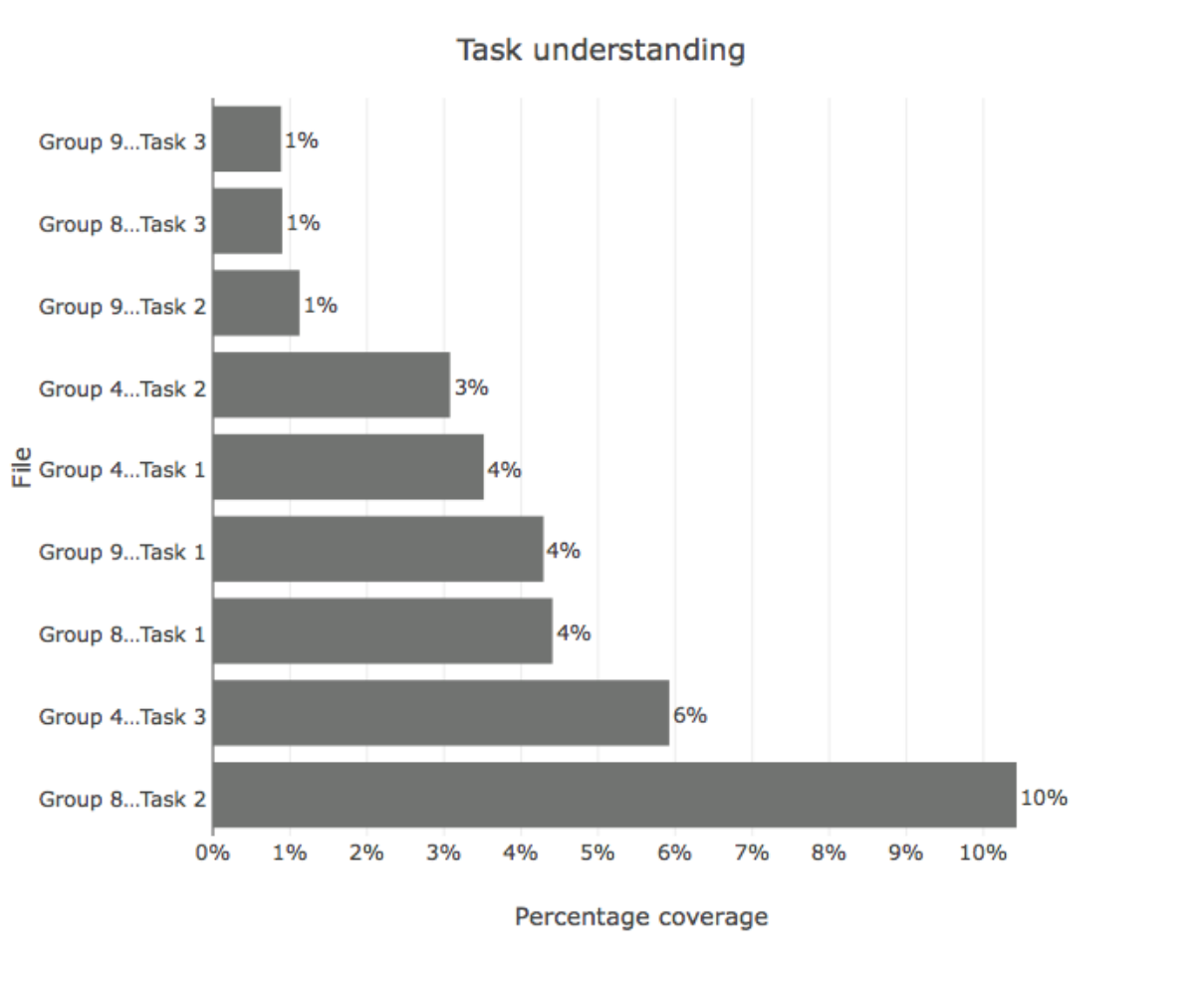


Figure 04: Comparing tasks and groups percentages on task understanding.

Table 04 is an example of how group nine members set goals in the first activity, in which students established deadlines to read all content from the course regarding the questions asked, set dates to discuss the proposal articles and videos, and agreed on how many questions they should start to answer. Other groups defined the same strategies to begin the discussion.

Group 9 members' number	Wrote on Facebook	Coded as
2	Comment <i>"Have we all finished with the preparation phase of reading and going through the material or do we need a little bit more time before starting the discussions? :)"</i>	Orientation > Setting goals
	Comment <i>"Radica I've finished reading one of the first core reading materials and started the second one. Hopefully, including the videos, I will be able to cover them till tomorrow evening. Two questions per week sounds plausible."</i>	Orientation > Setting goals
2	Comment <i>"Great, then let's all maybe try to finish them by Wednesday and then start discussing :)"</i>	Orientation > Setting goals

Table 04: How group nine members set goals in the first task. Highlight texts in grey are evidence for setting goals.

Next, Table 05 is an example of how group nine members understood the task in the first activity. Member number 5 elaborated an online Google Document for all members to start discussing in this platform. However, member number 3 informed that it was mandatory to discuss in the Facebook group page, and member number 5 comprehend the message, regulating their group member.

Group 9 members' number	Wrote on Facebook	Coded as
5	<p>Comment</p> <p><i>"Guys! I am in, lets start also with the questions 3 and 4. I create a google doc, so we can start discussing</i></p> <p><i><a href="https://docs.google.com/.../1FGb0ZswLezyntkPo0Xy.../edit...">https://docs.google.com/.../1FGb0ZswLezyntkPo0Xy.../edit...</a></i></p>	<p>Orientation &gt; Task</p> <p>understanding</p>
3	<p>Comment</p> <p><i>"I think it is mandatory to discuss in Facebook itself. See</i></p> <p><i><a href="https://www.facebook.com/.../permalink/191158794551187/">https://www.facebook.com/.../permalink/191158794551187/.</a></i></p>	<p>Orientation &gt; Task</p> <p>understanding</p>
5	<p>Comment</p> <p><i>"Ahh okay but I think its easier in order to classify the answers because if we start discussing here is going to be a little bit messy. Nonetheless, if we have to discuss here, there is any problem! So let's do it!"</i></p>	<p>Orientation &gt; Task</p> <p>understanding</p>

Table 05: How group nine members understood the activity in the first task. Highlight texts in grey are evidence for understanding task.

The numbers representing second and third tasks in the orientation phase dropped down in all participant groups. Regarding task number 2, group eight presented the highest frequency in task

understanding of the orientation phase, in contrast with other groups, as presented previously in Table 03. The discussion on Table 06 shortly represents the agreement on how members of group eight should post their arguments according to their roles. Thus, member number 5 had a question regarding on how the roles had to be played; in the same main post, member number 3 commented that he/she is concerned on how the questions must be posted in the Facebook group page—if in a different or in the same post—, which member number 4 highlighted that it wouldn't matter whereas everyone being on the same track.

<b>Group 8 members' number</b>	<b>Wrote on Facebook</b>	<b>Coded as</b>
5	Comment <i>“Love the concept! I think it's totally manageable to get started by Thursday :) Did I understood it correctly that the contributor is supposed to start by pointing out pro arguments, then the critic tries to deflate those arguments and the composer tries to form a synthesis while the captain motivates, controls and structures the interaction? Please let me know if I am right in my way of thinking :)”</i>	Orientation > Task understanding
3	Comment <i>“ok. I have a concern. If there are many pro-arguments I can find for a question, should I post all in one post or can be different posts? I”</i>	Orientation > Task understanding



Group 8 members' number	Wrote on Facebook	Coded as
	<i>see that now we are going to have 2 big discussions from 4 questions, if I post all of my arguments about 2 questions in 1 post, it maybe a bit long and then difficult for the critic and composer follow... I feel that way may cause a bit chaos in discussions. What do you think and suggest?"</i>	
4	Comment <i>"If u feel so.. and u feel that the arguments are not repetitive. . Then we seperate the question.. important thing is to have the question (s) on top of the post so we stay on the same track."</i>	Orientation > Task understanding
3	Comment <i>"Thanks Captain :)"</i>	—

Table 06: How group eight members understood the activity in the first task. Highlight texts in grey are evidence for understanding the task.

In the meantime, group four preferred to understand the task more than setting goals, conversely with group nine, which dedicated more writing to accord timetable than to share thoughts regarding the objectives of the task.

Nevertheless, task number 3 had the lowest frequencies of the orientation phase, in which results presented a similar rate of occurrence, except when members of group four were setting goals.

As shown on Table 07, members' number 5 and 6 wrote that they will have more time to spend on CSCL course at that moment, due to the fact that they previously have other important activities to accomplish.

<b>Group 4 members' number</b>	<b>Wrote on Facebook</b>	<b>Coded as</b>
5	Comment  <i>“Guys, sorry for little delay, but tomorrow is my maturity exam...that means I am finishing final requirement for graduating soon (probably in next 10 days). I can spend more time on CSCL now :)”</i>	Orientation > Setting goals
6	Comment  <i>“Good luck with your exam “5”! Last week was a hassle with deadlines from other courses, but I will now take time to concentrate on CSCL.”</i>	Orientation > Setting goals

Table 07: How members of group four set goals in third task. Highlight texts in grey are evidence for setting goals.

## **5.2 RQ2: How did small group members plan, monitor, and adapt strategies while performing a task in an on-line environment?**

Notably, group four reached the top-level of the execution phase, followed respectively by groups eight and nine in the three proposed tasks. The average frequencies reduced as the tasks passed, as presented at Table 08.

	Group 4			Group 8			Group 9		
	C:	D:	E:	C:	D:	E:	C:	D:	E:
<b>Task 1</b>	45	42	81	30	2	50	44	14	78
<b>Task 2</b>	37	11	54	53	14	51	25	7	32
<b>Task 3</b>	13	3	11	16	9	51	16	2	17

Table 08: Frequencies in the execution phase | C: Behaviour-emotions; D: Discussion about articles; E: Monitoring strategies

Figure 05 presents below a comparison between groups and tasks on behaviour-emotions, in which results have heterogeneous percentages.

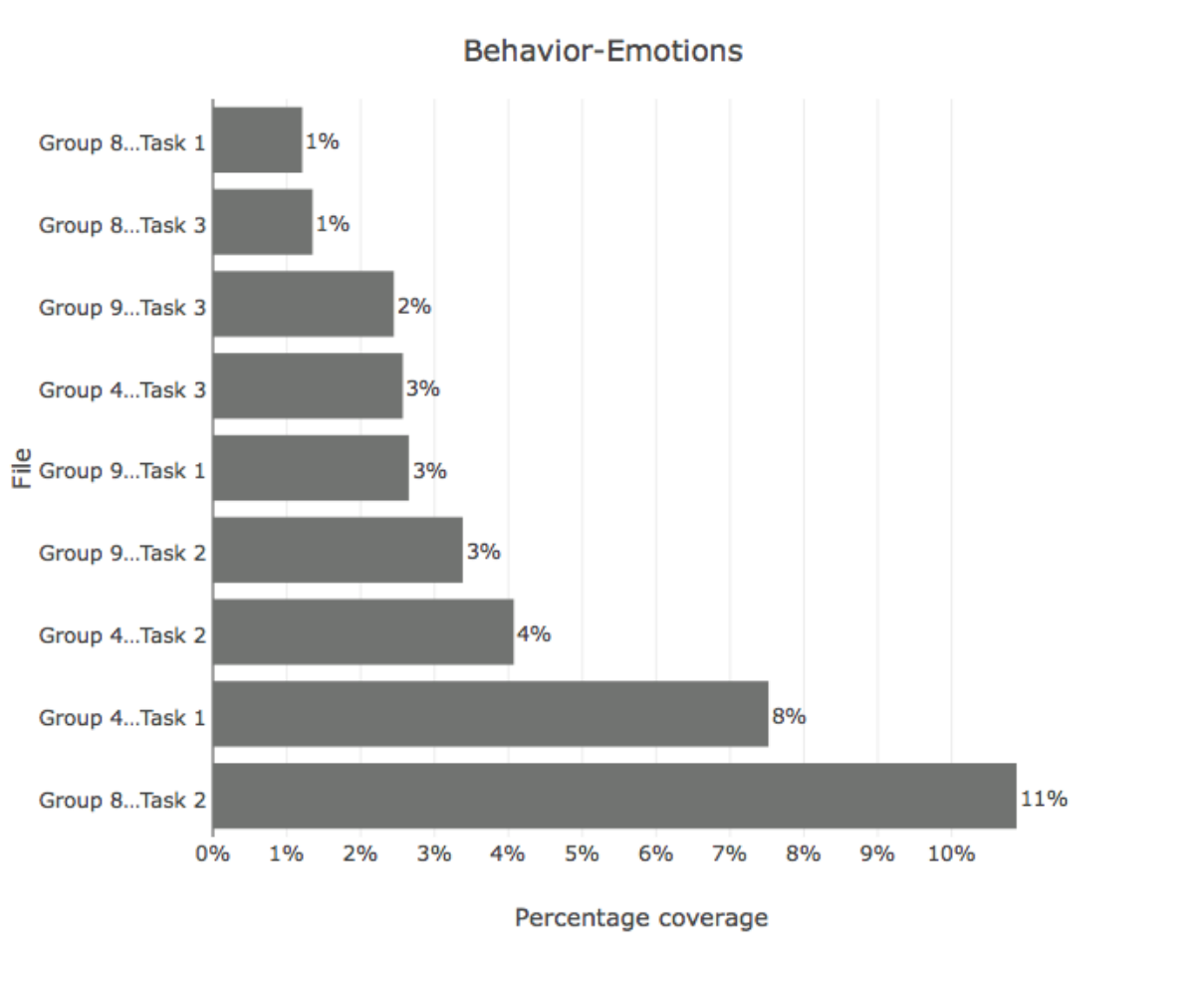


Figure 05: Comparing tasks and groups percentages on behaviour-emotions.

Figure 06 presents below a comparison between groups and tasks on discussion about articles, in which results have heterogeneous percentages.

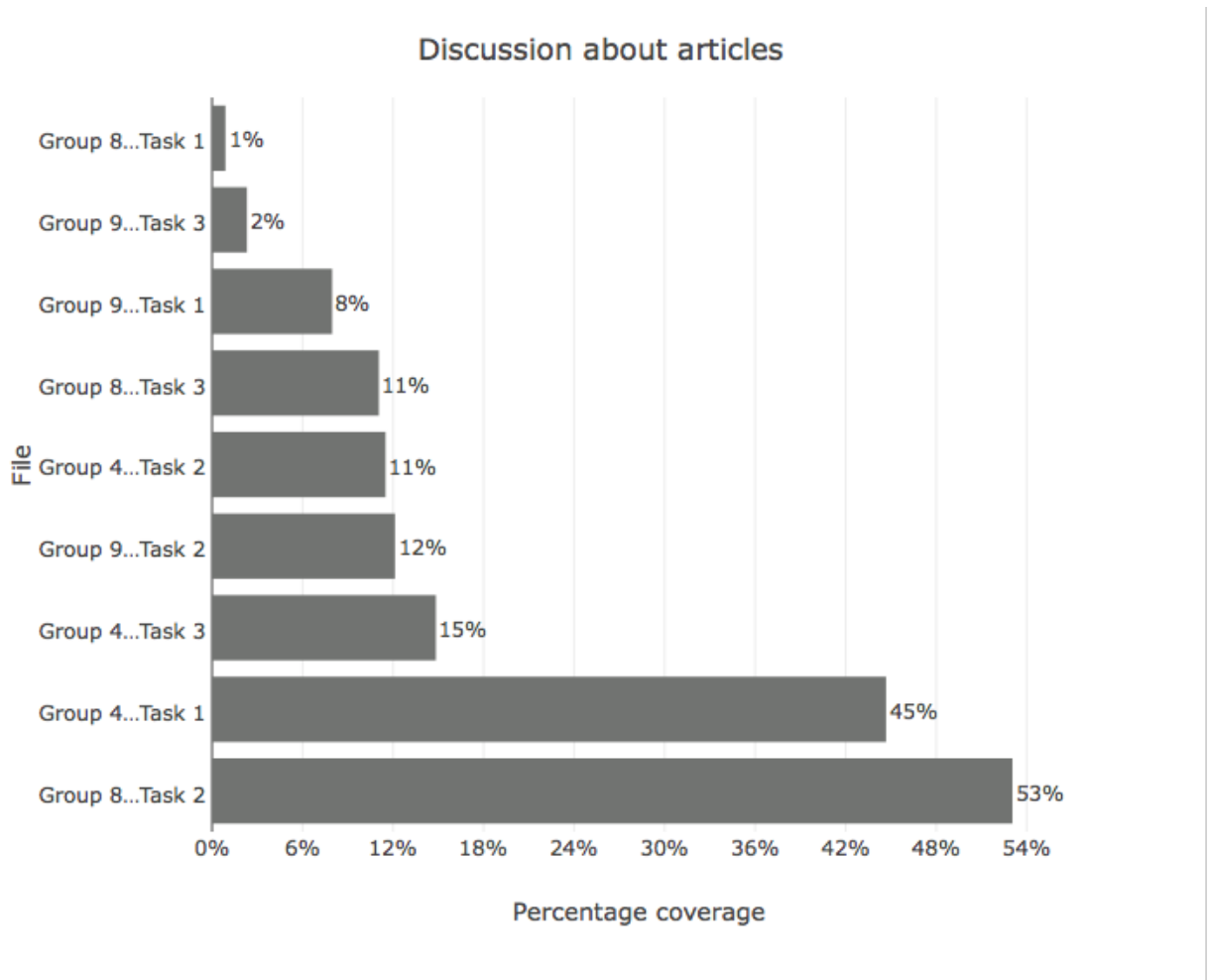


Figure 06: Comparing tasks and groups percentages on discussion about articles.

Figure 07 presents below a comparison between groups and tasks on monitoring strategies, in which results have heterogeneous percentages.

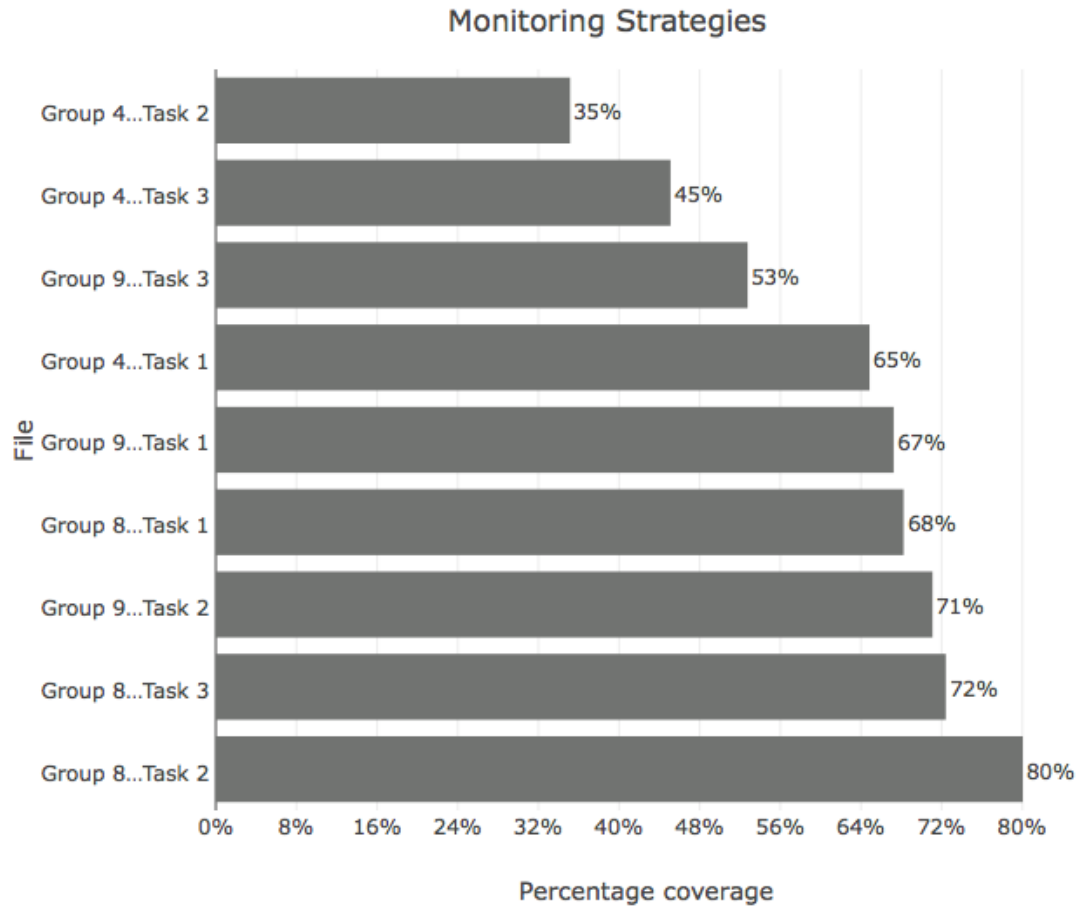


Figure 07: Comparing tasks and groups percentages on monitoring strategies.

In the first task, group four dedicated plenty of the writing in Monitoring strategies, followed by groups nine and eight respectively. Uniquely, group eight displayed a little more writing on the second task and contributed equally to the third task in this issue, although group four dedicated more writing to monitor strategies in the second task. Both groups four and nine had values contracted in the following tasks. As Table 09 represents below, member number 4 gave some interpretation from the proposal articles, which member number 6 complied and added one's own point of view.

Group 4 members' number	Wrote on Facebook	Coded as
4	<p>Main post</p> <p><i>“Of course CSCL environment is challenging, not only for learners as you mentioned regarding to teacher's help and unfamiliar tools for learners, but for facilitators as well. Because they have to set rules (scripts) and control the overall progress too. Moreover, for these kind teacher tasks a good amount of time is needed. Let's say, if we provide learners with external scripts (providing them with guidance) partly (not from threshold to the end), how would be the efficiency of scripts in CSCL environment in the end.”</i></p>	Execution > Monitoring strategies
6	<p>Comment</p> <p><i>“I agree with you that there are individual differences between people on what are the best way for each to learn. “5” was eager to take up your notion about learning by “absorbing knowledge”, and start a discussion about what is learning. I think learning is more than learning the substance of any subject (i.e.</i></p>	Execution > Monitoring strategies

Group 4 members' number	Wrote on Facebook	Coded as
	<p><i>learning facts). Learning entails also knowing how to apply that knowledge. And learning is also about learning different skills in addition to facts, for example skills in collaboration, communication, critical thinking and creativity, which have been considered as crucial 21st century skills."</i></p>	

Table 09: Dedication of group four to monitor strategies. Highlight texts in grey are evidence for monitoring strategies.

The group that skyrocketed time to discuss articles, meaning using references and quotations in the texts, was group number four. Groups eight and nine had the same frequency in the first task. Second and third tasks showed decreasing values in comparison with the first task.

Table 10 represents students' interpretations of the articles, where they used bracketed references after description of gain knowledge or they used compound prepositions, such as "according to", pointing out where one has taken the information.

Group 4 Task 1 members' number	Wrote on Facebook	Coded as
6	<p>Main post</p> <p><i>"My argument is that the potential of scripting is that it can provide an educational design to on-line learning with many benefits for students'</i></p>	<p>Execution &gt; Discussion about articles</p>

<b>Group 4 Task 1 members' number</b>	<b>Wrote on Facebook</b>	<b>Coded as</b>
	<p><i>learning. Findings from empirical studies confirm that scripts can facilitate specific process characteristics of CSCL, and that some scripts are greatly beneficial to individual knowledge construction (Weinberger, 2011).</i></p> <p>Main post</p> <p><i>“My argument is that the potential of scripting is that it can provide an educational design to on-line learning with many benefits for students’ learning. Findings from empirical studies confirm that scripts can facilitate specific process characteristics of CSCL, and that some scripts are greatly beneficial to individual knowledge construction (Weinberger, 2011). As discussed in the video by Professor Weinberger, computer supported collaboration scripts can improve on-line discussions as they make learners participate more actively and transactively (this means the extend to which students build on others’ reasoning and potentially arrive at a shared understanding), as</i></p>	





Group 4 Task 1 members' number	Wrote on Facebook	Coded as
4	<p><i>well as with higher epistemic quality. Also, transactively scripted discussions (e.g. peer-review scripts) have a clear relation to better individual learning outcomes and also improve cognitive processes.”</i></p> <p>Comment</p> <p><i>“I am curious about your argument which benefits could be provided by scripting for students’ learning, and namely is the potential scripting you meant, external or internal scripting. According to Professor (Weinberger, 2011), this is not final stage of researching of the scripting concept. He states that further investigations should be conducted in order to discover substantial effects from scripts.”</i></p>	Execution > Discussion about articles

Table 10: How members of group four used examples from the article. Highlight texts in grey are evidence for discussing articles.

The behaviour-emotions had the highest value in group eight in most tasks. Groups four and nine had similar frequencies in the first task. Second task demonstrated group eight as the high point, followed by groups four and nine. In the third task, groups eight and nine had similar numbers, while group four showed the lowest frequency.

Table 11 demonstrates a written conversation between members' number 4 and 2 from group eight, where they used emojis, gif, meme or interjections to reinforce their feelings and behaviour. Another interesting perspective is using another's mother tongue to sympathise with a cause and motivate other members.

Group 8 Task 2 members' number	Wrote on Facebook	Coded as
4	<p>Comment</p> <p><i>"I would also like to ask a question that wasn't clear to me in the reading. Are the strategies used to enhance self-regulation (personal level and CSCL environments) taking into the consideration the different approaches needed to develop a learner's self-regulation? In other words, different learners have different backgrounds, interests and level of self-regulation. Are we able to tackle the different learners' needs and interests to optimize the development and acquisition of self-regulation? Just wondering"</i></p>	Execution > Behaviour- emotions
	 	
4	Comment	Execution > Behaviour-


Group 8 Task 2 members' number	Wrote on Facebook	Coded as
2	<p>“ “2” 😊😊 We still have to answer few of the questions posted here, and then we need to finalize this question in order to post the second one on Monday 😊 So du bist dran 😊 once these questions are addressed (hopefully by tomorrow), it would be great if you can work on the synthesis of this question/discussion 😊 And Monday will be a new day, a new week, and a new question ... hahahah</p> 	<p>emotions</p> <p>Execution &gt; Behaviour-emotions</p>
4	<p>“Dear Captain, thank you for motivation and attempting to put your "other's regulation" into practice 😊”</p> <p>“Hahahahaha... good one “2”.. trying to see if it works .. hahahah”</p>	<p>emotions</p> <p>Execution &gt; Behaviour-emotions</p>

Table 11: How group eight demonstrate behaviour-emotions according to the use of emojis, gifs, and memes. Highlight texts in grey are evidence for behaviour-emotions.

Regarding the reaction tool provided by Facebook, all members from groups four, eight, and nine have chosen only the “like” button to reinforce their state of mind on posts and comments. However, group eight has shown using more the “like” button compared to the other groups, which was tapped 214 times. Group four tapped the “like” button only 20 times and group nine tapped 90 times.

### 5.3 RQ3: How did learners adapt and evaluate their work?

In the evaluation perspective, results demonstrate the lowest frequencies in terms of discussion notes, compared to the other phases, as presented in the Table 12 below. Comparing frequencies between evaluation lenses and adaptation lenses, relevant frequencies were noted in the evaluation part only. Group four had the highest numbers in the first and second tasks, except for the third one. Group eight demonstrated some relevant values in the second task, however none in the first task, due to no evidence in the Facebook group page. Group nine showed frequencies only in the evaluation perspective. Lower frequencies were especially noted in the third tasks, specific on the adaptation lenses.

	Group 4		Group 8		Group 9	
	F:	G:	F:	G:	F:	G:
<b>Task 1</b>	16	42	0	0	0	1
<b>Task 2</b>	15	11	3	13	0	4
<b>Task 3</b>	0	1	0	2	0	4

Table 12: Frequencies in the evaluation phase | F: Adaptation | G: Evaluation.

Figure 08 presents below a comparison between groups and tasks on adaptation, in which results have heterogeneous percentages and shown in fewer groups.

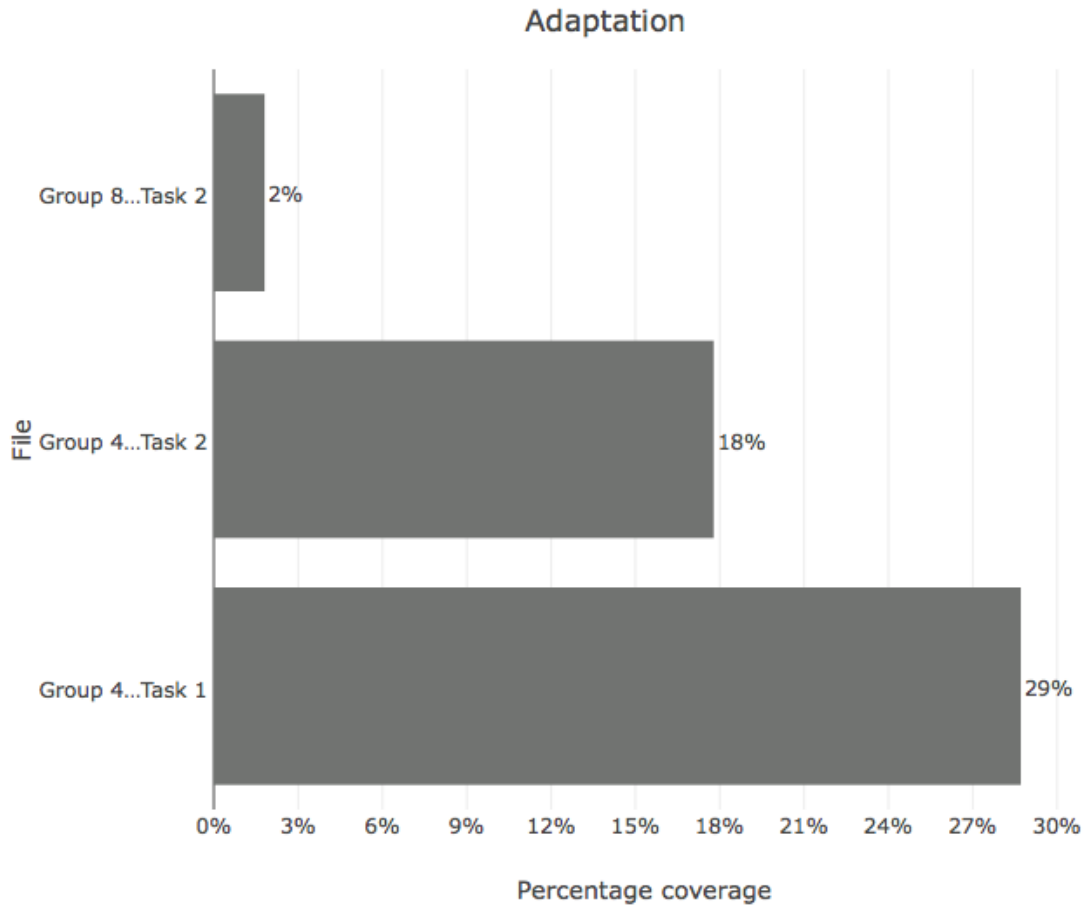


Figure 08: Comparing tasks and groups percentages on adaptation.

Figure 09 presents below a comparison between groups and tasks on evaluation, in which results have heterogeneous percentages.

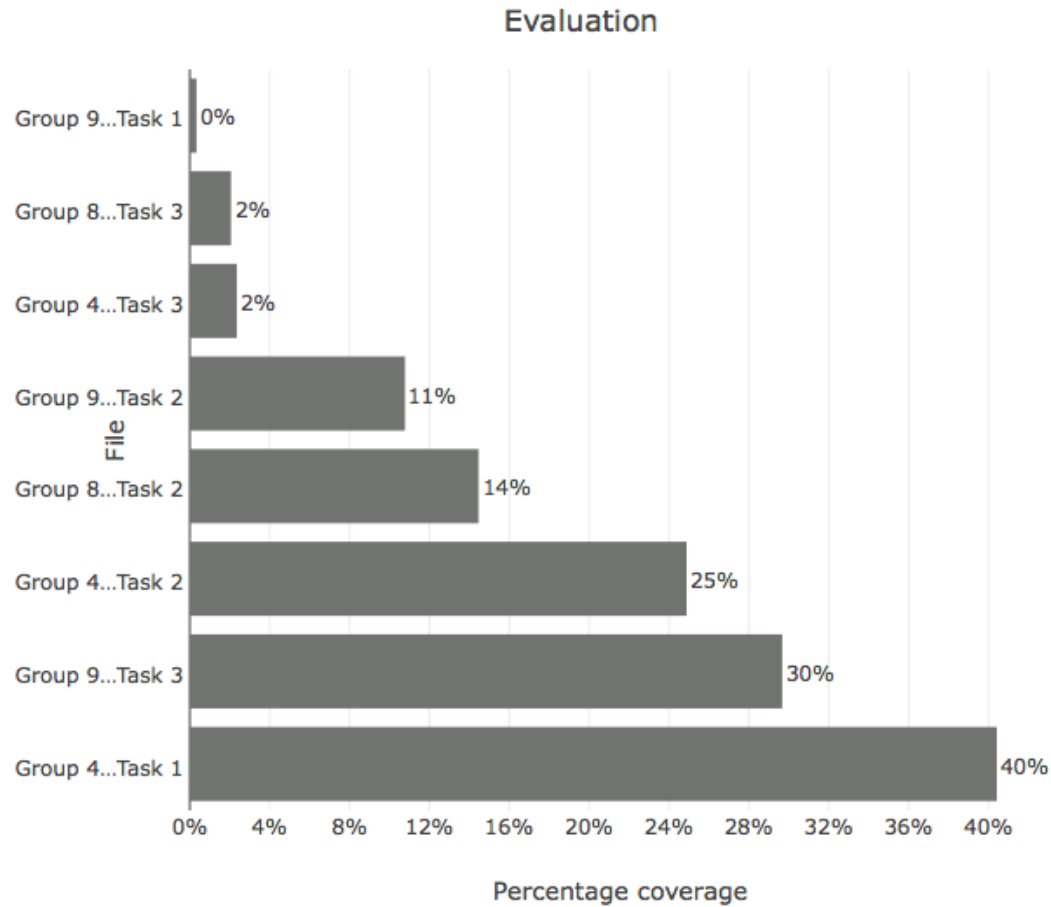


Figure 09: Comparing tasks and groups percentages on evaluation.

Table 13 demonstrates the adaptation and evaluation lenses of group four, member number 5, which played the composer role, that is, one's construction for a synthesis of the pro- and counterarguments. Mainly, member number 5 pointed out some missed parts of interpretations of others' perspectives to make the discussion richer and deeper, and the adaption was shown in the "Conclusion" section. These actions can be found similarly in the other groups.

Group 4 Task 3 members' number	Wrote on Facebook	Coded as
5	<p data-bbox="363 342 493 373">Comment</p> <p data-bbox="363 415 781 447"><i>“...CA seemed little off track. ...</i></p> <p data-bbox="363 489 927 594"><i>I think it would open up new avenue for our debate and perhaps for research as well.</i></p> <p data-bbox="363 636 938 741"><i>Similarly, another CA for additional support (e.g. scaffolding) is needed in traditional</i></p> <p data-bbox="363 783 967 888"><i>learning environment as well for tasks that are within students' ZPD, although a valid claim, it</i></p> <p data-bbox="363 930 964 1035"><i>does not directly counter why scripts is needed in the first place. Contrary, it make the case for</i></p> <p data-bbox="363 1077 922 1182"><i>scripts stronger by mentioning a parallel in traditional learning environment</i></p> <p data-bbox="363 1224 391 1255">...</p> <p data-bbox="363 1297 976 1549"><i>However, what I felt inadequate in the series of arguments (and in particular, I was expecting the CA would elaborate it in detail), is the discussion about limitation of external scripts.</i></p> <p data-bbox="363 1591 971 1839"><i>Although negative effects of external script and possible solution was mentioned in the third series of arguments, however, it I think these aspects needed more discussion, so we arrive at</i></p>	Evaluation > Evaluation

Group 4 Task 3 members' number	Wrote on Facebook	Coded as
	<p><i>realistic (and perhaps a balanced) view of scripting support that not only take into account positive effects of scripting but limiting factors as well</i></p> <p>...</p> <p><i>In my view, these issues could lead to critical exploration of exiting empirical evidence as PA claimed that “scripts can improve on-line discussions as they make learners participate more actively and transactively”.</i></p>	
5	<p>...</p> <p><i>Conclusion</i></p> <p><i>There are some broad agreements (e.g. challenges faced by students in both traditional and CSCL learning environments, and individual difference in learning) as well as disagreements (e.g. robustness of evidence in support of external scripts). There are several open questions as well that need our attention as pointed out in the text. Group members appreciated the importance of external script in</i></p>	Evaluation > Adapting



Group 4 Task 3 members' number	Wrote on Facebook	Coded as
	<i>structuring the learning process in CSCL, however, they also agree that guidance should be sufficient and teacher may determine it based on the requirements and characteristics of a specific group of learners and this is potential area for further research (and development).</i>	

Table 13: How members of group four demonstrate adaptation and evaluation in third task. Highlight texts in grey are evidence for adaptation and evaluation.

#### 5.4 Reliability and validity of the research, and ethical considerations

An inter-rater reliability depends on the judgment of the observer, therefore, is about how author interprets the coding scheme with the purpose to recognize SSRL main phases. Previous knowledge of author about concepts and theories regarding SSRL and CSCL also might collaborate for the understanding or misinterpretation of coding schemes. Fortunately, Cohen's Kappa value was 0,76, meaning that agreement is substantial (McHugh, 2012).

Since the data is written, the author applied a content validity to this research, carefully assessing the measurement chosen (lag sequential) against SSRLs theory and previous search. Nonetheless, Facebook group members may have deleted their account on the social media right after the course ended or in between time of analysis, which might automatically delete some interactions from that person, provoking suggestions and assumptions of orientation, execution or evaluation phases, accordingly with written responses of other group members, if they exist.

It is important to clarify that any interaction between student-student and student-professor outside the Facebook group page environment, as well the use of other communication tools is not known and, consequently, it was not analysed.

For the ethical considerations, high-educated participants had conceded rights of using the Facebook group pages as research material and names have been suppressed from the analysis.

## **6. Discussion & Conclusion**

This research had the purpose to identify how the international higher education students regulate their learning in group level (SSRL) in a CSCL course held in 2015 through social media (Facebook group page), which was the chosen interactive and technological tool where students could discuss tasks, exchange information and construct new knowledge in order to have productive discussions and greater learning outcomes. The results answered the specific research questions, revealing that it is possible to demonstrate SSRL in social media, which is essential for learners to effectively achieve new knowledge. Also, it manifested that having pre ordered roles with scripting guidance is more effective to demonstrate SSRL than having no roles to play and no rules to follow while performing in an on-line collaborative task.

The CSCL course was divided into three phases, in which students had to play roles in the first and second tasks (captain, contributor, critic, and composer) and each task was followed by a type of script (argumentation, non-argumentation, and no external script). For the present study, the author connected findings with SSRL main phases: (1) orientation (task understanding and setting goals); (2) execution (monitoring strategies, discussion about the articles, behaviour/emotions); and (3) evaluation (adaptation and evaluation).

The majority of students have shown to be strongly comfortable and familiar with the social media environment (Hong & Gardner, 2018) due to the demonstration of discussion notes (see Table 02), e.g., using Facebook's features to tag whom they wanted to call attention—a factor that might reveal an effective communication skill (Stathopoulou et al., 2019)—and utilized emojis and shared videos from other platforms to reinforce one's state of mind (Danesi, 2016). When students were communicating their emotions, motivations or common goals in the tasks, using a metacognitive mind process to express these perceptions, they demonstrated collective agency, enabling monitoring and evaluations abilities towards the completion of their learning objectives, a core foundation of SSRL theory.

When the collaborative knowledge co-construction was supported by an argumentative script in the first task, frequencies in terms of discussion notes were higher than the following tasks in orientation and execution phases. Regarding collaborative learning skills, having roles to play in the first and second tasks were effective to demonstrate equally shared information and shown learners' efforts to goals' achievement (Dillenbourg et al., 1995; Järvelä et al., 2015). First and second tasks clearly exhibited the skills needed to construct new knowledge in group level by several ways, e.g., when group members were tagging each other's and writing suggestion of improvements in the interpretations written by their colleagues, or taking control of the course of actions, reminding schedules and deadlines to accomplish the task according with their roles (Beers et al., 2005; Chen et al., 2018; Vuopala et al., 2019) that is, negotiating how they will successfully accomplish the task (Malmberg, Järvelä, Järvenoja, et al., 2017). Professors intervened when needed to facilitate the process of knowledge co-construction (Chen et al., 2018), although analysis of teachers and students' interactions were suppressed from this research.

Hence, they are all equally able to monitor and to evaluate the group progress. Finally, individual and collective beliefs and experiences inside and outside of the group interact with the learners, forming and being formed by joint task engagement. This factor makes the co-construction of knowledge even more challenging, whereas learners are asked to regulate their learning within the group characteristics as well as the surroundings of the learning environment (Kirschner & Erkens, 2013).

The evaluation phase of the first task demonstrated skyrocket frequencies of group four, whereas groups number eight and nine presented little or no discussion notes, which might reveal a misunderstanding of the completion of the task, or the main post with this subject was deleted, or students concluded in another platform, or discussed throughout another communication tool.

However, the argumentative script was fundamental to provide a scaffold for learners, and supported how they progressed the first task, probably due to the fact they were more aware of the purpose of the activity, stimulated learners to reflect, prompted a sequence of posts and comments in the Facebook group page, interacted accordingly to their responsibilities and roles, achieving new knowledge, and constructing better learning outcomes (Kirschner & Erkens, 2013; Weinberger, 2011). When learners have roles to play and know the objectives of the task, they can be more engaged and motivated to the collaborative activity, which was specially unveiled both in the first and second tasks. According to Weinberger (2011), scripts can support learners to construct better quality of arguments during on-line discussions, providing better learning outcomes.

The percentages presented in the orientation phase of the second and third tasks dropped down in all participant groups, possibly due to the understanding of students on how the task works and preferred “cut to the chase”, moving forward to the execution phase. Perhaps if the

argumentative script were provided in the second or third task, it wouldn't be that much attractive for learners' engagement in the CSCL course. In addition to an argumentative script that had a profound connection with the success of the activity, it was effortless to identify how learners demonstrated SSRL phases in the CSCL course in the first task.

The second task had a non-argumentative script with the same roles to play. Students had already been aware of their roles; they just had to organize themselves into the task, building their own course of action. Therefore, they already knew the right actions to successfully accomplish the task, for example, performing the same roles played by different group members. However, groups presented different results regarding the execution phase, for instance, group four had the highest percentages on monitoring strategies and discussing articles, which might indicate that the members were previously aware of regulated learning strategies, or they acted more willingly to achieve new knowledge. Moreover, group eight demonstrated more behavioural-emotional writing and tapped a lot more times the "like" button compared to the other groups.

In the evaluation perspective, lowest frequencies were observed, which might reveal the importance of the scripts provided to the tasks (argumentation script in the first task; non-argumentation script in the second task; and no external script in the third task). The first and second tasks required that students had roles to play, whereas none in the third task, which can justify lower, or no frequencies notes in the third tasks, especially through the adaptation lenses. When students are reasonably free to choose and perform in a collaborative activity, they might have their learning outcomes prejudiced and are not motivated to continue the task (Kollar, Fischer, & Hesse, 2006). At the same time, when learners are in a collaborative setting and have no explicit guidance, they rarely engage into the interactions and "build a false consensus as a

result” (Weinberger, 2011, p. 190), and the lack of scripts or guidelines might provoke shallow discussions, unequal participation of the group members in the task, and inferior results (Malmberg, Järvelä, & Järvenoja, 2017). Little discussion notes or no evidence of adaptation/evaluation phase was found in all CSCL course, especially in the third task, meaning there are not any posts or comments: or students did not discuss it, or the posts/comments were deleted. Maybe they could have used the same argumentative script from the previous task or enhance their abilities of agreement on how to proceed in the activities to accomplish their objectives.

As shown in the study of Chaker and Impedovo (2021), and Lim et al. (2019), this paper’s results suggest that socially shared regulations of learning strategies have heterogeneous effects on how learners constructed new knowledge and behaved on the social media in a CSCL course. Moreover, when students had scripts and roles to play, they performed better (Järvelä et al., 2016).

All research answers demonstrated and enhanced the importance of the regulations of learning while group members are performing in an on-line collaborative task to successfully achieve new knowledge, whereas group members may request attention and collaboration of other group members through an on-line learning environment, even as having guidance, scripts and support to achieve common goals as well.

This paper revealed that students performed better and demonstrated SSRL methods when they were scaffold by scripts in an on-line environment while executing in a computer-supported collaborative learning activity. All main phases of SSRL theory could be found in all three tasks, however, students might have skipped some sub phases, such as task understanding and adaptation of learning due to the fact that, first, they already knew how to make an

interesting discussion without investing time-writing to understand the activity in the second and third task, and second, the execution phase was incredible richer that they didn't find necessary to add more information to adapt new knowledge in the evaluation part and felt satisfied with the discussion processes, or they were just tired in the end of the CSCL course.

Despite the use of Facebook as an interactive and iterative principal tool in which students are comfortable and familiar with (Hong & Gardner, 2018), and they could act and react simultaneously not only by writing but also using other digital communication ways, promoting the collaboration to a different level (Gatignol, 2016), this study revealed that use of scripts and having guidance were more relevant to demonstrate SSRL than the use of social media itself.

The limitations of this paper occur mainly in a few items described next. Firstly, the author's ability to recognize the three main phases of SSRL and to interpret results in the CSCL course, and pre- gain knowledge from both theories as well. Secondly, the fact that the course was held in 2015 and analysed in 2021 is also a limitation factor, once the results might reveal more information if data was analysed right after the end of the course, with participants still having their Facebook accounts activated. Thirdly, the introduction and orientation from the professors on the CSCL course guidelines might also have revealed more information about types of scripts used by students, and roles to play- it was not available on Facebook group page at that time. Fourthly, if participants communicated through other devices, that could also bring some evidence of SSRL (i.e., to understand the task, to set goals, to remind other participants to do the task or to play a role, to motivate others, to adapt new knowledge), it is not known by the author.

The presented tasks in the CSCL course could demonstrate that the involvement of students to answer the questions properly and work synchronously in favour of a common goal

depended also on how well designed the on-line course was. If the teachers' role and scaffolding facilitate the collaborative learning process (Barrot, 2018; Chen et al., 2018; Matzat & Vrieling, 2016; Voivonta & Avraamidou, 2018), which increases the interest and motivation of students to perform more wisely in an on-line setting (Dabbagh & Kitsantas, 2012), scripts may have a fundamental part to engage students' performances if they equally share information, make efforts to achieve the goal (Dillenbourg et al., 1995; Järvelä et al., 2015), and maintain high levels of motivation, quality of interactions, and performance of learners (Järvelä et al., 2016). Furthermore, scripts contribute to the reduction of process losses and can make students more conscious of their responsibilities as learners performing in a collaborative setting (Weinberger, 2011).

Future educational researchers should design more effective scripts that are necessary for students to progress and accomplish tasks successfully that achieve new knowledge, predicting all aspects of deviation from the objectives of the task. Despite tutors and professors of CSCL course scaffold students through the on-line environment, and provided feedback questionnaires for students to answer, the author would suggest for educators to provide learning assessments in groups during the activity, to awaken attention and provoke reflection among students during the learning path.



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