A study of the relationship between regulatory systems, assessment e locomotion, and online learning groups

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Abstract

The present paper examines the relationship between assessment, locomotion and attitudes and learning outcomes in a Computer-supported collaborative learning (CSCL) framework. Results showed that regulatory mode predicted exam marks, numbers of tasks completed, messages sent and attitudes towards the course and the ingroup. The theoretical implications and some reflections about CSCL and Regulatory-mode Theory (RMT) are presented.

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1 Introduction

In 1991 Koschmann (Koschmann, 1992) coined the acronym CSCL (Computer Supported Collaborative Learning) to indicate didactic paths where the use of ICT to support collaborative learning and the active participation of students is central.

Since then, a number of studies have investigated the characteristics of this approach and its validity for facilitating teaching and learning (Dillenbourg, 2002; Fischer *et al.*, 2007). A common denominator of this research is the idea that CSCL learning pathways enhance teamwork and collaborative construction of knowledge through the activation of processes of reflection, social negotiation and discussion with other learners, teachers and tutors, making learning deep (Garrison *et al.*, 1999) and significant.

Besides, as CSCL interaction is mainly text-based, this makes it particularly suitable for activating reflective processes concerning both learning contents and the learning process. Learning is further encouraged by the abolition of space and time boundaries (synthesized in the motto "anywhere – anytime", Kreijns *et al.*, 2002), and the opportunity to support learning groups in highly collaborative and interactive modes (Altinay & Paraskevas, 2007; Rourke & Anderson, 2002).

However, as Kreijns pointed out (*op.cit.*), the assumption that in a CSCL environment collaborative interaction can be taken for granted is misleading and potentially dangerous.

Learning in a collaborative environment is by no means an automatic process but requires the use of cognitive, emotional and social resources. It is a complex process which goes beyond textual interaction in learner participation to include many kinds of activities such as doing, talking, thinking, feeling and belonging (Hrastinski, 2008).

As evidence of this, several studies have identified a number of moderators of the effectiveness of the distance collaborative learning path such as extroversion (Hsu *et al.*, 2008; Solimeno *et al.,* 2 008), the ability of self-regulation (Järvelä *et al.*, 2008), the locus of control (Lynch, 1997), intrinsic motivation (Rienties *et al.*, 2009).

The research reported so far highlights the importance of taking into account several factors for a successful use of CSCL. On the one hand, the intrinsic characteristics of CSCL as an environment in which it is possible to develop social and learning practices, on the other, various individual differences that interact with this environment, promoting or inhibiting its effectiveness.

This relationship between contextual characteristics and individual aspects is well explained in the Regulatory-mode Theory (Kruglansky *et al.*, 2000) which, in the last few years, has had a big impact on scientific literature, but

has not yet been applied to distance learning.

1.1 Regulatory-mode theory

Individual functioning in a social context may find interesting theoretical and empirical points of reference in the Regulatory-mode Theory (RMT) (Kruglansky, *Ibidem*; Higgins *et al.*, 2003; Pierro *et al.*, 2006; Mauro *et al.*, 2009).

Taking a famous example from Kruglansky (*Ibidem*), let's imagine a husband and wife on the day before they go on holiday realize they need to buy some essential items for the journey and decide to go to a shopping mall. When they arrive at the mall the husband finds a parking place almost immediately and parks the car. He is about to switch off the engine when his wife says he should look for another place nearer the mall so they do not have so far to carry the shopping.

So, while on the one hand, the husband wants to reach his goal as quickly as possible, on the other hand, the wife tries to reach it in the best way possible. If they decide to continue to search for the "ideal" parking lot the husband will be frustrated but his wife will be satisfied. On the contrary, if they choose the first parking lot, he will be satisfied but she will be frustrated.

RMT takes into account the psychological basis of the tension which arises between the two partners. When we need to reach a goal we regulate our behaviour as a function of two trends: assessment and locomotion.

Assessment (in the example personified by the wife's behaviour) constitutes the comparative aspect of self-regulation that critically evaluates alternative goals or means to decide which are best to pursue in order to achieve an objective.

Locomotion (in the example personified by the husband) constitutes the aspect of self-regulation concerned with movement from one state to another, including commitment of psychological resources to initiate and maintain such movement, without distractions or delays. The two self-regulatory functions are independent of each other and are present in individuals in varying degrees.

Typically, self-regulatory models (e.g. Lewin *et al.*, 1944; Gollwitzer, 1990) have treated the assessment and locomotion functions as interdependent parts of a functioning whole, where the comparative phase, assessment, always precedes the phase in which the person carries out a series of activities to achieve the goal, locomotion.

Studies regarding RMT mark a turning point in this field of research because they demonstrate that the two self-regulatory functions, assessment and locomotion, can be considered as independent although simultaneously coexisting in the same individual. So, from the perspective of individual differences, the

independence assumption implies the possible existence of individuals who are high in assessment and low in locomotion, low in assessment and high in locomotion, or high or low in both tendencies.

This independence also exists at a situational level. From a situational perspective, in fact, the independence assumption implies that some psychological contexts may induce a tendency towards assessment in most people (e.g. a revision task or, in general, one which requires great accuracy), whereas other psychological contexts may induce a locomotion tendency (e.g. a task which must be accomplished in a short time), others may stimulate both the self-regulatory functions (e.g. a task which must be accomplished both quickly and accurately).

Therefore, there is no regulatory tendency which is "better" than another, but rather it depends on the context under consideration.

In some contexts, individuals with high locomotion cope better than those who have higher assessment levels and vice versa, but it is also possible that some contexts facilitate individuals who are high in both assessment and locomotion. Generally, individuals perform better when there is a regulatory fit between regulatory tendencies elicited by the context and personal tendencies. (Avnet & Higgins, 2006).

If we consider the proclivity toward movement as a psychological continuum, at the extreme pole of the assessment tendency we find individuals who use a full-evaluation strategy and consider all of the possible alternatives and all of the attribute values for each alternative, not only in relation to their own choices, but also to those that others might make. Thus, individuals with high assessment invest a great deal of cognitive and affective resources (energy), consuming a lot of time in achieving their goals.

Because assessors tend to perennially evaluate themselves, they exhibit more pronounced levels of anxiety and lower optimism and self-esteem, they take longer to reach decisions, are less tolerant of ambiguity, show greater public and private awareness, and are inclined to engage in and evaluate the success of their activities according to precise standards and in relation to the performance of others.

Instead, at the extreme pole of the locomotion tendency we find individuals who use a progressive-elimination strategy, identifying an initial means for achieving a goal which is later compared to alternative means and either discarded or confirmed according to its functional value. It is important to highlight that in the achievement of a goal, the progressive-elimination strategy takes into consideration only one alternative, the full-evaluation strategy involves different alternatives simultaneously.

Besides, individuals with high locomotion tend not to worry about other people's opinions, to show high self-esteem and optimism, a high degree of de-

cisiveness and high levels of intrinsic and autonomous motivation (Kruglanski, *op.cit.*, Pierro, *op. cit.*).

2 The research

2.1 Contest of the study

The present study will investigate whether a relationship exists between regulatory systems (assessment and locomotion) and a CSCL setting.

More specifically, in a context of online collaborative learning where students are required, on the one hand, to reach learning objectives quickly and, on the other, to recognize, evaluate and mediate the status of the participation of others, it is interesting to understand if performance varies in relation to a greater or lesser tendency to make comparisons (assessment) or, conversely, to take action (locomotion).

In particular, it is assumed that performance is independently affected both by locomotion and assessment. Individuals with high locomotion should show greater participation and greater satisfaction with a course because it is conducted in a CSCL context that stimulates their regulatory mode system. In contrast, participants with high assessment should demonstrate greater assiduity in carrying out different activities.

In general, participants with both high assessment and locomotion should have a negative attitude towards their collaborative group. In fact, these individuals are strongly oriented towards the carrying out of an activity and persist conscientiously until it is completed (locomotor), while also doing their best do evaluate different ways of achieving their goal (assessor).

From this point of view, a collaborative group is a learning context in which the two components of self-regulation, assessment and locomotion, are difficult to reconcile.

2.2 Method

The work described here was carried out as part of a mandatory course focused on the topic "Psychological Testing", for students attending the Faculty of Psychology at Genoa University, during the 2009/10 academic year.

The course was planned using a blended approach, a form of training that draws on specific aspects of both face-to-face teaching and online education.

The face to face meetings were preparatory to the activities provided in an online modality. Both the meetings and distance activities were differentiated according to learning objectives and teaching strategies.

The face to face lessons were characterized by experiential activities, in which students used simulations and role-playing exercises, to learn about the

best methods for administrating and scoring tests.

The distance activities, interspersed with the face to face sessions according to a previously arranged timetable, were structured primarily with the aim of encouraging processes of collaborative learning and decision making through collaborative summarizing exercises and case studies and diagnosis simulation. There were seven scheduled activities in the distance learning modules.

2.2.1 Participants

93 students took part in the study. They were aged between 20 and 50 years old (M = 24.62, SD = 7.12), and were mostly female (69% females; 30% males; 1% missing). The students were randomly assigned to 12 online groups, in order to simplify the cooperative learning tasks and the organization of activities.

2.2.2 Measures

Assessment and Locomotion: the two constructs were measured using Kruglanski scales (*op.cit*), composed of 24 items (12 for assessment and 12 for locomotion). Ratings are provided on a 6-point Likert-type scale ranging from 1 (strongly disagree) to 6 (strongly agree). Both assessment (α =.81) and locomotion (α =.84) showed good internal consistency.

Outcomes: the performance of the participants was marked out of thirty, according to the number of activities carried out, the average number of messages posted on the forum, the delay time in consigning the tasks.

Attitudes towards the course and the work group: Attitudes towards the course and the work group were measured on two rating scales (Mucchi-Faina *et al.*, 2009). Participants had to rate 12 adjectives (6 positive and 6 negative) associated with the work group and the course on a 6-point Likert-type scale ranging from 1 (not at all) to 6 (extremely). Both scales showed good reliability (α attitude course =.92; α attitude group =.88).

2.3 Results

In order to examine the effect of assessment, locomotion and their interaction on the predicted outcomes, we used moderated multiple regressions (Cohen *et al.*, 2003). Assessment and locomotion were entered at step 1 as (centred) predictors, whereas the interaction assessment X locomotion was entered at step 2.

As shown in Table 1, both assessment (β = 0.28) and locomotion (β = 0.29) predicted exam marks. Participants with high levels of assessment or

locomotion received higher marks than those with low levels of assessment or locomotion, respectively.

In tabella 1 sono riportate le stime per il modello relativo al voto. Sia l'assessment (β = 0.28) che la locomotion (β = 0.29) sono risultati essere dei predittori significativi del voto preso al termine del corso. In particolare, i partecipanti con alto assessment o con alta locomotion tendono a prendere voti più alti di quelli con, rispettivamente, più bassi livelli di assessment o locomotion.

TABLE 1
Effects of assessment and locomotion on exam marks

		B	SE B	β	R^2
Step 1	Locomotion	0.67	0.23	0.29**	
	Assessment	0.63	0.23	0.28**	.18***
Step 2	Assessment X Locomotion	-0.15	0.23	-0.07	.19**

*Note. R^2 = variance explained by Step 1 and Step 2; * p <.05, ** p <.01, *** p <.001.*

Moreover (Table 2), locomotion (β = 0.27) predicted the number of messages sent, whereas assessment predicted the number of tasks completed (β = 0.21). No significant effect was found on time for task completion.

TABLE 2
Effects of assessment and locomotion on numbers of tasks completed and messages sent

		Number of tasks completed				Number of messages sent			
		B	SE B	β	R^2	B	SE B	β	R^2
Step 1	Locomotion	.15	.13	.12		.86	.33	.27*	
	Assessment	.26	.13	.21*	.07*	.18	.32	.05	.08*
Step 2	Assessment X Locomotion	-.18	.13	-.01	.07	-0.23	.30	-.08	.09*

*Nota. R^2 = variance explained by Step 1 and Step 2; * p <.05, ** p <.01, *** p <.001*

As Table 3 shows, locomotion predicted attitude towards the course significantly. Participants with high levels of locomotion liked the course more than those with low levels of locomotion.

TABLE 3
Effects of assessment and locomotion on attitudes towards the course and the ingroup

		Attitude towards the course				Ingroup Attitude			
		B	SE B	β	R^2	B	SE B	β	R^2
Step 1	Locomotion	.24	.08	.31**		.01	.08	.01	
	Assessment	-.12	.08	-.16	.10**	-.12	.08	-.15	.02
Step 2	Assessment X Locomotion	-.09	.08	-.13	.11*	-.23	.09	-.26*	.09*

*Nota. R^2 = variance explained by Step 1 and Step 2; * p <.05, ** p <.01, *** p <.001*

Regarding the ingroup attitude, adding first order interaction provided a significant increase of the R square (F (1,85) = 6.01, p <.05). Following Bauer & Curran (2005), in order to graphically depict this interaction, we estimated two roots of locomotion which demarcate boundaries of the region of significance (95% CI -3.13, 0.13). Within the region of significance (Figure 1), the relationship between assessment and ingroup attitude was not significant. For locomotion values above.13 SDs, the relationship between assessment and ingroup attitude was negative and significant, and the magnitude of this association was proportional to locomotion levels. Participants with high levels of both assessment and locomotion showed a mainly negative attitude toward their work group.

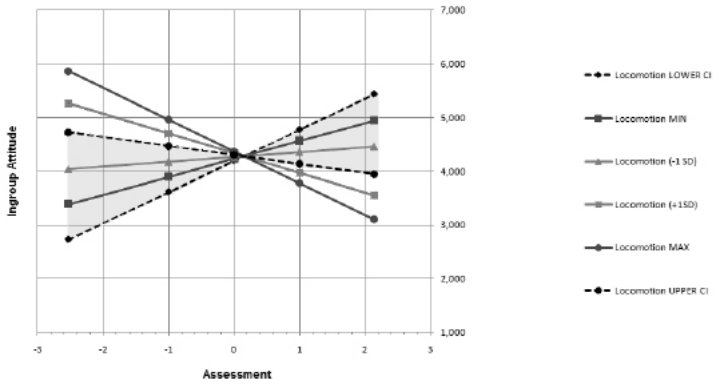

Fig 1. - Moderating effect of locomotion on the relationship between assessment and ingroup attitude

Discussion and concluding reflections

This first exploratory study investigated how individual differences related

to the two self-regulatory functions, assessment and locomotion, determine the effectiveness of a learning process in an organized social context like CSCL.

In a CSCL context in which both reflective and dynamic participation is required (Lehtinen, 2003), individuals with a high assessment tendency who are theoretically likely to show greater accuracy in achieving their aims, and those with a higher locomotion tendency, who are therefore more dynamic in their behaviour, felt at ease in the proposed setting, getting good marks.

Moreover, it would seem plausible that the methodology used, based on a succession of learning activities to be completed within a given time which is neither excessively short nor overly long, enabled everyone to contribute in equal measure.

However, while the students with high assessment showed greater assiduity and completed more activities, students with high locomotion showed greater involvement and dynamism, posting a higher number of messages on the forum and expressing a high level of satisfaction with the course.

One of the most striking results of the study was the effect of the regulatory systems on the students' attitudes towards their work group. Participants with high levels of both assessment and locomotion, showed an attitude tendentially more unfavourable.

These individuals who already have difficulty at an individual level in reconciling the two self-regulatory functions, assessment and locomotion, have an increased stress level when they work in a group that does not meet their standards. Consequently, the group is evaluated more unfavourably.

Although this study could be considered just the beginning of an investigation that needs further study, it represents an opportunity to offer some useful suggestions for Instructional Designers related to the organization of the online course and to the different learning activities (e.g. the importance of harmonizing collaborative activities with individual activities, taking into consideration the time variable), so that the CSCL provides an effective and efficient learning experience to all the students whose levels of the two observed self-regulatory functions, assessment and locomotion, influence performance.

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