

# **Cooperative Learning and Support in the Transition from School to University: an integrated Research-Intervention aimed at first-year Psychology Students**

**Viviana Sappa, Laura Bonica, University of Turin, Italy**

## **Introduction**

Moving from a theoretical framework (Bonica1998; 2008) that integrates the interactionist and socio-constructivist perspectives (Doise & Mugny, 1981; Stambak & Sinclair, 1990; Pontecorvo et al., 1995; Wood et al., 1976) with Bronfenbrenner's ecological approach (Bronfenbrenner, 1979), we aim to discuss the potentialities of "cooperative learning" as a form of support in the school-to-university transition.

The transition from high school to university can be considered a challenge, as it exposes students to several discontinuities in the learning setting in terms of both the complexity of study activity and a new system of roles and relationships.

The new academic context requires students to improve their meta-cognitive skills in order to study a greater quantity of material, to monitor and organize their learning and study time more independently, and to develop the ability to critically analyse and integrate a variety of texts and theoretical approaches (Cornoldi, 1995; Pazzaglia et al., 2002; Kember, 2001; Bonica et al., 2007). Success in confronting this learning challenge depends on the degree to which students are able to improve these skills and the opportunities they are presented with to reinforce their self-confidence in facing these new learning tasks.

Moreover, these challenges are faced within a new learning community that involves several roles and relational discontinuities (Tinto, 1997; Wilcox et al., 2005). In the Italian academic setting, where our research took place, university classes are often larger than high school classes and relationships with classmates and teachers lack the closeness and familiarity that is common in the high school class setting. Secondly, there is a greater

degree of formality in the student-teacher relationship and the academic context requires the student to be more autonomous in asking for help. Thus, in order for students to take advantage of the collective context to support their learning, it is important that a sense of belonging to the new learning community be developed.

Based on the above-mentioned aspects, we consider the first year of university to be a significant and critical period of transition. Students' initial impact to the new context can strongly affect the process of further adaptation, and supportive teaching and learning programs could be particularly useful during this initial phase. National surveys also confirm the decisive nature of the first year of university: 20,8% of Italian students drop out of university during their first year (MIUR, 2002-2003).

Based on these considerations, several innovative teaching-learning projects were put into practice by Professor Laura Bonica in the Psychology Department of the University of Turin. Inspired by cooperative learning methodology, these projects involved first-year university students enrolled in educational and developmental psychology courses.

In developing these projects, cooperative learning was selected as a useful teaching-learning strategy to support students facing the challenge of the school-to-university transition primarily because of the socio-cognitive processes it promotes. The educational and developmental potential of cooperative learning, both on the meta-cognitive and social side, are supported by several authors in the fields of educational, developmental, and social psychology (Johnson & Johnson, 1987; Slavin, 1990; Comoglio & Cardoso, 1996; Gillies & Ashman, 2003; Watson & Marshall, 1995; Borsch & Heinz, 2001). In particular, as Johnson and Johnson underline (1998), what makes cooperative learning different from most instructional methods is that it encourages a process of "positive interdependence", or rather, the belief by each individual that there is value in working with other students and that both the individual learning process and the end result of their work will benefit from cooperation. In a cognitive developmental perspective, the principle of "positive interdependence" is largely linked to the *social-cognitive conflict* that stimulates perspective-taking ability and meta-cognitive development (Doise & Mugny, 1981; Piaget, 1936) and to the *peer-tutoring processes* that promote the social building of knowledge (Vygotskij, 1978; Rogers, 1969; Damon, 1984). Moreover, in the framework of social and ecological psychology, working together with a common aim has been shown to support the development of *positive in-group relations* and a *motivation to reciprocity* (Deutsch, 1968; Lewin, 1948; Bronfenbrenner, 1979; Bruner, 1992, 1996).

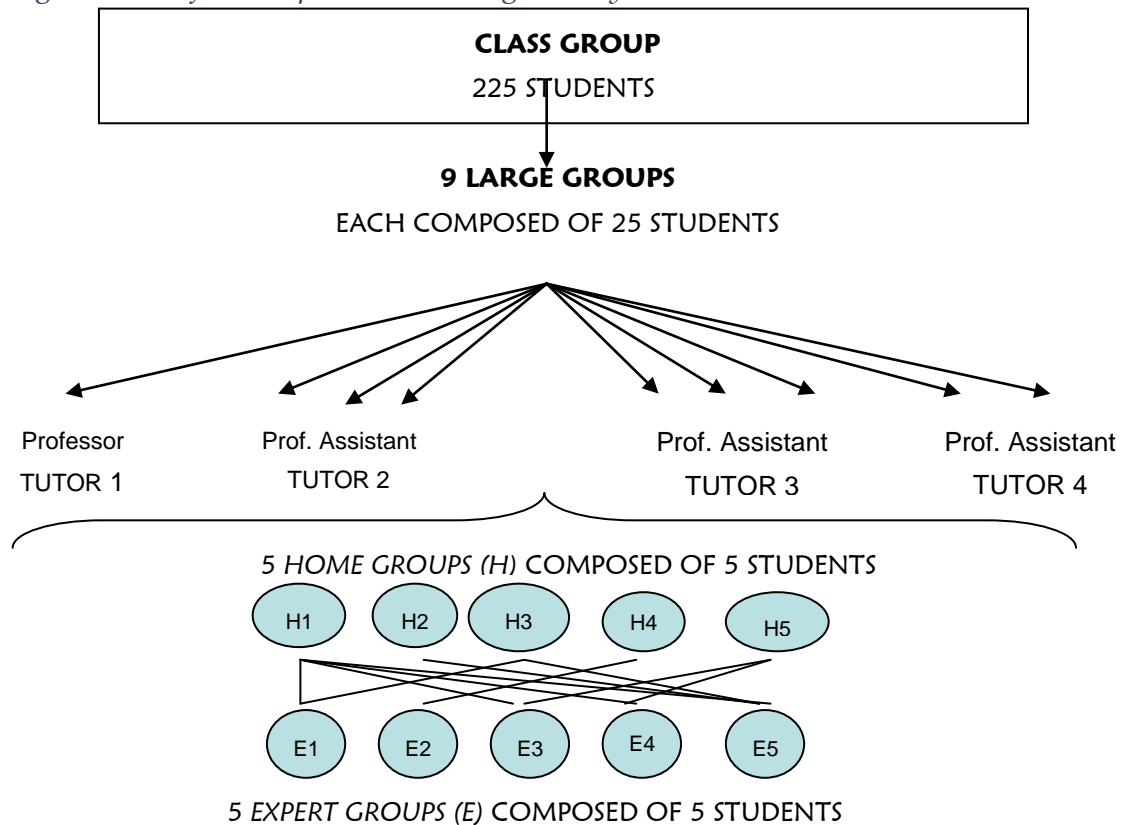
The present study is part of the broader research-intervention project cited above and examines the outcome of the recent application of cooperative learning in a group of 225 first-year psychology students at the University of Turin (academic year 2005-2006).

The main aim of this paper is to present the Cooperative Learning project cited above and to explore its potential role in supporting students facing the school-to-university transition and the discontinuities this transition entails.

## The Cooperative Learning Project

The Cooperative Learning Project was integrated during the Prof. Laura Bonica's Developmental and Educational Psychology course, attended by first-year psychology students. The Jigsaw methodology was applied (Aronson, 1978) with the aim to study, cooperatively, about 192 pages of the examination programme (approximately one third). Most of the learning activity took place during regularly scheduled class times (two meetings lasting three hours each, plus two out-of-class meetings, and a plenary session to present the tasks performed). It involved 225 first-year students organized firstly in four large groups each monitored by a tutor (the teacher or one of the three teaching assistants) and secondly divided into "home" and "expert" groups (five to six students each) (see fig.1).

*Fig. 1 Organisation of the cooperative learning activity*



The materials to be learned were the five main psychological developmental theories (cognitivism; ethology attachment theory; psychoanalytic approach; human information processing; and socio-cultural constructivism) and different kind of texts were used as learning instruments (research manual, specialised dictionary, manuscripts by specific

authors). In accordance with the Jigsaw method, each expert group studied one of the five theories in depth, and each home group was composed of one expert in each theory.

Both expert and home groups met once in the classroom during a regularly scheduled class under the supervision of the tutors, and once autonomously outside of class. *The aim of the expert groups* was to study a specific developmental theory and to identify the clearest method for explaining it to the classmates in their home group. *The aim of the home groups* was to share knowledge about each of the theories adopting a reciprocally teaching and comparing their different assumptions and critical points. Finally, drawing inspiration from the theoretical frameworks, each home group had to produce a metaphor for human development. Several kinds of materials could be used to represent this metaphor, such as pictures, films, songs, or symbols created ad-hoc by the groups. Each metaphor had to be presented to the whole class, professor and tutors included. Finally, the cooperative learning activity was not intended to replace individual study. Students alternated group study with individual study at home.

On the base of this kind of organization, six different phases of the activity were identified and classified on the basis of two dimensions: a) the recipient of the cooperative learning activity (within-group learning vs. public learning product); b) the level of formality of the learning context (formal vs. informal learning context) (Table 1).

**Table 1 Phases of the cooperative Learning activities**

	<b>Within-group cooperative learning product</b>	<b>Public cooperative learning product</b>
<b>Formal context</b>	Expert group during class with tutor	Home group during class with tutor Public presentation of the metaphors
<b>Informal context</b>	Individual study Expert group outside class without tutor	Home group outside class without tutor

The “within-group” cooperative learning product refers to an understanding of the specific theory the students were expected to become an expert in. This “product” was the aim of the expert group activity and individual study at home and its presentation was not public. Each expert taught the theory exclusively to his home group classmates. On the other hand, a “public” product (the metaphor) was the goal of the home group work. Sharing knowledge and discussing the different psychological developmental perspectives laid the foundation for the production of the metaphor, which was presented publicly as a collective product.

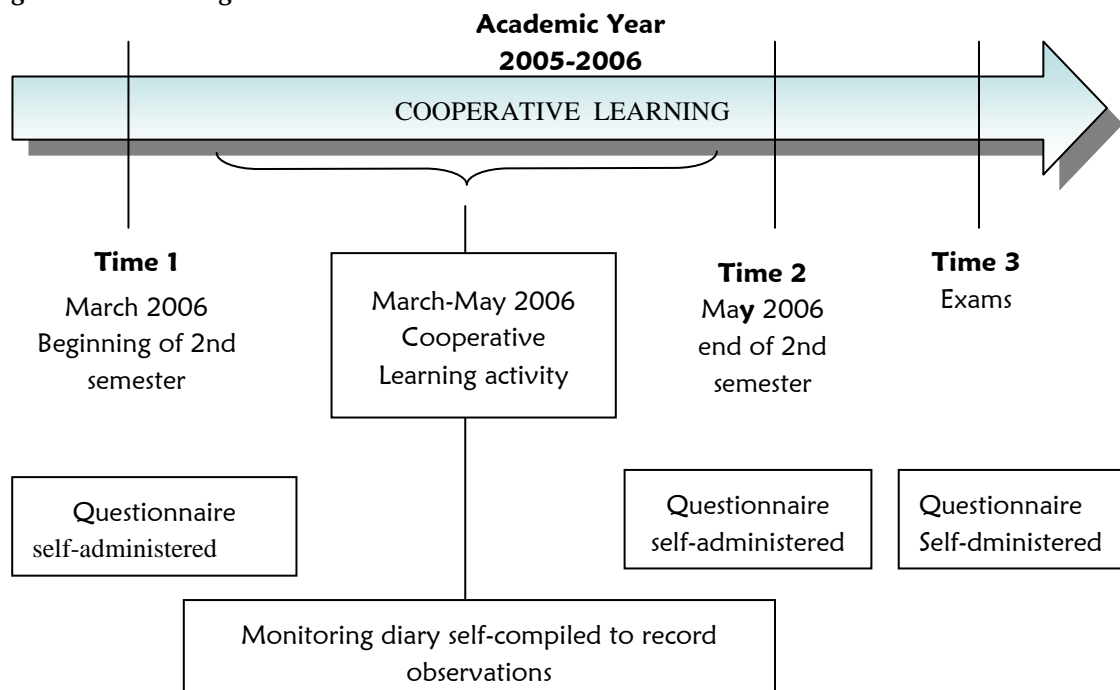
Regarding the learning context, all activities carried out during regularly scheduled class time under the supervision of a tutor were considered as taking place in a “formal” context, whereas autonomous study sessions organised by the students were classified as “informal”.

## Research design

The research design (before, during, and after the intervention) made use of questionnaires (Bonica, 2006) administered at two different times, written accounts, video-recordings, and a self-compiled monitoring diary (Fig.2).

The questionnaire and the written accounts focused on several topics related to both the high school-to-university transition and the cooperative learning experience. The most important phases of the cooperative learning project were video-recorded and the monitoring diary was compiled by each student over the course of the project.

*Fig. 2 Research design*



In this paper we aim to analyse the outcome of the cooperative learning project in terms of its effectiveness in promoting self-confidence in facing new learning tasks, learning achievement, and a sense of belonging to the new learning community.

All students participated in the cooperative learning project, thus there was not a control group. Consequently, we controlled the effect of the project both by comparing data before and after the experience (pre-post test) and by analysing the participants' perceptions of the usefulness of cooperative learning as a support to their meta-cognitive and social abilities.

## Characteristics of the sample

Our sample consisted of 122 subjects involved in the cooperative learning activity described above, who completed questionnaires and written accounts at both time 1 and time 2.

Typical of university psychology courses, most of the sample was composed of females (81%), while just 19% was male. The average age was 21.5 (*s.d.*=4.8). 87% of subjects had attended lyceum, whereas 13% had a professional or technical diploma. The school trajectory for most of the students in the sample was characterised by achievement since 93% had never failed in high school or at university and the majority usually received high marks: the average high school mark for the sample was 85.6 out of 100 (*s.d.*=11,5) and the average mark for university examinations was 26.2 out of 30 (*s.d.*=3.02).

As highlighted in previous publications (Bonica et al., 2007; Bonica & Sappa, 2008), despite the fact that this data is proof of successful school paths, almost all the sample perceived the transition to university as a complex challenge: compared to high school they were more often afraid to ask for explanations, spoke out less often during class, and less often felt important in the classroom (Bonica et al., 2007). Moreover, they viewed the academic learning tasks and the need to carry out these tasks independently as difficult and complex. The following statements (Bonica & Sappa, 2008) demonstrate these sentiments:

Here we need to study in a more organised way (female; 20 years old; written account)

In high school I could use memorisation as a learning strategy. Now we have too much to study, so I have to select and integrate. (female; 20 years old; written account)

Here we need to figure out our own way of studying, without constant help from teachers. (male; 21 years old; written account)

Finally, at the beginning of the course the students claimed that they were not accustomed to the cooperative learning method. They stated that they usually studied alone and that they had developed their study strategies more through personal and solitary experimentation than through comparison with classmates, or with the help of teachers or parents (Bonica & Sappa, 2008).

## **Instruments and analysis**

In accordance with the aims of this study, data analysis explores the outcomes of the cooperative learning project, focusing on two aspects: a) change in the students' self-confidence in facing a new learning task, achievement, and sense of belonging to the new learning community before and after the cooperative learning activity; b) the degree of satisfaction and the perceived usefulness of the cooperative learning activities from the students' point of view.

Longitudinal analysis is based on data collected through a questionnaire (Bonica, 2006) administered shortly before and following the cooperative learning activities (Time 1 and Time 2 showed in fig.2). Written accounts, collected at the end of the cooperative learning project (Time 2 showed in fig.2) were also considered in order to explore satisfaction with and perceived usefulness of the learning project. Finally, achievement was investigated considering the marks earned by the students on the Developmental and Educational Psychology examination (Time 3).

## Measures

The following variables were used to collect data:

1. *Self-confidence in facing a new learning task* was explored first using a set of items selected and adapted from the *meta-cognitive learning self-efficacy scale* (Bandura, 1997). Specifically we asked the students to what degree they felt able to: a) confront a new learning task; b) deal with the anxiety of an examination; c) persevere in the face of difficulties; c) recognise personal limitations and capabilities; c) engage in studying; d) achieve their personal aims. A range of answers from 1 (minimum self-perceived capability) to 4 (maximum self-perceived capability) was possible.

Secondly, we explored personal satisfaction with achievement asking students to what degree they felt: a) pride in the learning success they had achieved; b) admired for the learning success they had achieved; c) satisfied with the learning success they had achieved. A range of answers from 1 (minimum satisfaction) to 4 (maximum satisfaction) was possible, except for the sense of admiration that was analysed considering a range of 1 to 6 (1, minimum level of perceived admiration; 6, maximum level of perceived admiration). This latter variable was extracted from the sense of control scale of Pulkkinen and Rönkä (1994), so we prefer to keep the same range of answer used by these authors.

2. *Achievement* was analysed considering, as an absolute value, the marks earned by the students on the Developmental and Educational Psychology examination (in Italy the range of marks is 18 to 30). We also considered a relative index comparing the mark obtained by each student on the exam with their average mark for all other subjects.
3. *Sense of belonging to the new learning community* was examined by asking the students how satisfied they were with their relationships with professors and classmates and how satisfied they were with the overall learning experience offered by their university courses. A range of answers from 1 (minimum agreement) to 4 (maximum agreement) was possible.
4. *Degree of satisfaction with and perceived utility of the cooperative learning experience* was analysed first by asking the students how satisfied they were with the cooperative learning project (range: 1= “not satisfied”; 2= “a little satisfied”; 4= “quite satisfied”; 4= “very satisfied”). We then asked the students to what degree they considered cooperative learning useful in order to improve meta-cognitive, motivational and social skills. On the meta-cognitive side we consider:
  5. the capability to apply different study strategies to specific material to be learned;
  6. the ability to make connections between texts and theories;
  7. the ability to self-evaluate one’s performance in a learning activity.

On the motivational side we considered the ability to face new and more difficult learning tasks. On the social side we explore the Cooperative Learning perceived utility in improving relationships with classmates

Students were asked to indicate the perceived degree of usefulness considering separately each of the cooperative learning phases (see tab.1). A range of answers from 1 (minimum usefulness) to 4 (maximum usefulness) was possible. \*

Finally, two open-ended questions asked students to describe what Cooperative Learning was most and least useful for.

## Statistical Analysis

For our statistical analysis, paired sample t-tests were used in order to assign values to longitudinal change (time 1 and 2), whereas GLM repeated measures tests were applied to compare the degree of perceived usefulness for the different phases of the cooperative learning activity. Furthermore, a lexical co-occurrence analysis of the text was performed, supported by Alceste software (Reinert, 1986; 1993). Co-occurrence analysis is the statistical analysis of frequent word pairs in the body of a text and can be described as a marriage of textual and statistical analysis. This technique determines word distribution patterns within a text, with the objective being to obtain a primary statistical classification of simple statements (using the chi-squared criterion) in order to reveal the most characteristic words, which in turn can be distinguished as word classes representing different forms of discourse concerning the topic of the text. A descending hierarchical cluster analysis was applied in order to define the classes, while chi-squared criterion was followed to value the association between classes and each word. From a psychological point of view each cluster represents a different “semantic universe” activated by the starting stimulus, which was, in our case, the specific open-ended questions on the areas for which cooperative learning had been most or least useful for.

## Findings

### **Longitudinal analysis on self-confidence, achievement, and sense of belonging to the new learning community**

As revealed in a longitudinal analysis (Table 2), over the course of the cooperative learning activity the mean values of self-confidence in facing a new learning task, learning achievement, and sense of belonging to the new learning community increased.

First, development of meta-cognitive learning self efficacy was found for all the considered variables. After the cooperative learning experience students perceived themselves as better able to confront a new learning task ( $t = 3.32$  sig. = .001), to deal with the anxiety of an examination ( $t = 7.67$  sig. <.001), to persevere in the face of difficulties ( $t = 2.02$  sig. < .05), to recognise personal limitations and capabilities ( $t = 2.09$  sig. < .05), to engage in studying ( $t = 2.33$  sig. < .05), and to achieve their personal aims ( $t = 2.14$  sig. < .05).

Furthermore, an increase in personal satisfaction with learning achievement was found. At the conclusion of the activity students felt more pride in ( $t = 3.67$  sig. <.001), admired for ( $t = 2.2$  sig. < .05), and satisfied by ( $t = 2.66$  sig. < .01) their learning success.

In addition, the students achieved high average marks on the developmental and educational psychology examination: 27.11 out of 30 (s.d. 2.6), and 67% of the students earned a higher mark than their personal average on this examination.

Regarding the sense of belonging, we found an increase of satisfaction with the collective learning context. Soon after the cooperative learning activity, students were more satisfied with their relationships both with professors ( $t = 3.16$  sig.  $< .005$ ) and classmates ( $t = 2.48$  sig.  $< .05$ ) and a higher satisfaction with the learning opportunity offered by the university course was also found ( $t = 2.66$  sig.  $< .01$ ).

**Table 2 Change from time 1 to time 2 in self-confidence and sense of belonging.**

Note: N=116; paired sample t-test; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .005$

Variables	Range	Time 1 Mean (s.d.)	Time 2 Mean (s.d.)	t
<b>Self-confidence in facing new learning tasks</b> <i>To what degree do you feel able:</i>				
1. To confront a new learning task?	1-4	2.41 (.70)	2.65 (.66)	3.32***
2. To deal with the anxiety of an examination?	1-4	2.47 (.87)	3.18 (.65)	7.67***
3. To persevere in the face of difficulties?	1-4	2.98 (.72)	3.10 (.72)	2.02*
4. To recognise personal limitations and capabilities?	1-4	3.11 (.56)	3.26 (.58)	2.09*
5. To engage in studying?	1-4	2.84 (.74)	2.99 (.76)	2.33*
6. To achieve your personal aims?	1-4	3.08 (.53)	3.19 (.50)	2.14*
<i>To what degree do you feel:</i>				
1. Pride in the learning success you have achieved?	1-4	3.25 (.61)	3.45 (.55)	3.67***
2. Admired for the learning success you have achieved?	1-6	3.74 (1.09)	3.95 (.93)	2.2*
3. Satisfied for the learning success you have achieved?	1-4	3.11 (.61)	3.26 (.61)	2.66**
<b>Sense of belonging to the new learning community</b> <i>How satisfied are you:</i>				

Variables	Range	Time 1 Mean (s.d.)	Time 2 Mean (s.d.)	t
1. With your relationships with professors?	1-4	2.26 (.72)	2.48 (.78)	3.16***
2. With your relationships with classmates?	1-4	3.18 (.73)	3.34 (.68)	2.48*
3. With the overall learning experience offered by your university courses	1-4	2.99 (.57)	3.17 (.67)	2.66**

## Satisfaction with and perceived usefulness of the cooperative learning activity

Participants were generally satisfied with the cooperative learning activity: 32% (39 subjects) of the students stated that they were “very” satisfied; 53.3% (65 subjects) were “quite” satisfied with the activity, 13% (16 subjects) stated that they were just “a little” satisfied, and only 1.6% (2 subjects) stated that they were unsatisfied.

Comparing the perceived usefulness of the different phases of cooperative learning (Table 3), we found that the activities focused on a public product (the metaphor) were considered more valuable than the other phases of the project.

The highest values of perceived usefulness for all considered variables (meta-cognitive, motivational, and relational) were, in fact, attributed to one or more of the home group activities. Furthermore, learning activities taking place in the classroom under the supervision of a tutor (formal context) were perceived as more useful than the others, which occurred in a more informal context and this difference regard in particular the expert group activity.

In terms of meta-cognitive processes, the whole home group activity, the objective of which was to share knowledge and create a collective product to be presented publically, provided students with the most valuable opportunities *to make connections between texts and theories* and to *improve self-evaluation*.

Studying individually at home was also perceived as highly useful in terms of these meta-cognitive variables, but it was considered the most useful phase in which to improve the ability to *apply different study strategies to specific material to be learned*.

Analyzing our findings in greater depth, we want to consider more precisely the relationship between these different meta-cognitive skills and the kind of cognitive tasks focused on in the various phases of the cooperative learning project. Students stated that they had tested their ability to appropriately use different study strategies overall individually and during the first home group activity held in the classroom under the

supervision of the tutors. Though we do not know exactly how the students organized their home group work, it is reasonable to assume that the first meeting focused on knowledge sharing and reciprocal teaching, while in the second students concentrated more on the production of the metaphor. Reciprocal teaching was likely to have encouraged students to explore how and when to use different study strategies. It was during this activity that students were able to compare their own teaching and study methods with those used by others, and to evaluate the effectiveness of the various study strategies. On the base of these considerations we can consider that the ability to appropriately use different study strategies could be reinforced through both an individual experimentation (activated during the phase of studying at home) and a cooperative process of knowledge sharing that gave to the students the opportunity to socially evaluate the effectiveness of the different study strategies.

**Table 3 Mean comparison for perceived usefulness of different cooperative learning phases**

Note: N=116; GLM repeated measures; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .005$ .

Different letters indicate significant differences in usefulness (paired sample t-test;  $p < .05$ )

	Activities focused on a within-group cooperative learning product			Activities focused on a public cooperative learning product			
	Formal expert group	Informal expert group	Informal individual study at home	Formal home group	Informal home group	Formal public presentation	
<b>Perceived usefulness</b> <i>How useful was cooperative learning in improving your ability to:</i>	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	<b>F</b>
<i>Apply different study strategies to specific material to be learned</i>	2.31c (1.16)	1.91d (1.3)	2.86a (1.03)	2.6b (1.05)	2.42c (1.05)	2.45c (1.19)	10.576***
<i>Make connections between texts and theories.</i>	2.28b (1.17)	1.89c (1.3)	3.05a (.88)	3.10a (.97)	3.11a (.96)	3.11a (1.08)	19.582***
<i>Self-evaluate</i>	1.99c	1.66d	2.45b	2.72a	2.54b	2.79a	19.032***

	Activities focused on a within-group cooperative learning product			Activities focused on a public cooperative learning product			
	<i>Formal expert group</i>	<i>Informal expert group</i>	<i>Informal individual study at home</i>	<i>Formal home group</i>	<i>Informal home group</i>	<i>Formal public presentation</i>	
	(1.09)	(1.12)	(1.06)	(1.02)	(1.03)	(1.15)	
<i>Face new and more difficult learning tasks</i>	2.52c (1.13)	2.08d (1.38)	2.59c (1.13)	3.09a (.91)	2.95b (1.03)	2.92b (1.17)	22.149***
<i>Form closer relationships with classmates</i>	2.99c (1.02)	2.35d (1.41)	1.82e (1.19)	3.47ab (.72)	3.51a (.86)	3.31b (1.09)	2257.5** *

On the other hand, the ability to make connections between texts and theories constitutes a part of the learning product and involves the task of constructing a wider theoretical framework in which to collocate the different perspectives. This is clearly the aim of the home group, considering both the sharing of knowledge and the production of the metaphor. All the home group activities were, in fact, perceived as useful in this sense.

Furthermore, the ability to self-evaluate was improved especially during the formal home group meeting and the public presentation of the metaphor. These activities may have provided more opportunities to receive feedback from others as both of these phases involved a sort of “presentation” of the work done previously: the reciprocal teaching in the formal home group was the product of the study in the expert group, and the public presentation is the collective product of the entire learning activity.

Finally, on the motivational side, the students perceived the formal home group as the most useful context in which to *improve self-efficacy in facing new and more difficult learning tasks*, while on the relational side, activities focused on a public product were perceived as the most useful in terms of *improving relationships with classmates*.

The process of knowledge sharing and the creative work of producing the metaphor seem to have constituted an important opportunity for socialization, while the sharing of knowledge and reciprocal teaching that it implied were most valuable in terms of personal motivation and self-confidence in confronting new learning tasks.

### ***Analysis of the written accounts***

Open-ended questions were used in order to determine students’ perceptions about what Cooperative Learning was most and least useful for. The answers were analysed through a co-occurrence lexical analysis using Alceste software. As described in the methodology section of this paper, this analysis aims to point out the hidden structure of a text by

identifying word classes that represent different “semantic universes” within the subject of the text. A chi-square criterion was followed to value the association between classes and words.

The whole text was composed of 244 statements, 122 for each question. 75% of the text was classified by Alceste in six stable clusters which defined as many semantic universes (Table 4).

In general, we observed that several cognitive and social processes cited by the students. The semantic universes that emerged referred to a variety of psychological processes and suggest how this learning activity succeeded in stimulating students in these areas.

In addition, we pointed out four more specific clusters referring to what was perceived as useful, and two which defined some critical points.

With regard to the “positive clusters”, the first was composed of several statements about cooperative learning as a support for “learning” and a way to succeed on the “examination” and “to know” more about the “new” and most important “topics” of the specific subject. A focus on the content of the learning activities characterized this semantic universe. The most relevant statements grouped in this cluster describe the perception of usefulness, as we can read in the following examples (1 and 2):

**Statement 1**

*It was useful to **know** the **arguments** explained by the experts*  
(female; 20 years old; Chi2:25)

**Statement 2**

*This activity allow me to **learn arguments** useful for the **examination***  
(male; 20 years old; Chi2: 7)

Statements about positive perceptions were also frequent in the second cluster. This semantic universe deals with cooperative learning as an opportunity to discuss and debate with classmates. The verbs “to compare” and “to understand” were highlighted as most significant, and their association with the words “method” and “others” suggest a focus on the collective learning setting as a promoter of the meta-cognitive processes. As underlined in the following statements (3 and 4), a process of comparison and collaboration was activated, promoting improved comprehension and awareness in the students of their own personal approaches to learning and studying.

**Statement 3**

*It was useful in order to **compare** myself with the **other** members of my group and to **understand** better my potentialities and constrains*  
(male; 20 years old; Chi2: 22)

**Statement 4**

*It was useful to **compare** different **methods** of study and to **understand** the **methods** of study of the **others***  
(female; 20 years old; Chi2: 8)

#### **Statement 5**

*It was an opportunity of **comparison** that allow me to put into discussion my beliefs and ideas*  
(female; 20 years old; Chi2: 8)

The meta-cognitive ability to make connections between texts and theories is the focus of the third cluster. This semantic universe refers to capability and self-confidence in constructing a theoretical framework in which to collocate all the different psychological theories learned. These capabilities are highly relevant in the transition to university because they deal directly with a difficult and significant academic learning task that students must face.

In the following statements (6 and 7) we find examples of this process.

#### **Statement 6**

*It allows me to **be able** to make **connections** between **theories***  
(female; 20 years old; Chi2: 24)

#### **Statement 7**

*It was useful in order to learn to construct a learning project putting together different **theories** and **perspectives***  
(male; 20 years old; Chi2: 13)

The fourth semantic universe focuses on underlying relational aspects; or more specifically, how cooperative learning promoted positive in-group relations and motivation to reciprocity. “Classmates”, “relationships” and “to improve” appeared the most relevant words in this cluster and a specific reference to “positive interdependence” was pointed out in the following statements (8, 9, 10):

#### **Statements 8**

*I think it was useful to learn good strategy and to **improve relationship** with **classmates***  
(female; 20 years old; Chi2: 49)

#### **Statements 9**

*During this activity I understood that **together** with the **classmates** it is possible to do a lot*  
(female; 42 years old; Chi2: 13)

#### **Statements 10**

*It was useful especially to **construct** group strategies*

(male; 20 years old; Chi2: 10)

On the other hand, cluster 5 and 6 grouped several statements about what aspects were perceived as less useful. Two specific points of criticism emerged. With regard to cluster 5, we observe that the cooperative learning project was not perceived as useful in order to “change” students’ own personal study strategies.

**Statement 11**

*It was not so useful to **organize** better my **individual** study*

(female; 20 years old; Chi2: 17)

**Table 4. Semantic universes (clusters) identified through lexical co-occurrence analysis (Alceste).**

Note: \*illustrative variable

Semantic universes	Associated words and illustrative variables
Cluster 1 <b>Learning the content of the new subjects</b> (11.56% of the classified text)	<i>To learn (Chi2: 16.68)</i> <i>Examination (Chi2: 16.18)</i> <i>Subject (Chi2: 8.69)</i> <i>New (Chi2: 34.82)</i> <i>To know (Chi2: 47.83)</i>
Cluster 2 <b>Comparing different methods of study</b> (17% of the classified text)	<i>To compare (Chi2: 44.63)</i> <i>Method (Chi2: 16.75)</i> <i>Others (Chi2: 8.39)</i> <i>To understand (Chi2: 8.39)</i>
Cluster 3 <b>Making connections between different theories</b> (13,61% of the classified text)	<i>Connections (Chi2: 61.18)</i> <i>Theories (Chi2: 47.07)</i> <i>Different (Chi2: 53.27)</i> <i>To be able to (Chi2: 54)</i> <i>Texts (Chi2: 26.11)</i> <i>Confidence (Chi2: 19.41)</i>
Cluster 4 <b>Improving relationships with the classmates</b> (12,93% of the classified text)	<i>Together (Chi2: 88)</i> <i>Relationship (Chi2: 48.72)</i> <i>Classmate (Chi2: 82.33)</i> <i>To construct (Chi2: 34.6)</i> <i>Improve (Chi2: 23.94)</i>
Cluster 5 <b>Difficulties in organize better individual study</b> (14,97% of the classified text)	<i>To organize (Chi2: 47.47)</i> <i>Individual (Chi2: 54.10)</i> <i>Change (Chi2: 17.40)</i> <i>Competence (Chi2: 17.40)</i>
Cluster 6 <b>Limited time</b> (29,93% u.c.e.)	<i>Time (Chi2: 20.33)</i> <i>To study in-depth (Chi2: 8.71)</i> <i>Expert (Chi2: 34.87)</i>

Semantic universes	Associated words and illustrative variables
	Work (Chi2: 17.45)

The difficulty in transferring what one has learned into a new personal learning approach seems to emerge. As seen in the previous statement (11), many students failed to improve their “individual” study strategies and it seems that the protective processes encouraged by the cooperative activity may be limited exclusively to the same context where it took place.

**Statement 12**

*We could not optimize our **time***  
(female; 20 years old; Chi2: 16)

**Statement 13**

*In the **expert** group we had no enough **time** to study **in depth***  
(female; 20 years old; Chi2: 12)

Finally, several students underlined an organizational constraint: too little “time” was dedicated to this activity. Cluster 6 grouped a number of statements dealing with this aspect. The main problem was the difficulty of studying and understanding the topics in depth. The “expert” groups in particular seemed to have been affected by the time constraint (see statement 12 and 13). This finding could be read in continuity with the lower level of perceived utility assigned to the expert group activity (see Tab. 3). A sense of difficulty seemed, in fact, to characterize this first phase of the Cooperative Learning, objective of which was to study in deep a specific theory, while a higher level of satisfaction and effectiveness was associated to the second phase of the cooperative work, the home group activities, more focused on a public product.

## Discussion

The aim of this paper was to present a cooperative learning project carried out with first-year university students, and to explore its potential as a support in the school-to-university transition. Our findings suggest that cooperative learning was a fruitful learning strategy in order to help students cope with the challenges involved in this transition. An increase in participants’ self-confidence in confronting new learning tasks, achievement, and sense of belonging to the new learning community was found. Furthermore, an analysis of written accounts revealed that this learning activity succeeded in promoting meta-cognitive and relational skills that are very important in order to successfully face the new learning context.

The variety of the psychological processes evoked in the written accounts supports educational and psychological literature that value cooperative learning as a strategy effective in promoting several different skills: meta-cognitive, cognitive, relational and motivational ones (Slavin, 1990; Gillies & Ashman, 2003).

A feeling of positive interdependence pervaded the group activities made the students aware of the value of working together. On the social side, the collective context was perceived as an opportunity for reinforcing relational skills, while on the meta-cognitive side it allowed students to become better acquainted with themselves and their own learning strategies and approaches.

As for the different phases of the project, the most useful was perceived to be the cooperative learning context aimed at developing a public product. The construction of the metaphors enriched the cooperative learning activity with important additional aspects: it promote a sense of shared responsibility, because the metaphor should be presented publically as a collective product; and it give to the students the opportunity to elaborate the material learned in a creative way and to negotiate and integrate, in a collective perspective, different viewpoints and theoretical frameworks.

Some examples of metaphors presented by the students were a puzzle, a set of bridges, and the song "Father and Son" by Cat Steven.

The puzzle was presented as a synthesis of the different developmental areas studied in each developmental perspective (e.g. cognitive, emotional and relational). The students visualized each piece of the puzzle as one of these psychological functions and the whole puzzle as a symbol of the interdependence between them. The group which symbolized human development as a set of bridges (using a photograph), wanted to underline the infinite variety of potential developmental trajectories and the constant changes people are exposed to. The group which chose the song "Father and Son" song emphasized the processes of dependence and autonomy which characterize all human development and which is a central aspect in these specific phase of life presently being lived out by these students: late adolescence and young adulthood.

On the meta-cognitive side, this work involved perspective-taking processes and promoted socio-cognitive conflicts that had to be resolved in order to define a common and shared product. Moreover, it stimulated students to build a wider framework of knowledge in which to collocate different psychological perspectives derived not only from study of the authors, but also from the personal viewpoints of each group member.

On the social side, this work promoted motivation to reciprocity and positive in-group relationships, also mediated by the students' enjoyment of the creative activity. In addition to the opportunity it provided to become better acquainted with classmates, the activity also offered an important chance to enlarge the students' social network, increasing the sense of belonging to the new learning community and promoting the students' ability to take advantage of the collective context to support their learning. These interpretations can be interpreted as consistent with the socio-constructivist perspective, which views the learning process as the product of a cultural and social meaning shared in a learning community (Bruner, 1996; Resnick, 1987; Lave & Wenger, 1991; Pontecorvo et al., 1995). Moreover, the revealed potential of the phase in which the metaphor was produced could be interpreted in the framework of the social knowledge building perspective, which stresses that learning processes must be, first and foremost, a creative process of knowledge gaining (Scardamalia & Bereiter, 2003; Bereiter & Scardamalia, 2003; Sawyer, 2003).

Considering formal versus informal cooperative learning contexts, students viewed the former as more valuable. This finding might suggest that personal experimentation with this kind of project is best carried out in a protective context where students can count on the support of the expert tutors not only to help them with any difficulties encountered but also to sustain alternation between autonomy and dependence in the learning process. From a psycho-social and educational perspective that values the importance of learning domain experiences in the identity construction process (Bonica, 2005; 2008), this alternation of autonomy and dependence plays an important role in supporting not only learning achievement, but also self-growth..

Some negative points, did emerge, however. The inability to use what was learned to improve individual study methods pointed to the difficulty involved in changing one's personal methods, especially when based almost exclusively on an individual learning approach. As we underlined in other publications (Bonica et al., 2007; Bonica & Sappa, 2008), these students stated that they were unaccustomed to cooperative learning methods and usually studied alone. Moreover, using the same interpretative framework, we could also consider the students' perception of having too little time as a consequence of their lack of experience with cooperative learning. In this perspective it is important to note that the tutor's support emerged as particularly useful during the expert group activity, which constituted the first one and the most critical. It is probably necessary to put a particular attention to this first phase as first moment of facing with the new collective way of learning. More in general, taking into account these aspects, we feel that it is important to support students in a process of gradual integration of individual and collective learning approaches. Based on this experience, it may be useful, for example, to introduce more cooperative learning sessions. We did it successfully some years before the current project. In that experience, despite the organizational complexity of putting into practice the two sessions, positive outcomes were pointed out and students' skills improved over the course of the whole experience.

## **Conclusion**

The findings presented here lend support for the protective role that cooperative learning can play in the school-to-university transition and encourage the implementation of future projects of this kind, especially when a new learning community must be built, as was the case during this transitional period.

With regard to the overall organization of this project, we feel that it was particularly effective to fully integrate the project into the course. We believe that part of the success of this experience was due to the decision to present it as a project shared with the wider academic learning community and not only as a limited experience outside the formal course program. Providing an opportunity for participation to the entire class of students, engaging the professor and three assistants as tutors, and focusing the activity on a part of the official examination program were factors that supported the students' perception that they were part of a synergy.

In the future some organisational aspects could be improved, such as the opportunity to hold two sessions and to provide more time to work.

In terms of research methodology, we are aware of the need for a control group in order to gain a clearer understanding of the contribution of cooperative learning to the changes found. However, we feel that the textual analysis and the short time between the two waves (2 months) supports the positive role played by the learning activity in the students' improvement. In the future, we intend to collect some other longitudinal data in order to evaluate the long-term effects of this activity.

Finally, it should be noted that we chose to concentrate here on the positive effects of cooperative learning in terms of meta-cognitive and social skills improvement, overlooking many other equally relevant aspects. Our current work deals with a study on how the construct of metaphor was interpreted and developed by the students. We noted that some groups did not produce exactly a metaphor showing a sort of difficulty in the comprehension of its meaning. This interest found continuity with the field of psychological research focused on the process of metaphor comprehension-production (Morabito, 2002).

Secondly we aim to analyze within-group relational dynamics developed in the course of this activity. We noted, in fact, that some students found it difficult to develop relationships with the other members of the group, due to both their shyness and to the kind of leadership developed within the specific group. We intend to examine these aspects more closely by integrating group dynamics research with cooperative learning educational one (see for example Sweet & Michaelsen, 2007).

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