# Training of Non-University Level Teachers in Cooperative Learning Methods

Rosa María Pons<sup>1</sup>, Yael Sharan<sup>2</sup>, José Manuel Serrano<sup>1</sup>, Clotilde Lomeli<sup>3</sup>, Céline Buchs<sup>4</sup> <sup>1</sup>Department of Educational Psychology, University of Murcia, Murcia, Spain <sup>2</sup>University of Tel Aviv, Tel Aviv, Israel

<sup>3</sup>Faculty of Pedagogy and Educational Innovation, Autonomous University of Baja California, Mexicali, México <sup>4</sup>Department of Educational Science, University of Geneva, Geneva, Switzerland

Email: rmpons@um.es

Received December 21st, 2012; revised January 21st, 2013; accepted February 22nd, 2013

This article proposes a teacher training program in Cooperative Learning Methods (CLM). The analysis of the effects of the program on the development of CLM instructional designs is based on an eight category system which supports the development of instructional design that organizes the classroom from a cooperative perspective. This study also proves the existing differences among professionals teaching at different levels of the non-university education levels. The results demonstrate the efficacy of the training process of teachers who work in non-university educational system and its effect on their practice.

Keywords: Cooperative Learning; Training Teacher; Non-University Educational System

## Introduction

The appearance of the concept of competency, based on the DeSeCo (Definition and Selection of Competencies) approach developed by the OECD, was the trigger for the emergence of multiple initiatives which tried to give "a Copernican turn" to education in the last two decades (Salganik et al., 1999; Zhu, Valcke, & Schellens, 2010). It was not until the beginning of this century when these initiatives become more systematic. In fact, despite the slight shift from cognitive and socio cognitive constructivism to social constructivism, it was not until the characterization of the competency notion that this change would have the necessary policy support (Serrano & Pons, 2011).

DeSeCo not only establishes the internal structure of competency (knowledge, cognitive skills, practical skills, attitudes, emotions, motivation-disposition, values and ethics), but also the required conditions in order for them to be attained: ability to cooperate, situated on context. The aforementioned two elements correspond to two major interpretations of cognition: distributive cognition and situated cognition.

To say that knowledge is situated means that it is a part and a product of the activity, the context and the culture in which it takes place and is utilized. To say that knowledge is distributive implies that it is composed of human cognition resources as well as all the tools and artifacts provided by culture (Salomon, 2001).

The sliding of constructivism towards the concepts of distributive and situated cognition (Slaouti, 2007) leads to the idea of the classroom as a learning community or a community of practice (Angelides, Stylianou, & Leigh, 2007; Wenger, Mc-Dermott, & Sneyder, 2002), constituted of a group of people learning together by using common tools in the same environment. Therefore, knowledge is composed of a set of known facts that are present in different people and that once shared, are appropriated by the members of that group. This is known under the generic name of Cooperative Learning and the cooperative organization of the classroom is achieved through Cooperative Learning Methods (CLM).

CLM are systematic instructional procedures that are characterized by divide the class into small groups of different levels of heterogeneity and by carry the members those groups to be maintain a positive interdependence through task, goal and reward structures.

The application of cooperative pedagogy in the classroom is not a simple process, and requires specific teacher training. The design of teacher training programs for cooperative learning, both for pre-service training (Dyson, 2001; Helleve, 2007; Siberry & Kearns, 2005, Sharan, 2002, 2010), as well as for ongoing training (Angelides, Stylianou, & Leigh, 2007; Emmer & Stough, 2001; Hawkes, 2000; McGregor & Gunter, 2006; Solomon, 2000), to strengthen peer interaction is a promising line of research (Hoy & Tschannen-Moran, 1999; León et al., 2011). This line of research enables both the development of integrated teacher-training projects such as the SELA Project (Almog & Hertz-Lazarowitz, 1999) and the successful applications of instructional topics fostered by cooperative learning and applied to teacher-training (Dettori, Giannetti, & Persico, 2006; Slaouti, 2007; Taspinar, 2007).

Most of these research projects use a category system as a control and measuring element (Veenman, van Benthun, Bootsma, van Dieren, & van der Kemp, 2002), extracted from the analysis of the general dimensions of CLM conducted by S. Kagan (1985), or based on the teaching of CLM, whose efficiency has already been proven (Perkins & Saris, 2001).

An earlier study of the minimum contents of a teacher training program to ensure the development of cooperative learning instructional design (Serrano & Gonzalez-Herrero, 1996) was based on the results obtained in one of the first training experiences in Spain (Calvo, Serrano, Gonzalez-Herrero, & Ato, 1994), based on the experiential approach (Sharan & Sharan (1987). It is precisely this aforementioned design that we would like to submit to experimentation once it has been modified following experiences that took place in seminars and teachertraining courses (Cordero & Luna, 2010; Serrano et al., 2008), in order to prove its effectiveness.

It is from this standpoint that our work hypothesis is based on two premises. The first (H<sub>1</sub>) is that the essential elements for setting up a cooperative classroom involve specifying relevant elements of the philosophy of education and the nature of learning, the structure of the learning task, the reward structure, the formation of groups and students' roles, the teacher's role, evaluation and resources (Serrano & Calvo, 1994). The second (H<sub>2</sub>) is that since every knowledge-acquisition process is based on prior knowledge, the impact of a training program may vary among teachers, depending on their initial training and the grades they teach (preschool, elementary, secondary school or high school).

# Method

### **Participants**

Participation in the experiment was voluntary, and 76 teachers from all educational levels signed up. They were motivated to learn CLM as an alternative way of dealing with the problems (associated mostly with cognitive, ethnic and cultural diversity) in their classrooms. They came from areas with high levels of immigration, and all of them had a somewhat contact with cooperative learning.

The distribution of the seventy-six professionals, by cycles and levels, is shown in **Table 1**.

## Procedure

The activity was part of a weekly academic course with three-hour-long sessions (100 academic hours) and consisted of two alternating parts: lectures and cooperative seminar work.

The procedure was as follows: The first part was the presentation of the activity and work methodology. Afterwards, they were provided with the following program:

Theme 1: Introduction.

1.1. Systematization of the instructional process. 1.2. General strategies of instruction. 1.3. Developmental stages and instructional process. 1.4. The construction of knowledge: Piaget and Vigotsky. 1.5. The Piagetian and Vygotskian interpretation of the interaction process. 1.6. The importance of peer interaction for knowledge acquisition and objective achievement.

Theme 2: Instructional Process Design.

2.1. The need for design. 2.2. Design dimensions and components. 2.3. Design phases. 2.4. Evaluation of design: efficacy and efficiency of instructional design.

Theme 3: Cooperative Learning Methods.

3.1. Definition and general dimensions of Cooperative Learning Methods: The psychological dimension and the social dimension. 3.2. Specific dimensions of CLM: the underlying philosophy of education, the nature of learning, the nature of

#### Table 1.

Sample distribution by cycle and educational level.

Level	Pre	eschool	Ele	mentar	y	Seco	ndary	High
Cycle	1	2	1	2	3	1	2	1
Participants	0	21	10	10	7	15	8	5

292

cooperation and communication, students' and teachers' roles, and Evaluation. 3.3. Implications for analysis of process findings. 3.4. Examples and dimensional analyses of CLM.

Theme 4: The Cooperative Learning Environment.

4.1. Introduction: An ecological approach. 4.2. Analysis of the situation. 4.3. Tools of the configuration process: Conceptual and procedural requirements. 4.4. Implementation of a co-operative environment: Standards, principles, levels, and conditions.

Theme 5: Classroom Organization.

5.1. Introduction. 5.2. Elements: Nature, role they play in the system and means necessary for intervention. 5.3. Forms of organization: Theoretical framework and interpretation perspectives.

Theme 6: The Role of the Teacher.

6.1. General introduction to the mediation processes. 6.2. Areas of intervention. 6.3. Stages of the training process.

Theme 7: The Role of the Student.

7.1. Introduction. 7.2. Types of roles. 7.3. Areas of intervention: Formal Learning Groups, Informal Learning Groups and Base Groups. 7.4. Methodological considerations.

Theme 8: The Learning Activity in the Cooperative Classroom.

8.1. Task structures. 8.2. Reward structure. 8.3. Structure of a cooperative lesson. 8.4. Perspectives of interpretation: Cognitive, practical and social cohesion.

Theme 9: Observation in the Cooperative Classroom.

9.1. Introduction. 9.2. Prerequisite issues of interaction analysis. 9.3. Recording and coding. 9.4. The Human Factor.

Upon completing the presentation, the participating teachers were asked to use the idea they had regarding the design of a cooperative learning activity, and based on their previous experiences, to produce a design about a specific level and subject matter they were teaching (initial design). They were given two hours to design the activity.

Once the instructional design was produced, a photocopy was made for the researcher and the participants kept the original. Following this, there was a meeting scheduled for the following week (the activity was carried out on a specific day).

The nine units of the program were grouped in six Blocks based on the theme: Block 1, Themes 1 and 2; Block 2, Theme 3; Block 3, Themes 4 and 5; Block 4, Themes 6 and 7; Block 5, Theme 8; and Block 6, Theme 9.

These Blocks were conducted in two types of sessions: theoretical and practical. Theoretical sessions were composed of two three-hour-long lectures. The first two hours covered a theoretical presentation and the last one was dedicated to a discussions and questions. Practice sessions or workshops, that were carried out after the theoretical sessions were structured cooperatively and interdependence was generated due to the structure of the task.

Workshops were conducted as follows: 18 groups were formed, composed of four or five members who taught at different educational levels. 14 groups had 4 members each and 4 had 5 members each.

Following this they were told the rules for group work. The researcher's role was also explained (responding to difficulties that may arise, redirecting the action to the group and intervening, when required but never providing an answer to a question). The interaction between the groups was voluntary and could be carried out freely.

Once the themes in Block 1 had been learned and an activity

was designed based on the theme, there was an individual evaluation session which was to make a new design (design number 1). In this evaluation session participants were told the following: "You have received and prepared information that might make you rethink several things that you have developed or did not consider in your initial design. You can take this design and based on it prepare another one with the same contents. If you think this design is correct you can leave it as is."

Then, just as before, a photocopy was made of the new design and was kept by the researchers. We proceeded the exact same way with the other Blocks.

That way, at the end of the training program we had seven designs: an initial one, and six that were prepared after teaching each Block of contents.

Evaluation of the Designs:

To evaluate the designs produced by the teachers participating in the training program we used a system of constructs based on the categories and dimensions identified in a cooperative learning method (Kagan, 1985; Serrano & Calvo, 1994). A measurement model was defined for each construct, which had at least two indicators per construct.

These constructs (latent variables) and their indicators (observed variables) were the following:

1) Philosophy of Education.

a) References to activities aimed at giving the students a clear perspective on the purpose of their learning.

b) References to activities aimed at giving the students a clear perspective of what cooperation is.

c) Clearly formulated objectives.

d) The difference between general, specific, and operative objectives.

e) The difference between primary objectives (linked to the achievement of the objectives) and secondary objectives (linked to the act of cooperation itself).

f) The goal structure assumed with regards to learning (cooperation, competition, individualization).

2) The Nature of Learning

a) The source of the objectives and educational contents was specified.

b) There was a differentiation made between inter- and/or intra-group objectives.

c) The materials and the information sources which the students were going to use during the teaching/learning process were specified.

d) The type of learning intended to be promoted was specified.

3) Structure of the Learning Task.

a) The structure of an intragroup learning task was correctly detailed.

b) The presence or absence of an intergroup learning task structure was justified.

4) Reward Structure.

a) The reward structure was correctly detailed.

b) The presence or absence of a competitive or cooperative intergroup reward structure was detailed and justified.

5) Formation of Groups and Students' Role.

a) The group size was specified and justified.

b) The composition of the group (criteria of group formation) was specified and justified.

c) The existence or nonexistence of different types of groups was specified and justified.

d) The communication relationships and hierarchy of stu-

Copyright © 2013 SciRes.

dents among themselves were specified and justified.

6) Role of the Teacher.

a) The role of the teacher in the learning activity was clearly specified.

b) The role of the teacher was complementary and consequently to the role of the students.

c) The role of the teacher respected the constructive activity of the students.

d) The scaffolding processes were taken into account.

e) The sociolinguistic contexts were taken into account.

7) Evaluation.

a) The structure of the task evaluation was correctly detailed.

b) The type of evaluation established (continuous/punctual,

formative/summative, etc.) was detailed and justified.

c) The evaluation sources and the role of each in the overall evaluation of the process were detailed and justified.

d) The way to obtain the grade of the group was clearly specified.

e) The percentage of the overall grade that a cooperative unit received was specified and justified, and that was provided by the group's score (whether or not they have), and in their case, the percentage of the overall grade provided by the cooperative unit.

8) Identification and Material Resources.

a) The course, the unit, the lesson, etc., were correctly identified.

b) The physical organization was clearly specified.

c) The development time of the work unit was specified and justified.

d) The presence or absence of training was specified and justified.

e) The material to use was described and justified.

To quantify each of these variables, the following grading criteria were used:

1. Not appearing in the instructional design.

2. Appeared, but in an intuitive manner, and not in an explicit form.

3. Appeared in an explicit way, but incorrectly, and in some cases, contradictory in relation with other sections. There was no justification, or this was incorrect.

4. Appeared in a manner explicit and correct, but the justification was insufficient.

5. Correct in every sense.

### Data Analysis

To analyze the data obtained, we have used an analysis of the adjusted marginal means with a 95% interval of confidence. For this the differential change scores have been defined so as to quantify the inter-evaluation transition.

Due to the analytical complexity represented by the empirical data observed, and taking into account our work hypotheses, we decided to analyze the change of an evaluation to that following, in all the evaluative contents of the training course program, using those differential change scores. The analysis of the adjusted marginal means allowed us to determine which elements of evaluation were superfluous.

This model of statistical analysis allowed us to prove both of our hypotheses, and was prepared with Version 12.0 of the statistical package SPSS.

I. Analysis of Category 1: Philosophy of Education.

Regarding the transition between the initial evaluation (initial

design) and the first of the designs, the 95% confidence intervals include value 0 (that is, the mean of the observed changes is not significant) in content (f) for the first and third educational levels. The averages of other change scores were statistically significant.

In the transition from the first corrected design to the second one, the analysis of the adjusted marginal means reveals that there are no significant differences in content (c) in the first and fourth level, in content (d) in the third and fourth level and in content (e) in the fourth educational level. The rest presents confidence intervals that do not include value 0.

For the next transition, the change scores are minimal or null and there are no significant differences between levels. As shown in the table of estimated means, the change is null in the first five contents and insignificant (of little significance) in the last level, for all the educational levels.

We also found null change scores in contents (b) and (c), and of little significance in the remaining contents (with the exception of (f)), in the transition from the third to the fourth design. According to the table of estimated means, the change is significant in contents (a) in the first level, (d) in the third level, (e) in levels 1 and 4, and (f) in levels 1, 2 and 3.

The transition between the fourth and fifth design showed that the change scores are null in contents (b) and (c). As may be seen in the table of estimated means, the change is not significant in contents (d) and (e) for the fourth educational level.

Finally, for the transition to the final design, we found that

#### Table 2.

Confidence intervals at 95% for the philosophy of education category.

change is null in all the contents and for all educational levels. There is therefore no measurable change (**Table 2**).

II. Analysis of Category 2: Nature of Learning.

The analysis of estimated means in the transition from the initial design to the first corrected design, reveals significant differences in contents (a), (b) and (c) for all the educational levels (with the exception of (b), for the high school level), but not in content (d).

Regarding the following transition, all contents present a significant change in high school level, in secondary school the significance is found for contents (a), (b) and (d), and in preschool and elementary school, (b) and (d).

The transition from the second to the third design presents null change in contents (a), (b) and (c), with the exception, in this last case, of the high school level. In content (d) there is a certain level of significance in the elementary school level.

The following transition between designs reveals null change in content (c) and non significant differences at a high school level for any of the contents.

Most relevant in the transition of the fourth to the fifth design is the null change observed in content (c). The remaining contents show a significant change in all the other educational levels.

The transition between the fifth and the final design, in this category, shows a null change in contents (a) and (c), and non significant changes, or scarcely significant, in the rest (**Table 3**).

		$I \rightarrow 1$		1→2		2→3		3–	→4	4-	→5	5-	→F
Item	Level	Lower Level	Upper Level	Lower Level	Upper Level	Lower Level	Upper Level	Lower Level	Upper Level	Lower Level	Upper Level	Lower Level	Upper Level
	1	.788	1.308	1.108	1.464	.000	.000	.115	.361	.306	.646	.000	.000
-	2	.956	1.414	.954	1.268	.000	.000	071	.145	.776	1.076	.000	.000
	3	1.143	1.640	1.047	1.388	.000	.000	073	.161	.620	.945	.000	.000
	4	1.067	2.133	1.035	1.765	.000	.000	251	.251	.651	1.349	.000	.000
	1	1.035	1.536	.951	1.239	.000	.000	.000	.000	.000	.000	.000	.000
0	2	1.334	1.777	.910	1.164	.000	.000	.000	.000	.000	.000	.000	.000
<u> </u>	3	1.717	2.196	1.080	1.355	.000	.000	.000	.000	.000	.000	.000	.000
	4	1.486	2.514	1.305	1.895	.000	.000	.000	.000	.000	.000	.000	.000
	1	1.776	2.319	010	.391	.000	.000	.000	.000	.000	.000	.000	.000
0	2	1.649	2.128	.156	.510	.000	.000	.000	.000	.000	.000	.000	.000
3	3	2.393	2.912	.113	.496	.000	.000	.000	.000	.000	.000	.000	.000
	4	2.844	3.956	011	.811	.000	.000	.000	.000	.000	.000	.000	.000
	1	1.071	1.691	.019	.362	.000	.000	096	.096	.398	.936	.000	.000
-	2	1.689	2.236	.034	.336	.000	.000	048	.122	.244	.719	.000	.000
0	3	2.095	2.688	250	.076	.000	.000	.037	.223	.699	1.214	.000	.000
	4	2.964	4.236	351	.351	.000	.000	199	.199	152	.952	.000	.000
	1	1.533	2.086	1.008	1.469	.000	.000	.043	.242	.367	.776	.000	.000
0	2	1.904	2.392	.537	.944	.000	.000	087	.087	.449	.810	.000	.000
	3	2.084	2.612	.519	.959	.000	.000	095	.095	.544	.934	.000	.000
	4	2.834	3.966	273	.673	.000	.000	.196	.604	419	.419	.000	.000
	1	108	.203	2.239	2.714	037	.194	.180	.677	.725	1.085	.000	.000
6	2	.048	.322	2.383	2.802	050	.124	.262	.701	.508	.825	.000	.000
-	3	105	.192	2.295	2.749	051	.138	.328	.803	.654	.998	.000	.000
	4	.282	.918	2.513	3.487	203	.203	510	.510	.031	.769	.000	.000

		I–	→1	1-	1→2		→3	3–	→4	4-	→5	5-	→F
Item	Level	Lower Level	Upper Level										
	1	1.198	1.660	084	.179	.000	.000	1.007	1.565	.329	.814	.000	.000
	2	.944	1.352	042	.190	.000	.000	.643	1.135	.527	.955	.000	.000
а	3	.823	1.264	.044	.256	.000	.000	.125	.658	1.464	1.927	.000	.000
	4	.727	1.673	.130	.670	.000	.000	172	.972	1.103	2.097	.000	.000
	1	.687	1.313	1.071	1.310	.000	.000	.498	1.025	.531	1.088	050	.050
	2	.316	.869	.932	1.142	.000	.000	.731	1.195	.828	1.320	073	.081
1	3	.266	.865	.886	1.114	.000	.000	.487	.991	1.386	1.918	048	.048
	4	042	1.242	1.156	1.644	.000	.000	140	.940	1.029	2.171	103	.103
	1	.798	1.297	045	.045	.023	.474	.000	.000	.000	.000	.000	.000
	2	1.150	1.590	040	.040	.051	.467	.000	.000	.000	.000	.000	.000
5	3	1.110	1.586	043	.043	.731	1.182	.000	.000	.000	.000	.000	.000
	4	1.889	2.911	.106	.294	083	.883	.000	.000	.000	.000	.000	.000
	1	070	.451	1.425	1.909	072	.167	.721	1.184	.388	.850	104	.104
_	2	119	.341	1.268	1.695	.056	.217	.722	1.130	.092	.500	091	.091
Ċ.	3	249	.249	1.464	1.927	027	.201	.518	.961	.345	.786	.074	.273
	4	535	.535	1.504	2.496	245	.245	074	.875	.527	1.473	012	.413

 Table 3.

 Confidence intervals at 95% for the learning nature category.

III. Analysis of Category 3: Task Structure.

Even though the thematic blocks (except for the last one), have proven the importance of this category in the production of a cooperative instructional design, it is worth emphasizing the following facts:

First, the only non significant differences were found related to high school level, and exceptionally, in the transition from the initial design to the first corrected design, for content (b), in teachers of compulsory secondary education. Second, these non significant differences only occur in that transition and the one pertaining to the transition from the second design to the third. Finally, and as we have just mentioned, the transition to the final design shows null change, in all categories and for all the educational levels (**Table 4**).

IV. Analysis of Category 4: Reward Structure.

The evolution found in the reward structure is almost isomorphic with the task structure (see **Table 5**).

First, changes do appear in the transition from the fifth corrected design to the final design, but the changes are not statistically significant; and second, the lack of significance for the high school group is produced in the transition from design three to design four (though maintaining the change from second to third for content (a)).

V. Analysis of Category 5: Group Formation and Role of the Students.

The analysis of the estimated means in the transition from the initial design to the first corrected design, reveals significant differences in contents (a) and (d), but there is either no change at all, or only non significant change for contents (b) and (c), in any of the educational levels.

Regarding the transition between the designs 1 and 2, all the contents present a significant change in all the educational levels.

The transition of second to third design presents a non sig-

nificant change, and in the three cases where it was presented (contents (a) and (c) for the first level, content (b) for the second level and content (d)), neither its statistical nor its psychological significance is relevant.

The following inter-design transition (3-4) is very significant from the content perspective for (c) and (d), and has little or no significance from the (a) and (b) contents standpoint.

What is most relevant in the transition from the fourth to the fifth design is the remarkable lack of significance presented by contents (c) and (d) at the high school level.

In the transition between the fifth design and the final design, there is a null or statistically non significant change in this category, for every level and content (**Table 6**).

VI. Analysis of Category 6: Role of the Teacher.

The transition between the initial design and the first corrected design shows very significant differences in their execution related to all the contents (except for content (e)). These results are repeated in the transition 1-2, but this time they are related to content (d). Non significant differences also appear in content (c), for the preschool education and high school levels.

The transition between the second and third designs reveals a non-existent change in contents (a) and (b), and non significant or minimum change for (c). In addition, the contents (d) (barely significant differences in levels 1 and 4, and non significant in level 3) and (e) (non significant in levels 2 and 3, and barely significant in 4) show some differences which are not especially relevant for this category either.

The transition between designs three and four shows relevant changes for all the contents of this category, except for content (c) for the intermediate levels (compulsory elementary and secondary school).

The shift from the fourth to the fifth corrected designs shows a lack of change for contents (a) and (b), and very significant

		I–	→1	1→2		2-	→3	3–	→4	4→5		5→F	
Item	Level	Lower Level	Upper Level										
	1	.671	1.233	.885	1.210	.209	.648	.132	.630	.732	1.077	.000	.000
_	2	.863	1.359	1.005	1.291	.362	.749	.262	.701	.737	1.041	.000	.000
5	3	1.079	1.616	1.149	1.459	.268	.688	.675	1.151	.400	.730	.000	.000
	4	1.024	2.176	.867	1.533	250	.650	.490	1.510	.246	.954	.000	.000
	1	.034	.347	.224	.633	.406	.832	.316	.732	1.308	1.740	.000	.000
-	2	.010	.286	.042	.402	.256	.632	.298	.665	1.476	1.857	.000	.000
4	3	062	.236	.109	.500	.101	.508	.541	.938	1.272	1.685	.000	.000
	4	120	.520	.181	1.019	237	.637	.574	1.426	.757	1.643	.000	.000

 Table 4.

 Confidence intervals at 95% for the structure of the learning task category.

Table 5.

Confidence intervals at 95% for the reward structure category.

Item	Level -	I→1		<b>1</b> → <b>2</b>		2→3		3→4		4→5		5→F	
Item	Level	Lower Level	Upper Level	Lower Level	Upper Level	Lower Level	Upper Level	Lower Level	Upper Level	Lower Level	Upper Level	Lower Level	Upper Level
	1	1.324	1.723	.415	.823	.175	.587	.352	.791	.663	1.051	023	.118
_	2	1.157	1.509	.450	.810	.077	.441	.288	.675	1.014	1.356	062	.062
60	3	1.027	1.408	.674	1.065	.107	.502	.443	.862	.510	.881	024	.111
	4	.591	1.409	.582	1.418	022	.823	049	.849	.802	1.598	145	.145
	1	.236	.621	.467	.867	.195	.662	.163	.599	1.822	2.178	023	.119
•	2	.127	.466	.342	.695	.313	.724	.289	.674	1.695	2.009	025	.099
1	3	098	.358	.722	1.104	.212	.658	.139	.556	1.700	2.039	067	.067
	4	394	.394	.590	1.410	.122	1.078	047	.847	1.636	2.364	145	.145

# Table 6.

Confidence intervals at 95% for the student role category.

_		I–	→1	1-	→2	2-	→3	3–	→4	4–	→5	5-	→F
Item	Level	Lower Level	Upper Level										
	1	.774	1.131	1.466	1.867	.035	.251	040	.231	.660	.959	.000	.000
	2	.472	.787	1.379	1.733	021	.169	.028	.268	.757	1.021	.000	.000
9	3	.525	.866	1.808	2.192	103	.103	043	.217	.727	1.012	.000	.000
	4	.634	1.366	1.589	2.411	221	.221	279	.279	.693	1.307	.000	.000
	1	.000	.000	2.720	3.090	103	.198	.505	.828	.102	.469	.000	.000
	2	.000	.000	2.578	2.904	.089	.355	.058	.290	.579	.902	.000	.000
1	3	.000	.000	2.823	3.177	099	.187	067	.241	.651	1.001	.000	.000
	4	.000	.000	2.621	3.379	308	.308	331	.331	.624	1.376	.000	.000
	1	023	.119	1.551	1.973	.088	.387	.853	1.147	.697	1.018	.000	.000
	2	025	.099	1.554	1.927	020	.243	.908	1.166	.859	1.141	.000	.000
0	3	067	.067	1.798	2.202	143	.143	1.208	1.488	.499	.805	.000	.000
	4	145	.145	1.567	2.433	306	.306	1.700	2.300	329	.329	.000	.000
	1	.782	1.027	.887	1.113	084	.084	.923	1.268	.625	.994	038	.133
_	2	.855	1.071	.826	1.026	037	.112	.959	1.263	.652	.978	016	.150
0.	3	.839	1.074	.805	1.021	037	.124	1.139	1.469	.519	.872	082	.082
	4	.749	1.251	.368	.832	.026	.373	1.646	2.354	179	.579	176	.176

changes to the rest of the contents, except for (d) in the elementary education level.

Finally, the transition to the final design shows very significant changes in content (a), and moderate changes in (e), with a lack of significance for this last in the level of preschool education. The change is null for the rest of the contents (**Table 7**).

VII. Analysis of Category 7: Evaluation.

The transition between the first two designs (initial and first corrected design) shows a lack of change or differences of very little significance in all the contents (except for content (b), Level 2).

There are very significant differences in contents (a), (d) and (e) in transition 1-2, and a lack of change in the other contents.

The transition between the second and third design reveals either no change, or non significant changes in all the contents, since the change which appears in content (a) for the level of preschool education seems to present no high level of significance.

The transition between designs three and four shows a lack of change in all the contents.

The shift from the fourth to the fifth designs shows a lack of change for contents (b) and (c), and very significant changes for the rest of the contents, and in all the educational levels.

Finally, the transition to the final design shows significant changes in contents (d) and (e), with a lack of significance for

#### Table 7.

Confidence intervals at 95% for the teacher role category.

the first at the high school level, and a lack of change for the rest of the contents (**Table 8**).

VIII. Analysis of Category 8: Identification and Material Resources.

The transition between the initial design and the first corrected design shows there has been no change for content (d). The significance for the rest of the contents has been high (except for content (c) in the high school level).

The shift from the first to the second design shows very significant changes in content (d), and a lack of change for the rest of the contents. This situation is repeated in transition 3-4, while the transition from 2 to 3 shows no changes in any of the contents, since the change which appears in content (a) for the secondary school level appears to present no excessive significance.

The transition between designs four and five presents a lack of change in contents (a), (b) and (d), and a high level of significance in (c) and (e).

The transition to the final design presents null change in all the contents (**Table 9**).

Finally, to determine the homogeneity of the results between the teachers of the different educational levels a comparison was conducted among means which shows training differences between high school and preschool teachers with the rest of the educational levels. There were no differences between elementary and secondary teachers (**Table 10**).

to an all and		I→1		1→2		2→3		3-	→4	4-	→5	5-	→F
Item	Level	Lower Level	Upper Level										
	1	.508	.920	.676	1.038	.000	.000	.995	1.195	.000	.000	.422	.721
	2	.263	.626	.877	1.197	.000	.000	.912	1.088	.000	.000	.720	.984
60	3	.455	.849	.870	1.217	.000	.000	.904	1.096	.000	.000	.857	1.143
	4	.578	1.422	.629	1.371	.000	.000	.795	1.205	.000	.000	.693	1.307
	1	.750	1.059	.960	1.136	.000	.000	.975	1.215	.000	.000	.000	.000
	2	.642	.914	.922	1.078	.000	.000	.968	1.180	.000	.000	.000	.000
2	3	.722	1.017	.916	1.084	.000	.000	.972	1.202	.000	.000	.000	.000
	4	.683	1.317	.819	1.181	.000	.000	.754	1.246	.000	.000	.000	.000
	1	1.152	1.705	118	.118	035	.226	.162	.504	.609	1.010	.000	.000
0	2	1.238	1.725	.072	.215	.107	.337	039	.262	.898	1.251	.000	.000
0	3	1.388	1.916	.017	.243	125	.125	033	.294	.852	1.235	.000	.000
	4	1.433	2.567	241	.241	267	.267	.049	.751	.190	1.010	.000	.000
	1	.589	.935	.106	.370	.016	.379	1.399	1.839	.091	.480	.000	.000
	2	.736	1.042	042	.190	.426	.759	1.176	1.565	022	.319	.000	.000
3	3	.791	1.122	082	.169	049	.311	.790	1.210	.684	1.055	.000	.000
	4	.645	1.355	270	.270	.013	.787	.149	1.051	.603	1.397	.000	.000
	1	.098	.283	.819	.990	.260	.597	.314	.639	.815	1.185	032	.381
0	2	081	.081	.962	1.112	037	.260	.745	1.032	.762	1.089	.016	.353
9	3	088	.088	.918	1.082	074	.248	.801	1.112	.475	.829	.296	.661
	4	189	.189	.825	1.175	.054	.746	.267	.933	.620	1.380	.422	.721

		I–	→1	1→2		2-	→3	3–	→4	4-	→5	5-	→F
Item	Level	Lower Level	Upper Level										
	1	.038	.437	.368	.775	.090	.386	.000	.000	1.035	1.346	.000	.000
	2	.046	.398	.599	.957	055	.204	.000	.000	1.011	1.286	.000	.000
5	3	059	.321	.588	.977	010	.271	.000	.000	.981	1.279	.000	.000
	4	408	.408	.583	1.417	302	.302	.000	.000	.680	1.320	.000	.000
	1	117	.117	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	2	.638	.844	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
q	3	112	.112	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	4	239	.239	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	2	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
ပ	3	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	4	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	1	.000	.000	1.633	1.987	014	.205	.000	.000	1.013	1.367	.606	1.013
	2	.000	.000	1.659	1.971	023	.171	.000	.000	1.029	1.341	.524	.883
q	3	.000	.000	1.700	2.039	061	.149	.000	.000	.961	1.300	.284	.673
	4	.000	.000	1.637	2.363	226	.226	.000	.000	.637	1.363	017	.818
	1	.000	.000	1.739	2.166	024	.097	.000	.000	.857	1.333	.351	.792
	2	.000	.000	2.182	2.559	044	.044	.000	.000	.383	.803	.102	.491
e	3	.000	.000	.368	.775	047	.047	.000	.000	.512	.967	.311	.733
	4	.000	.000	.599	.957	103	.103	.000	.000	.312	1.288	.548	1.452

Table 8.Confidence intervals at 95% for the evaluation category.

Table 9.

Confidence intervals at 95% of the activity and material resources category	y.
---	----

Item Level		I–	→1	<b>1</b> → <b>2</b>		2-	→3	3-	→4	4→5		5→F	
Item	Level	Lower Level	Upper Level	Lower Level	Upper Level	Lower Level	Upper Level	Lower Level	Upper Level	Lower Level	Upper Level	Lower Level	Upper Level
	1	.785	1.215	.000	.000	096	.096	.000	.000	.000	.000	.000	.000
_	2	.884	1.264	.000	.000	048	.122	.000	.000	.000	.000	.000	.000
0	3	1.273	1.684	.000	.000	.037	.223	.000	.000	.000	.000	.000	.000
	4	1.559	2.441	.000	.000	199	.199	.000	.000	.000	.000	.000	.000
	1	1.950	2.050	.000	.000	050	.050	.000	.000	.000	.000	.000	.000
	2	2.956	3.044	.000	.000	044	.044	.000	.000	.000	.000	.000	.000
Ą	3	2.909	3.004	.000	.000	044	.091	.000	.000	.000	.000	.000	.000
	4	2.897	3.103	.000	.000	103	.103	.000	.000	.000	.000	.000	.000
	1	1.858	2.142	.000	.000	.000	.000	.000	.000	1.622	1.902	.000	.000
	2	1.875	2.125	.000	.000	.000	.000	.000	.000	.766	1.012	.000	.000
S	3	.299	.570	.000	.000	.000	.000	.000	.000	.823	1.090	.000	.000
	4	291	.291	.000	.000	.000	.000	.000	.000	.714	1.286	.000	.000
	1	.000	.000	2.812	3.092	.000	.000	.875	1.220	.000	.000	.000	.000
	2	.000	.000	2.654	2.901	.000	.000	.996	1.300	.000	.000	.000	.000
q	3	.000	.000	2.779	3.047	.000	.000	.879	1.208	.000	.000	.000	.000
	4	.000	.000	2.713	3.287	.000	.000	.647	1.353	.000	.000	.000	.000
	1	.292	.756	.000	.000	.000	.000	.000	.000	.241	.711	.000	.000
	2	.351	.760	.000	.000	.000	.000	.000	.000	.200	.615	.000	.000
e	3	.909	1.352	.000	.000	.000	.000	.000	.000	.601	1.051	.000	.000
	4	1.524	2.476	.000	.000	.000	.000	.000	.000	.518	1.482	.000	.000

Table 10.

Comparisons among educational levels.

Comparisons	t	Significance
Preschool vs. Elementary Education	3.09	.01
Preschool vs. Secondary Education	3.31	.01
Preschool vs. High School	4.53	.001
Elementary Education vs. Secondary Education	0.62	n.s.
Elementary Education vs. High School	2.82	.01
Secondary Education vs. High School	3.14	.01

# **Discussion and Conclusion**

The analysis of data results leads to the following conclusions about the teacher training program:

The analysis of the first category, Philosophy of Education, shows that contents of the core psychological concept of instruction (general and specific instructional theory), and of the projective nucleus of this discipline, both from a general perspective (instructional design), and from a specific perspective (cooperative instructional design) substantially improved the teachers' understanding of the importance of student activity in the teaching/learning process. Therefore, the initial Blocks 1 and 2, pertaining to roles, and those of cooperative instructional design (Blocks 4 and 5), have greater effect in teacher training.

The second category, The Nature of Learning, together with the previous category, are apparently the contents of the technological and the theoretical dimensions which contribute most in raising the teachers' consciousness regarding the nature of the learning. This is due, in part, to a deepened understanding of the objectives of this dimension. However, with reference to the previous dimension, in which the general elements seemed to have a greater weight, it is the specific theoretical and technological elements of cooperative learning that have greater relevance for this category. In addition, the conceptualization of the roles of the teacher and of the students in the teaching/learning process (Block 5 of the contents) appears complementary.

The third category, Structure of the Learning Task, is a category that depends on all the training elements; therefore it improved with each work session. Similarly, the general components (Blocks 1 and 2) appeared more frequently in the intra-group task structure than in the intergroup.

Regarding the fourth category, Reward Structure, as seen in a comparative inspection of **Tables 4** and **5**, the patterns of improvement in the elaboration follow the task structure direction, and all the contents of the different thematic blocks are the ones that have occurred in the construction of a conceptual and procedural reward structure, acceptable within the different instructional designs. It is in the analysis of these two sequences where the difference of educational "sensitivity" among the teachers of the first educational levels (primarily those of preschool education) and those of the last educational levels (mainly of high schools) is best outlined, since after each training activity there was always important improvement in the first ones, which did not always happen with the latter.

In the fifth category, Students' Roles, it can be observed that the knowledge of the teaching/learning process determines the consideration of the factors that enable the rationalization, effectiveness and efficiency on the teaching/learning process. In this sense, both the theories of Piaget and Vygotsky pose the need of a proper interaction process based, respectively, on socio-cognitive conflict, or expert mediation. Based on this knowledge, we can conclude that group size is important for an effective interaction, and that it is necessary to specify the relationships of communication and hierarchy among students (observable variables or contents (a) and (b) of the category). However, it is more complex, for example, to perceive the possible need for forming separate typological groups. Then again, this situation can be very easily considered on the basis of the dimensional analysis of the CLM (Block 2 of contents). The greatest improvements in the designs occur, therefore, after the teaching of Content Blocks 2 (dimensional analysis of the CLM) and 5 (cooperative instructional design), which specifically address the elements of this category.

It is evident that after the introductory block the foundations were laid for the sixth category, that is, the teachers' role in the knowledge acquisition process, and completed by the development of Block 4 (roles) and Block 5 (instructional design). It is for this reason that although there are differences between the initial instructional design and the one developed after the first training activity, there are significant differences in almost all the indicators; this dimension is progressively completed with the development of the specific blocks on cooperative learning, basically, in what is called the observable variable (e), which referred to the sociolinguistic contexts in which the instruction is developed.

The analysis of the change in the seventh category, Evaluation, has been shown as a slow but constant process. Although the circumstances and the function of the evaluation were present in the initial design, this category has been in process of transformation to the point where it can be considered as the "beginning" of the decision-making processes. In this sense, the contents of Block 2 (Dimensional Analysis of the CLM) and 5 (Cooperative Instructional Design), besides, of course, the observational methodology (Block 6), have implied a change in the evaluating culture of teachers participating in the experience.

Finally, the basic training for the eighth category, Identification and Resource Materials, was provided by the initial block of contents (Blocks 1), where 4 and 5 are acted as complementary blocks, for the observable variable (d), in which Blocks 2 and 4 raised the teachers' awareness of the need for training in prior skills for the functioning of the group, and Block 5 improved the design timing.

According to the program's effects on the production of cooperative instructional designs, we can extract some basic conclusions with regarding our initial hypotheses.

First of all, we must emphasize the importance of cooperative teacher training methodology (Calvo et al., 1994; Mc-Gregor & Gunter, 2006), since none of the 76 participants in the course obtained a score of less than three in any of the design dimensions. This means that all the dimensions appeared in the task design in an explicit and appropriately, and in some cases, it was necessary only to ask for a bit more elaboration of the dimension involved.

Second, we must emphasize, just as O'Donnell & King (1999) did, the relevance of the first thematic block in the production of the design, since it has had an enormous influence in every design dimension, except for the Evaluation category.

Third, and as expected, the categories related to the task structure and to reward are those where there were major differences, which presupposes, due to the initial scores, that they are what teachers know least about (Serrano et al., 2008, Serrano & Pons, 2007; Serrano, Pons, & Calvo, 2008). This point confirms the work of Dyson (2001), Veenman, Van Benthum, Bootsma, Van Dieren, & Van der Kemp (2002) and Zhu, Valcke and Schellens (2010). In the fifth dimension (Formation of Groups and Role of Students), teachers' designs underlined the detailed elaboration of group formation. This aspect, as proved Helleve (2007) was the one participants emphasized the most.

Fourth, predictably, the last block had little thematic impact in the production of the design, but we expect that it will be of great use once the teachers address the implementation of the cooperative instructional design in the classroom, particularly if they consider the relevance of the type of language that students use in their communication, especially in Exploratory Language as proposed by Helleve (2007) and Mercer (2000). We believe that this block is important so that it can produce knowledge transfer: The transference of knowledge from the training program to implementation is known to be very difficult and shouldn't taken for granted!

Fifth, it was a surprise to find such a negligible amount of influence on the design of thematic Block 3 (the Organization of the Classroom and the Environment of Cooperative Learning), except for the task structure and that of reward, in which we could appreciate the influence of elements developed with regards to classroom organization. However, contrary to the expected results based on previous research (Angelides, Stylianou & Leigh. 2007: Slaouti. 2007), the need for creating a cooperative environment for learning has not appeared in any of the components of the cooperative instructional design, perhaps because by its very definition, the psychology of instruction deals with the processes of teaching and learning produced in environments specifically designed for generating them, the classroom. In any event, due to the present results and the results obtained by other researchers (Helleve, 2007), this block of contents must be an object of further research.

Finally, we found differences in performance among the teachers of different educational levels, especially high school teachers (less elaborated designs), and teachers of preschool (more elaborated ones). The first group perhaps because of their lack of psycho educational training, and the second because they are more interested in the children having a clear predisposition toward the psychocentric design (centered on students), coupled with the lesser rigidity they perceive in the curriculum contents. In contrast, the teachers of elementary education and of compulsory secondary education have been shown to be much more homogeneous, perhaps because a high percentage of secondary school teachers come from elementary schools.

#### REFERENCES

- Almog, T., & Hertz-Lazarowitz, R. (1999). Teachers as peer learner: Professional development in an advanced computer learning environment. In A. M. O'Donnell, & A. King (Eds.), *The Rutgers Invitational Symposium on Education Series: Cognitive perspectives on peer learning* (pp. 285-311). Mahwah, NJ: Lawrence Erlbaum Associates.
- Angelides, P., Stylianou, T., & Leigh, J. (2007). The efficacy of collaborative networks in preparing teachers. *European Journal of Teacher Education*, 30, 135-149. doi:10.1080/02619760701273953
- Calvo, M. T., Serrano, J. M., González-Herrero, M. E., & Ato, M. (1994). Formación de profesores: Una experiencia de elaboración y aplica-

300

ción de métodos de aprendizaje cooperativo en las aulas de educación Infantil, Primaria y Secundaria. Memoria de Investigación. Madrid: D.G.I.C.Y.T. del Ministerio de Educación y Ciencia.

- Cordero, G., & Luna, E. (2010). Retos de la evaluación de los programas de formación de profesores: el caso de un programa en métodos de aprendizaje cooperativo. *Revista Iberoamericana de Evaluación Educativa*, 3, 193-201.
- Cottrill, J. F. (2000). Students' understanding of the concept of chain rule in first year calculus and the relation to their understanding of composition of functions. *Dissertation Abstracts International, Section A: Humanities and Social Sciences, 60,* 3941.
- Dettori, G., Giannetti, T., & Persico, D. (2006). SRL in Online Cooperative Learning: Implications for pre-service teacher training. *European Journal of Education*, 41, 397-414.

doi:10.1111/j.1465-3435.2006.00273.x

- Dyson, B. (2001). Cooperative learning in an elementary physical education program. *Journal of Teaching in Physical Education*, 20, 264-281.
- Emmer, E. T., & Stough, L. M. (2001). Classroom management: A critical part of educational psychology, with implications for teacher education. *Educational Psychologist*, *36*, 103-112. doi:10.1207/S15326985EP3602 5
- Hawkes, M. (2000). Structuring computer-mediated communication for collaborative teacher development. *Journal of Research and Devel*opment in Education, 33, 268-277.
- Helleve, I. (2007). In an ICT-based teacher-education context: Why was our group "the magic group"? *European Journal of Teacher Education*, 30, 267-284. doi:10.1080/02619760701486118
- Hoy, A. W., & Tschannen-Moran, M. (1999). Implications of cognitive approaches to peer learning for teacher education. In A. M. O'Donnell, & A. King (Eds.), *The Rutgers Invitational Symposium on Education Series: Cognitive perspectives on peer learning* (pp. 257-284). Mahwah, NJ: Lawrence Erlbaum Associates.
- Johnson, D. W., Johnson, R. T., & Stanne, M. B. (2000). Cooperative learning methods: A meta-analysis. Minneapolis: University of Minnesota.
- Kagan, S. (1985). Dimensions of cooperative classroom structures. In R. Slavin, S. Sharan, S. Kagan, R. Hertz-Lazarowitz, C. Webb, & R. Schmuck (Eds.), *Learning to cooperate, cooperating to learn* (pp. 67-96). New York: Plenum Press.
- Kennett, D. J., Young, A. M., & Berrill, D. P. (1999). Is cooperative learning effective for high achieving entrance students? Implications for policy and teaching resources. *Journal of Research and Devel*opment in Education, 33, 27-35.
- Kumpulainen, K., & Kaartinen, S. (2000). Situational mechanisms of peer group interaction in collaborative meaning-making: Processes and conditions for learning. *European Journal of Psychology of Education*, 15, 431-454. doi:10.1007/BF03172986
- León, B., Felipe, E., Iglesias, D., & Latas, C. (2011). El aprendizaje cooperativo en la formación inicial del profesorado de Educación Secundaria. *Revista de Educación*, 354, 715-729
- McGregor, D., & Gunter, B. (2006). Invigorating pedagogic change. Suggestions from findings of the development of secondary science teachers' practice and cognisance of the learning process. *European Journal of Teacher Education*, 29, 23-48. doi:10.1080/02619760500478498
- Mercer, N. (2000). Words & Mind. How we use language to think together. London: Routledge. doi:10.4324/9780203464984
- O'Donnell, A. M., & King, A. (1999). *The Rutgers Invitational Symposium on Education Series: Cognitive perspectives on peer learning.* Mahwah, NJ: Lawrence Erlbaum Associates.
- Oja, S. N. (2000). The unique place of role-taking and reflection in collaborative action research. In A. L. Comunian, & U. P. Gielen (Eds.), *International perspectives on human development* (pp. 531-549). Lengerich: Pabbst Science Publishers.
- Peklaj, C., & Vodopivec, B. (1999). Effects of cooperative versus individualistic learning on cognitive, affective, meta-cognitive and social processes in students. *European Journal of Psychology of Education*, 14, 359-373. doi:10.1007/BF03173120
- Salganik, L. H., Rychen, D. S., Moser, U., & Konstant, J. W. (1999). Projects on competencies in OECD contexts: analysis of theoretical

and conceptual foundations. Neuchâtel: Swiss Federal Statistical Office.

- Salomon, G. (2001). Distributed cognitions. Psychological and educational considerations. New York: Cambridge University Press.
- Serrano, J. M., & Calvo, M. T. (1994). Aprendizaje cooperativo. Técnicas y análisis dimensional. Murcia: Obra Cultural de Cajamurcia.
- Serrano, J. M., Calvo, M. T., Pons, R. M., Moreno, T., & Lara, R. M. (2008). Training teachers in cooperative learning methods. *IASCE Conference*. Turín: IASCE.
- Serrano, J. M., & González-Herrero, M. E. (1996). Cooperar para aprender. ¿Cómo implementar el aprendizaje cooperativo en el aula? Murcia: DM/PPU Editores.
- Serrano, J. M., & Pons, R. M. (2007). Cooperative learning: We can also do it without task structure. *Intercultural Education*, 18, 215-230. doi:10.1080/14675980701463562
- Serrano, J. M., & Pons, R. M. (2011). El constructivismo hoy: Enfoques constructivistas en educación. *Revista Electrónica de Investigación Educativa*, 13, 1-27.
- Serrano, J. M., Pons, R. M., & Calvo, M. T. (2008). Reward structure as a tool to generate interdependence in higher education. *IASCE Conference*. Turín: IASCE.
- Sharan, Y. (2002). Essential features of a teacher education program for cooperative learning. Asia Pacific Journal Education, 22, 68-74. doi:10.1080/0218879020220107
- Sharan, Y. (2010). Cooperative learning for academic and social gains: Valued pedagogy, problematic practice. *European Journal of Education*, 45, 300-310. doi:10.1111/j.1465-3435.2010.01430.x
- Sharan, Y., & Sharan, S. (1987). Training teachers for cooperative learning. *Educational Leadership*, 45, 20-25.

- Siberry, L., & Kearns, H. (2005). An intercultural approach to challenging issues in Northern Ireland teacher education. *European Jour*nal of Teacher Education, 28, 259-266. doi:10.1080/02619760500269350
- Slaouti, D. (2007). Teacher learning about online learning: experiences of a situated approach. *European Journal of Teacher Education*, 30, 285-304. doi:10.1080/02619760701486126
- Solomon, R. P. (2000). Exploring cross-race dyad partnerships in learning to teach. *Teachers College Record*, 102, 953-979. doi:10.1111/0161-4681.00088
- Taspinar, M. (2007). The cooperative learning method in teacher training. International Journal of Educational Reform, 16, 54-70.
- Veenman, S., van Benthum, N., Bootsma, D., van Dieren, J., & van der Kemp, N. (2002). Cooperative learning and teacher education. *Teaching and Teacher Education*, 18, 87-103. doi:10.1016/S0742-051X(01)00052-X
- Waxman, H. C., Padrón, Y. N., & Arnold, K. M. (2001). Effective instructional practices for students placed at risk of academic failure. In G. D. Borman et al. (Eds.), *Compensatory education at the crossroads* (pp. 137-170). Mahwah, NJ: Lawrence Erlbaum Associates.
- Wenger, E., McDermott, R., & Sneyder, W. (2002). Cultivating communities of practice: A guide to managing knowledge. Cambridge, MA: Harvard Business School Press.
- Zhu, Ch., Valcke, M., & Schellens, T. (2010). A cross-cultural study of teacher perspectives on teacher roles and adoption of online collaborative learning in higher education. *European Journal of Teacher Education*, 33, 147-165. doi:10.1080/02619761003631849