

Impact of teacher training on academic self-concept and educational outcomes

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Abstract

Introduction. Current research based on observational design studies characterized the teaching practices that stimulate the development of academic self-concept, but there is a need for experimental and quasi-experimental studies to validate those findings. The present research evaluate the impact of a teacher training program based on academic self-concept stimulation strategies on academic self-concept, attendance and grades of their students.

Method. 36 teachers of primary level and 819 students from public schools of the Province of Concepción, Chile, participated. A quasi-experimental design with pre and post measures was applied. Information was collected through self-report and information available on official records.

Results. After the intervention, teachers in the experimental group have greater capacity to stimulate the self-concept of their students, $D(1, 41700.91)=17.09$, $p < 0.001$, encouraging self-concept related to capacity, work procedures and class participation. Also, the students on experimental group have a greater perception about their capacity to participate in classes after the intervention, dependent on the pre-test perceived capacity, $D(1, 983-22)=6.10$, $p=0.014$, and higher attendance rates, $D(1, 691.34)=82.50$, $p<0.001$, than control group.

Discussions and conclusions. The teacher training program is effective to improve the teaching strategies of stimulating the academic self-concept, the perception of competence to participate in classes of the students and to increase the levels of attendance.

Keywords: Academic self-concept, teacher training, educational outcomes, teacher strategies.

Resumen

Introducción. La investigación actual, basada en estudios de diseño observacional, ha caracterizado las prácticas de enseñanza que estimulan el desarrollo del autoconcepto académico. Sin embargo, se necesitan estudios experimentales y cuasi experimentales para validar estos hallazgos. La presente investigación evalúa el impacto de un programa de capacitación docente basado en estrategias de estimulación del auto-concepto académico sobre el autoconcepto académico, la asistencia y las calificaciones de los alumnos.

Método. Participaron 36 profesiones de enseñanza primaria y 819 estudiantes de escuelas públicas de la Provincia de Concepción, Chile. Se aplicó un diseño cuasi-experimental con medidas pre y post test. La información se recopiló mediante autoinforme e información disponible en los registros oficiales.

Resultados. Después de la intervención, los profesores del grupo experimental presentaron mayor capacidad para estimular el autoconcepto de sus estudiantes, $D(1, 41700.91) = 17.09$, $p < 0.001$, en las áreas de capacidad, procedimiento de trabajo y participación en clases. Además, los estudiantes en el grupo experimental informaron una mayor percepción sobre su capacidad para participar en las clases después de la intervención, dependiente del nivel percibido de capacidad en el pre-test, $D(1, 983-22) = 6.10$, $p = 0.014$, y mayores tasas de asistencia a clases, $D(1, 691.34) = 82.50$, $p < 0.001$, que el grupo control.

Discusiones y conclusiones. El programa de entrenamiento docente es efectivo para mejorar las estrategias docentes de estimulación del autoconcepto académico, la percepción de competencia para participar en clases de los estudiantes y para aumentar los niveles de asistencia.

Palabras claves. Auto-concepto académico, entrenamiento docente, resultados académicos, estrategias docentes.

Introduction

Several investigations confirm a positive relation between Academic self-concept (ASC) and academic performance, establishing a considerable predictive value of the first over the second (Bueno, 2004; Gallardo, Garfella, Sánchez, Ros & Serra, 2008; Herrera, Ramírez, Roa & Herrera, 2004; Green, Marsh & O'Mara, 2006; Ibarra-Aguirre & Jacobo-García, 2014; Marsh & Martin, 2011; Miñano & Castejón, 2011). In addition, ASC facilitates other desirable outcomes for the primary and secondary school (Miñano, & Castejón, 2011; Urhahne, Chao, Florineth, Luttenberger & Paechter, 2011) such as: higher quality in the execution of tasks, greater responsibility in the classroom commitments, greater social adjustment (Carbonero, Martín-Antón, Reoyo & Román 2010) and greater achievement motivation.

ASC is defined as the self-perception of the student about his/her own competence related to school activities (Marsh & Martin, 2011; Esnaola, Goñi & Madariaga, 2008; Guay, Boivin & Marsh, 2003; Salum, Marín & Reyes, 2011). Its development results from the early interventions performed by significant others on students, helping them to improve self-evaluative methods they have about their own skills (Guay et al., 2003; Salum, Marín & Reyes, 2011). The academic self-concept is very flexible in the first school periods and decreases its flexibility at the age of 15 (Ibarra-Aguirre & Jacobo-García, 2016) making the primary classroom an ideal space for its intentional development (Lobos, Díaz, Bustos & Sáez, 2018). At the school level, the significant others are classmates and teachers (Cerrillo, 2003; García, 2009; Barraza & Gutiérrez, 2011; McInerney, Dowson, Seeshing, Yeung & Genevieve, 2000), being teacher's feedback the reinforcement most considered by the students in relation to academic work skills (Ginsberg, 2007; Marsh & Craven, 2006; McInerney et al., 2000). Diverse investigations have characterized the teaching practices that stimulate favorable environments for learning (Álvarez, 2008; Catalán, 2011; Ginsberg, 2007; Marsh & Craven, 2006; Salum, Marín & Reyes, 2011; García, 2009).

Two variables of relevance for the development of ASC are praise and instructive messages. Expressions of praise represent encouraging messages to the development of skills, behaviors or procedures shown by the student (Catalán, 2011). Praise, if used frequently, predicts greater effectiveness in ASC improvement interventions (Ginsberg, 2007; Marsh & Craven, 2006; Salum, Marín & Reyes, 2011; García, 2009). On the other hand, instructive messages are indications about the performance of the students, which require detail and precision, as

opposed to praise that can be less specific and indicate the student what he/she did well (or not) and how to improve it (Álvarez, 2008; Catalán, 2011).

Several studies and meta-analyses have sought to establish factors of effectiveness of interventions in self-concept (Green et al., 2006; Hartie, 1992; Haney & Durlak 1998; Hui-Ju, 2009; Isiksal, 2010; Marsh & Martin, 2011; O'Mara, 2003; O'Mara, Marsh, Craven & Debus, 2005; 2006). These studies have revealed a larger effect size when (a) the interventions use a multidimensional approach instead of a one-dimensional one; (b) the focus of intervention is only the self-concept and not other variables; (c) the groups are randomized and there is a control group; (d) praise and feedback techniques are used; (e) they are focused on practice or training; (f) the intervention is carried out by teachers and not by other professionals; (g) standardized procedures are used; and (f) they are preventive interventions instead of reparatory interventions.

The design of educational resources that allow teachers to activate the psychological mechanisms of stimulation of ASC of their students in the daily interaction of the classroom, allows moving from the traditional theoretical models to practical ones and from correlation descriptive models to experimental designs, scarce and necessary in Latin America (Cornejo & Redondo, 2007).

Both in Chile and in Latin American countries, the low attendance of economically disadvantaged students is a priority issue, because is directly related to students' academic performance (Miranda-Zapata, Lara, Navarro, Sarracosti & De-Toro, 2018, Cabrera & Merari, 2015). Absenteeism is one of the antecedents of low academic performance, school failure and desertion, affecting to a greater extent the most disadvantaged sectors of our country (Muñoz, 2018). Failure to attend classes implies lower curricular coverage, causing gaps in the provision of pedagogical content and difficulties to develop complex competencies (Castillo & Escalona, 2016; Donoso-Díaz, Díaz, & Benavides, 2018; Hernández & Bazán, 2016). Increase student attendance at classes could improve the quality of learning in vulnerable educational contexts, characterized by lower students learning achievements (Agencia de Calidad de la Educación Gobierno de Chile, 2018).

This research was aimed to evaluate the impact of a training program in the skills of teachers to stimulate ASC and the effect of the application of these strategies by teachers in the

academic self-concept, attendance and grades in Chilean schools of high social vulnerability. The analysis of the effect of the intervention will be analyzed considering age, sex and differences between schools and teachers.

Method

Participants

The study population corresponds to teachers and students, of third and fourth grade of primary education of public centers of 5 municipalities – Concepción, San Pedro de la Paz, Talcahuano, Penco and Chinguayante - of Province of Concepción, Chile, with indexes of social vulnerability (IVE) greater than 50%; this means that at least 50% of their students are in poverty condition, according to an indicator obtained from the official socioeconomic classification by the Chilean government. Also, these public centers obtain low results in the Educational Quality Assurance System (SIMCE), a standardized national test that measures the level of learning at different educational levels and knowledge areas (Agencia de Calidad de la Educación Gobierno de Chile, 2015).

The sample consisted of 36 teachers and 819 students, corresponding to complete classes of 16 schools. In the experimental group participated 21 teachers, and 443 students. On the other hand, 15 teachers and 376 students participated in the control group. The average age of the teachers was 45.3 years ($SD=12.4$), and each attended an average of 22.75 students per class. In turn, the average age of the students was 9.09 years ($SD=1.06$). Experimental group students had an average age of 9.06 ($SD=1.16$) and control group average age was 9.13($SD=0.92$). Of them, 415 (50.6%) were girls – 194 in the control group and 221 in the experimental group- and 404 (49.4%) were boys – 182 in the control group and 222 in the experimental group. Convenience sampling was used, because the access to schools is carried out through agreements between municipalities and universities. The municipal administrations define the groups in which it is authorized to investigate, under the criterion that they are not participating in other programs.

Assignment of schools to control and experimental group was performed intentionally by the municipal administrations, pairing geographical location and number of students. Full classes were considered, without election of students or teachers.

Instruments

- Academic self-concept Scale in Classroom Interaction (Lobos, Díaz, Bustos, & Pérez, 2015): it consists of 22 items that measure the ASC level perceived by the students in three areas: Participation, procedure and capacity. Each item corresponds to a 6-point Likert scale, where 1 corresponds to “never” and 6 to “always”. Lobos, Díaz, Bustos & Pérez (2015) studied their psychometric characteristics, finding high levels of internal consistency in all subscales of Cronbach’s $\alpha > 0.8$, content validity, adequate fit of data to the theoretical model, $\chi^2(203) = 615.182$, $CFI=.97$, $TLI=.97$, $RMSEA= .05$, and measurement invariance up to the strict level. Likewise, concurrent validity were found with the Academic Self-Esteem Subscale (ASES) of the Coopersmith Self-Esteem Inventory validated for Chilean population (Brinkmann, Segure & Solar, 1989), with strong correlations between this subscale and Capacity ($r = .540$, $p < .001$), Participation ($r = .580$, $p < .001$) and Work procedures ($r = .518$, $p < .001$).
- Academic self-concept stimulation strategies scale (Lobos, Bustos, Díaz & Sáez, 2018): measures the students perception about application by the teacher of ASC stimulation strategies in the areas of participation, work procedure and capacity. Students must answer a series of 16 statements about the behavior of the teacher in the classroom through a 6-point Likert scale, where 1 is equivalent to “never” and 6, to “always”. The psychometric characteristics of the scale show adequate reliability, domain and dimensional validity, with an adequate fit of the model to data using CFA, $\chi^2(87)=148.09$, $CFI=.99$, $TLI=.99$, $RMSEA=0.046$, with concurrent validity with Coopersmith self-esteem inventory, $r_s=.24$, $p < .001$.
- Academic results: Grades in the subjects of Mathematics and Language and Communication, and attendance to classes per academic semester, obtained from the SIGE platform that corresponds to the official student information system of the Ministry of Education in Chile.

Reliability indexes (Cronbach’s alpha and McDonald’s omega) for Academic self-concept Scale in Classroom Interaction and Academic self-concept stimulation strategies scale are presented in Table 1. Can be observed that reliabilities are good for all measures for both pre and post test.

Table 1. *Reliability as internal consistency (alpha and omega) of valuation practices and academic self-concept*

Scale	Pre-test		Post-test	
	<i>alpha</i>	<i>omega</i>	<i>alpha</i>	<i>omega</i>
Valuation practices				
Capacity	.875	.877	.874	.875
Participation	.87	.871	.882	.882
Procedure	.862	.862	.86	.86
Total	.938	.938	.942	.942
Academic self-concept				
Capacity	.857	.858	.798	.799
Participation	.842	.842	.844	.846
Procedure	.853	.853	.834	.834
Total	.923	.923	.912	.912

Treatment

The ASC skills training program includes praise actions and instructive messages (Marsh & Craven, 2006; Marsh & Martin, 2011; O'Mara, Marsh, Craven & Debus, 2006) performed by the teacher with his/her students, aimed to stimulate in them their academic self-concept in the areas of participation, procedure and capacity (Lobos & Díaz, 2015; Lobos, Díaz, Bustos & Pérez, 2015). The strategies of stimulation to the capacity correspond to those actions (verbal, gestural and playful; private and in public) used by the teacher to indicate positive aspects of the student skill to carry out the activities. It also includes discouraging attribution to the lack of capacity. The stimulation to the procedure addresses the form of work used by the student, being focused on behaviors such as attention to instructions, organization of materials, follow-up of indications, etc. Finally, the stimulation to participation in classes is focused on achieve the verbal involvement of their students in the class activities, such as asking questions, giving opinions, answering questions from the teacher, etc. Training was executed in two modalities. The first one was extra-classroom, in workshop sessions; priming, role-playing and modeling were the main strategies used. The second modality, intra-classroom, implied the individual accompaniment in the room of the application of strategies by the participating teachers.

Procedure

The researchers contacted, in each of the 5 municipalities, the department in charge of public education (Direcciones de Educación Municipal – DEM) through e-mail, to explain the characteristics of the project and invited to participate. Meetings were held in person with the Directors of each DEM to plan the allocation of centers to groups. The DEM professional team selected the educational centers included in control and experimental groups. After the assignment, meetings were held with school directors to organize the research in each center. All the DEM and Educational Centers invited accept to participate.

Once the courses have been selected to participate, individual meetings were held with the experimental group teachers, to explain the project, obtain informed consent and coordinate actions. Teachers in the control group were called to a meeting in their DEM to explain the project, invite them to participate and coordinate actions to apply instruments to their students. In these meetings with the participating teachers, the pretest of both the control and experimental group were applied.

In the case of the students, the protocol of informed consent consigned by signature of the act of consent was applied to the directors and parents (parents and caregivers). In addition, students were invited to participate voluntarily, using the modality of informed assent and ensuring the confidentiality of the information provided. The instruments were applied during class time and without the presence of the professor participating in the research.

All teachers were aware of the assignment to control or experimental group. The students were blind to the group assignment, because although they knew they were participating on a research, they didn't know which group their teacher was assigned to.

The project was subject to review in its ethical aspects by an academic committee of the Doctorate Program in Psychology, of the Faculty of Social Sciences, of the University of Concepción, Chile.

The extra-classroom stage lasted 10 sessions of 120 minutes each, with a frequency of two sessions per week. Intra-classroom training was carried out in the same schools. Each accompaniment lasted 90 minutes, with six instances per teacher. Training lasted 4 months. Once the accompaniment was completed, participants were required that to apply autonomously in

their classrooms the learned strategies for a period of two months. During this period, there was no contact with researchers. After this period, a post-test application of the instruments was carried out in the same schools.

Data Analyses

Previous to effect of intervention analysis, exploratory and descriptive analysis were performed on all variables, to detect errors and strange response patterns.

For the analysis of the effect of intervention, a multilevel model was used, specifically linear mixed-effects regression with structure analogous to ANCOVA. The effect of the intervention was analyzed in each of the dependent variables, using the value of the pre-test as a statistical control, as well as age and gender. The effect of school and school teacher was controlled as random effects nested in an only intercept model. The assumption of parallel slopes of ANCOVA was reviewed. In the case it was not fulfilled, a moderation analysis of the effect of the pre-measurement level on the intervention was performed. In this case, the J-N technique of region of significance (Jaccard & Turrisi, 2003), using Bauer & Curran (2005) adaptation for mixed models. Model assumptions - linearity, Gaussian errors, homocedasticity - were tested with graphical and numerical methods, to assess the model fit to data.

To handle missing data, multiple imputation with chained equations was used at item level, through the R *mice* library (Van Buuren & Groothuis-oudshoorn, 2011). The work was carried out with 10 imputed bases, occupying predictive mean matching and bayesian regressions, considering the multilevel structure of the data. The method described by Meng & Rubin (1992) for tests of hypotheses using multiple imputation was used, using the D_m statistic, that is approximately distributed as F. For ASC promotion strategies, self-concept and grades, D_m was calculated using a Wald type statistics, while for attending data, as a mixed logistic model was used, a likelihood based statistic was used. The effect size is presented by using the adaptation of Cohen's d for ANCOVA by Cooper, Hedges & Valentine (2009). Significance level was set at $\alpha=.05$.

Results

Results of the student reports of the ASC stimulation strategies by their teachers in both pre and post-test are shown in Table 2. In the pre-test, the experimental group of teachers starts

with higher scores than the control group, being these differences non-statistically significant. In the post-test the valuation practices scores of the control group are maintained, whereas those of the experimental group are higher in all dimensions. In all ASC stimulation strategies in post-test, the difference is statistically significant between experimental and control groups.

Table 2. Student reports of valuation practices in pre and post-test measurements

	Control			Experimental			Estimated mean difference		
	<i>M</i>	<i>SD</i>	95% <i>IC</i>	<i>M</i>	<i>SD</i>	95% <i>IC</i>	<i>Dm</i>	<i>p-value</i>	<i>d</i>
Pre-test									
Capacity	4.19	1.54	(4.04, 4.35)	4.51	1.36	(4.38, 4.64)	$D(1, 425044719.63)=1.60$	.207	.08
Participation	4.19	1.47	(4.04, 4.33)	4.53	1.31	(4.41, 4.66)	$D(1, 11973098270.25)=2.77$	.096	.11
Procedure	4.54	1.40	(4.40, 4.69)	4.85	1.22	(4.74, 4.97)	$D(1, 40687827.28)=3.58$	.059	.12
Total	4.30	1.34	(4.17, 4.44)	4.63	1.16	(4.52, 4.73)	$D(1, 33421414324.87)=2.67$	.102	.10
Post- test									
Capacity	4.12	1.37	(3.98, 4.26)	4.97	1.07	(4.87, 5.08)	$D(1, 59225.35)=13.12$	<.001	.20
Participation	4.19	1.34	(4.05, 4.32)	4.89	1.12	(4.78, 5.00)	$D(1, 21820.94)=12.44$	<.001	.21
Procedure	4.51	1.27	(4.37, 4.65)	5.07	1.06	(4.96, 5.17)	$D(1, 3125.70)=11.67$	.001	.22
Total	4.27	1.19	(4.15, 4.39)	4.97	0.99	(4.88, 5.07)	$D(1, 136987.93)=13.67$	<.001	.21

Note: Test based on a hierarchical linear model controlling effects of school and class.

In the measurement of students (Table 3) it can be observed that for ASC there are no significant differences between control and experimental groups in pre-test. This indicates that both have similar characteristics at the beginning of the experiment. However, in post-test the mean of the experimental group show higher scores than the control group in all dimensions, being significant the difference between experimental and control group in participation dimension of ASC, although small, $D(1,16883)=4.16, p=.042, d=.12$.

Regarding educational results, en pre-test measurement it can be observed that there are no statistically significant differences between experimental and control groups. Between pre and post-test, experimental group maintains Language and Communication and Mathematics grades, whereas attendance shows an increase of 2%. On the other hand, in the control group,

grades in Language and Communication and attendance to classes increase, though in mathematics the students decrease their scores.

Table 3. *Academic self-concept, grades and attendance of the students in pre and post-test measurements*

	Control			Experimental			Estimated mean difference		
	<i>M</i>	<i>SD</i>	95% <i>IC</i>	<i>M</i>	<i>SD</i>	95% <i>IC</i>	<i>Dm</i>	<i>p-value</i>	<i>d</i>
Pre-test									
ASC Capacity	4.66	1.08	(4.55, 4.77)	4.86	1.05	(4.76, 4.96)	$D(1, 25851199) = 3.05$	.081	.12
ASC Participation	4.21	1.17	(4.09, 4.32)	4.44	1.19	(4.33, 4.55)	$D(1, 12062202) = 2.77$	.096	.11
ASC Procedure	4.74	1.06	(4.64, 4.85)	4.77	1.06	(4.67, 4.87)	$D(1, 8216491) = 0.16$	.692	.03
ASC Total	4.53	0.96	(4.43, 4.62)	4.67	0.97	(4.58, 4.76)	$D(1, 218601779) = 1.68$	.194	.08
LAC grades	5.11	0.85	(5.02, 5.20)	5.26	0.81	(5.18, 5.34)	$D(1, 185296) = 1.05$	.307	.06
Mathematics grades	5.19	0.96	(5.10, 5.29)	5.33	0.86	(5.25, 5.42)	$D(1, 616655) = 0.66$	.417	.05
Attendance (%)	91.83	6.6	(91.17, 92.50)	90.62	8.1	(89.86, 91.39)	$D(1, 28871375) = 2.95$	.086	-.13
Post-test									
ASC Capacity	4.68	0.95	(4.57, 4.78)	4.8	0.89	(4.72, 4.89)	$D(1, 19839) = 2.13$	.145	.09
ASC Participation	4.2	1.14	(4.08, 4.32)	4.47	1.07	(4.36, 4.57)	$D(1, 16883) = 4.16$	.042	.12
ASC Procedure	4.69	0.95	(4.59, 4.79)	4.7	1	(4.60, 4.79)	$D(1, 5823) = 0.27$	.605	.03
ASC Total	4.51	0.86	(4.42, 4.60)	4.64	0.87	(4.56, 4.72)	$D(1, 21064) = 2.35$	.126	.10
LAC grades	5.23	0.86	(5.14, 5.32)	5.27	0.76	(5.19, 5.34)	$D(1, 184680) = 0.99$	.320	.06
Mathematics grades	5.12	0.92	(5.03, 5.22)	5.33	0.82	(5.25, 5.41)	$D(1, 65668) = 2.75$	.097	.11
Attendance (%)	90.26	8.39	(89.41, 91.11)	92.43	6.87	(91.78, 93.08)	$D(1, 372350) = 1.87$	.172	.05

Note: ASC: Academic Self-Concept . LAC: Language and Communication. Test based on a hierarchical linear model controlling effects of school and class.

When analyzing the impact of the intervention on the use of ASC promotion strategies (table 4), controlling the effect of measuring pre-test, gender and age, it is observed that regression slopes are parallel in experimental and control groups, which indicates that the effect of the experiment is similar in all teachers. This is independent of their initial skill level both for the total scale $D(1,1316.76) = 1.58, p=0.210$, to encourage participation, $D(1,1020.85) = 0.33, p=0.568$, and to promote procedures, $D(1,1334.54) = 1.22, p=.270$. ANCOVA shows that there is a significant difference in the post-test between experimental and control groups, controlling the effect of the pre-test for total scale $D(1,41700.91) = 17.09, p < .001, d = .22$, to

encourage participation, $D(1,7468.82)=14.88$, $p<.001$, $d=0.21$, as well as in procedure, $D(1,1287.54)=12.33$, $p<.001$, $d=.21$.

Table 4. *Non-parallel slopes test and ANCOVA results for effect of intervention for valuation practices and Academic self-concept.*

	Non-parallel slopes	ANCOVA	<i>d</i>
Valuation practices			
Capacity	$D(1,790.10)=6.12$, $p=.014$	$D(1,21188.55)=17.13$, $p<.001$	.205
Participation	$D(1,1020.85)=0.33$, $p=.568$	$D(1,7468.82)=14.88$, $p<.001$	.214
Procedure	$D(1,1334.54)=1.22$, $p=.270$	$D(1,1287.54)=12.33$, $p<.001$	.212
Total	$D(1,1316.76)=1.58$, $p=.210$	$D(1,41700.91)=17.09$, $p<.001$	.215
Academic self-concept			
Capacity	$D(1,118.70)=0.95$, $p=.331$	$D(1,19974.24)=1.06$, $p=.303$	.061
Participation	$D(1,983.22)=6.10$, $p=.014$	$D(1,7585.37)=3.12$, $p=.077$	.097
Procedure	$D(1,2542.44)=0.19$, $p=.666$	$D(1,3569.68)=0.21$, $p=.650$	.027
Total	$D(1,791.42)=1.77$, $p=.184$	$D(1,10243.81)=1.67$, $p=.197$	.071
Academic output			
LAC	$D(1,2926.52)=3.52$, $p=.061$	$D(1,369380.05)=0.01$, $p=.943$	.003
Mathematics	$D(1,442.53)=1.05$, $p=.305$	$D(1,40413.36)=1.84$, $p=.174$	.061
Attendance	$D(1,691.34)=82.50$, $p<.001$	$D(1,539001.08)=4.46$, $p=.035$	.124

Note: LAC: Language and Communication. All test based on a hierarchical linear model controlling effects of school and class.

In the case of encouraging capacity, the regression slopes of pre-test measurements over the post-test are not the same between control and experimental groups, $D(1,790.10)=6.12$, $p=.014$, so a moderation analysis must be performed. Non-significant regression is out of the possible range of the scale, which would indicate that the effect is positive for 100% of the participants. The intervention effect is in inverse function of the pre-test values.

When analyzing the total self-concept, it can be observed that the regression slopes are parallel between groups $D(1,791.42)=1.77$, $p=0.184$. ANCOVA analysis shows that there is no significant difference between experimental and control groups in the post-test $D(1,10243.81)=1.67$, $p=0.197$, $d=0.07$. With respect to the dimensions of the self-concept, parallel slopes are observed for both dimension of capacity $D(1,118.70)=0.95$, $p=0.331$, and work procedures, $D(1,2542.44)=.19$, $p=.666$. When performing the analysis of the effect of intervention, this is not significant for both capacity, $D(1,19974.24)=1.06$, $p=0.303$, $d=0.06$,

and work procedure, $D(1,3569.68) = 0.21$, $p = 0.650$, $d = 0.03$.

In the participation dimension of self-concept, non-parallel slopes are observed between experimental and control groups, $D(1,983.22) = 6.10$, $p = 0.014$. When analyzing the significance region, significant differences can be observed between experimental and control groups, in the range between 1 and 4.09 of the pre-test measurement. This is, significant differences can be observed in 45.6% of the participants.

It is observed that regression slopes are parallel between groups for Language and Communication, $D(1,2926.52) = 3.52$, $p = 0.061$, and Mathematics grades, $D(1,442.53) = 1.05$, $p = 0.305$. There is no significant difference between experimental and control groups in the post-test both for Communication, $D(1,369380.05) = 0.01$, $p = 0.943$, and Mathematics grades, $D(1,40413.36) = 1.84$, $p = 0.174$.

In the particular case of attendance, it was modeled with a logistic regression over the total of days lost vs. the days attended, since the regression on the percentage of attendance presents a marked heterocedasticity. In attendance, it is observed that the regression parallel is not parallel between groups $D(1,691.34) = 82.50$, $p < 0.001$. When analyzing the pre-test moderation effect, a positive effect of the intervention can be observed in children with less than 90.7% of attendance. This implies that the program would benefit approximately 40.6% of the children.

Discussion and Conclusions

This study contributes in an important way to our comprehension of how an adequate teacher training in stimulation strategies of the academic self-concept can favor a more effective approach to the academic performance of the students. From the students' point of view, the teachers modify their skill to address them when they perform academic activities both in terms of their abilities and in their work procedures and participation in classes. They recognize that at the end of the study, their teachers show a positive and constructive language in front of their performances, praising them and indicating them what they did well and/or instructing them how to improve.

With respect to students, greater participation ASC were observed on experimental group, compared to control group. Students' discussion plenaries are a frequent teaching-learning technique used by teachers to improve learning (Lopes, Spear-Swerling, Oliviera, Velasquez & Zibulsky, 2014). Training to foster class discussion through appraising was well received by teachers, who quickly learned strategies to improve them. Although students do not distinguish important differences in frequency on different appraisal types, we can assume that skill to perform participation appraisal was higher than for capacity and procedures.

The lack of impact in the areas of capacity and procedure of the ASC is subject to: (1) greater complexity in learning of these strategies compared to strategies for participation; (2) require more time to develop; this will cause a transfer to classroom for a shorter period and at the end of the academic year, and (3) the presence of other sources of information for the perception of self-efficacy (marks, ranking, etc.) at the end of the academic period (Caprara, Vecchione, Alessandri, Gerbino & Barbaranelli, 2011; Diseth, 2011; Paoloni & Bonetto 2013) could decrease the impact of the approach of teachers in their ASC.

As a whole, the results of the study provide evidence of the flexible nature of the academic self-concept and the possibility of being intentionally modified by teachers (Ibarra-Aguirre & Jacobo-García, 2016). In addition, it suggests that the application of stimulation strategies of the academic self-concept promotes a teacher-student link based on interactions of recognition and valuation of the other. This could favor motivation for learning and commitment with educational activities of the students that would be reflected in the strong impact of the program on attendance to classes (Deci & Ryan, 2013; Ratelle & Duchesne, 2014).

These findings could guide interventions aimed at promoting academic student motivation from the development of stimulation strategies of ASC. With this, more adaptive and functional responses are facilitated in the teachers to face failures of their students and with these, forms of confrontation of greater commitment and personal effort with their school tasks.

Metacognition as an effective mental process for the awareness of genuine skill levels and the concrete identification of behavioral areas to be modified in the teaching work (Pizano, 2014; Quijano & Aponte, 2011) must be considered in teachers' competency training.

There are two main limitations of this research. First, the non-randomness of teacher assignation to control and experimental group does not allow assuring that both groups were equivalent at the beginning and during the intervention period. So, the results could be biased by factors confounded with the intentional assignation to groups. Second, there is no student measurement of teacher practices after intra-class training, that would have allowed to evaluate the direct effect of training. Although the instruments were reliable, there wasn't information available about how much carry-over effect would be observed between this intermediate evaluation and final evaluation, two months after, so it was decided to only measure the intervention effect after autonomous time of practice by teachers. It is necessary to test the intervention on a longer period of time, to measure the immediate effect of training separated from the effect of autonomous practice, and allow the change of students' ASC.

In conclusion, a protocolized teacher training program and instruments constructed for its evaluation, responds to the challenge of overcoming the exploratory and correlational research models of Latin America and progress towards experimental empirical approaches that become real contributions to the development of knowledge and the construction of an educational policy.

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Received: 13-11-2018

Accepted: 23-04-2019