CHANGES IN TEACHERS' CONSTRUCTIVIST BELIEFS FROM TEACHER EDUCATION PROGRAMS INTO THE FIRST YEARS OF TEACHING IN CHILE

Soledad Ortúzar, Trevor Driscoll and Carlos Mondaca-Rojas

SUMMARY

Teaching effectiveness can be improved by understanding what shapes teachers' beliefs and attitudes. This study focuses on constructivist beliefs, which are considered to foster quality, student-centered instruction. The study analyzes the extent to which early career teachers hold constructivist beliefs and how these beliefs may change from when they are studying in their teacher education programs to when they begin teaching in Chilean schools. The study uses a mixed-method explanatory sequential design with a sample of 101 beginning teachers in schools. They were surveyed twice: once when they were in the final years of their teacher education programs, and again in their first years of teaching. Their orientation towards constructivist beliefs decreased, but there are differences in the results depending on the background characteristics of the teachers, the teacher education program characteristics, the teachers' beliefs, and the characteristics of the school where they started teaching.

Introduction

Higher-quality teachers can significantly improve student performance (Marcelo, 2009; OECD, 2004). To improve teacher effectiveness, understanding teachers' beliefs and attitudes regarding instructional strategies is critical (Levin *et al*., 2013; Pajares, 1992; Shulman, 1986). Teachers' beliefs are related to their well-being and praxis, which, in turn, influences student motivation and learning (Levin, 2015; OECD, 2009; Shulman, 1986). Wang and Odell (2002) argue that in order to meet the increasingly diverse needs of students, education reforms should include helping beginning teachers develop constructivist beliefs and practices for teaching and learning.

This study examines the extent to which teachers hold constructivist beliefs and explores the role such beliefs may play in creating student-centered instruction, which builds students' interests and motivations (Brooks and Brooks, 1993). A constructivist approach to learning, based on exploration through questioning, critical thinking, and understanding in context, opposes the more traditional paradigm of the teaching and learning process, commonly referred to as the direct transmission approach, which emphasizes memorization and recitation (Levitt, 2002).

Chile faces serious challenges in the development of more effective learning environments. There is a shortage of qualified teachers and the profession continues to suffer from a lack of prestige compared to other professions requiring similar levels of training and vocation (Santiago *et al*., 2017). Another challenge is low socio-economic status (SES) schools have disproportionately high representations of weaker teachers, thus likely contributing to the inequity found in the Chilean education system (Cabezas *et al*., 2011; Ortuzar *et al*., 2009).

Researchers argue that teachers' beliefs shape their instructional behaviors (Kagan, 1992; Levin, 2015; Levin *et al*., 2013; Pajares, 1992; Shulman, 1986; Stipek *et al*., 2001). In particular, it is crucial to understand those beliefs regarding constructivist teaching practices versus direct transmission

KEYWORDS / Constructivist Beliefs / Early Career Teachers / Teacher Education Programs /
Received: 07/31/2024. Accepted:11/15/2024.

Soledad Ortúzar. PhD in Education, University of Pennsylvania, USA. Director, Centro de Innovación en Liderazgo Educativo (CILED), Universidad del Desarrollo, Santiago, Chile. e-mail: msortuzar@udd.cl.

Trevor Driscoll. Doctor (c) Doctoral Program in Education, Universidad de Tarapacá. Arica, Chile. e-mail: tdriscoll@academicos.uta.cl.

Carlos Mondaca-Rojas (Corresponding author). Doctor in Education, Universidad Autónoma de Barcelona. Spain. Academic, Department of Education, Universidad de Tarapacá, Arica, Chile. Address: Avenida 18 de Septiembre 2222. Oficina 13, Segundo Piso. Arica-Chile. e-mail: cemondacar@academicos.uta.cl.

CAMBIOS EN LAS CREENCIAS CONSTRUCTIVISTAS DE LOS DOCENTES DESDE LOS PROGRAMAS DE FORMACIÓN DOCENTE HASTA LOS PRIMEROS AÑOS DE DOCENCIA EN CHILE

Soledad Ortúzar, Trevor Driscoll y Carlos Mondaca-Rojas

RESUMEN

La efectividad en la enseñanza puede mejorarse comprendiendo qué factores moldean las creencias y actitudes de los docentes. Este estudio se centra en las creencias constructivistas, que se consideran fundamentales para promover una enseñanza de calidad centrada en el estudiante. El estudio analiza el grado en que los docentes en sus primeros años de carrera mantienen creencias constructivistas y cómo estas creencias pueden cambiar desde el momento en que están estudiando en sus programas de formación docente hasta cuando comienzan a enseñar en escuelas chilenas. El estudio utiliza un diseño explicativo secuencial de métodos mixtos con una muestra de 101 docentes noveles en escuelas. Se les encuestó en dos ocasiones: una cuando se encontraban en los últimos años de sus programas de formación docente y nuevamente en sus primeros años de enseñanza. Su orientación hacia las creencias constructivistas disminuyó, pero existen diferencias en los resultados dependiendo de las características de los docentes, las características de los programas de formación docente, las creencias de los docentes y las características de la escuela donde comenzaron a enseñar.

MUDANÇAS NAS CRENÇAS CONSTRUTIVISTAS DOS PROFESSORES DESDE OS PROGRAMAS DE FORMAÇÃO DE PROFESSORES ATÉ OS PRIMEIROS ANOS DE ENSINO NO CHILE

Soledad Ortúzar, Trevor Driscoll e Carlos Mondaca-Rojas

RESUMO

A eficácia do ensino pode ser aprimorada por meio da compreensão do que molda as crenças e atitudes dos professores. Este estudo concentra-se nas crenças construtivistas, que são consideradas promotoras de um ensino de qualidade, centrado no aluno. O estudo analisa até que ponto os professores em início de carreira mantêm crenças construtivistas e como essas crenças podem mudar desde o momento em que estão cursando seus programas de formação docente até quando começam a lecionar nas escolas chilenas. O estudo utiliza um desenho explicativo sequencial de métodos mistos com uma amostra de 101 professores iniciantes em escolas. Eles foram entrevistados duas vezes: uma quando estavam nos anos finais de seus programas de formação docente e novamente em seus primeiros anos de docência. Sua orientação em relação às crenças construtivistas diminuiu, mas existem diferenças nos resultados dependendo das características da formação dos professores, das características dos programas de formação docente, das crenças dos professores e das características das escolas onde começaram a lecionar.

teaching and what variables may strengthen or weaken those beliefs. This study examines the extent to which Chilean teachers exhibit constructivist beliefs and how they change from when they are students in Elementary school Teacher Education Programs (TEP) to their beliefs during their first few years of teaching after graduation. An analysis was performed on some factors that may be predictive of those beliefs and predictive of the changes in those beliefs, including teachers' background characteristics, the characteristics of the TEP they graduated from, the characteristics of the first school in which they started teaching, and their own beliefs in self-efficacy and whether "all students can learn".

Next is a review of the concepts the study is based upon, teachers' beliefs in constructivism vs direct instruction, and factors that can modify those beliefs. Constructivism is a theory of learning that emphasizes how prior experiences of learners influence how they construct knowledge and understand their world (Brooks and Brooks, 1993). Jean Piaget (1967) refers to the active role of the individual in learning and argues that "all knowledge is tied to action, and knowing an object or an event is to use it by assimilating it to an action scheme" (1967:14-15). From a constructivist point of view, knowledge is conceived as the product of interaction among prior conceptions and new experiences. Constructivism values and recognizes students' prior knowledge and promotes learning in which students constantly revise, reorganize, and deepen their understanding as they have new experiences and acquire more information (Brooks and Brooks, 1993; Levitt, 2002; Loyens *et al*., 2009). Although constructivism is a theory of learning and not of instruction, teachers can teach in a way consistent with a constructivist approach when they consider how students learn (Brooks and Brooks, 1993).

There is a sizeable body of literature spanning decades about the relationship between teachers' beliefs and the teaching practices they implement in their classrooms (Kagan, 1992; Levin, 2015; Levin *et al*., 2013; Pajares, 1992; Shulman, 1986; Stipek *et al*., 2001). Pajares (1992) argues that teachers' beliefs impact their perceptions about themselves and their students, affecting their classroom behavior. Also, there are positive relationships between teachers' holding constructivist beliefs and high-quality praxis in their classrooms (Stipek *et al*., 2001). However, Buehl and Beck (2015) have found that personal and contextual factors can affect the likelihood that teachers with constructivist beliefs will use quality instructional practices in their

classrooms. Even though the teacher understands constructivist approaches to instruction which have shown benefits in student achievement, as well as in the development of cognitive structures and improvement in the use of concepts (Kim, 2005; Smith *et al*., 2001; Wu and Tsai, 2005).

Regarding the stability of beliefs, significant research sheds light on how constructivist beliefs may change between pre-service training and the beginning teaching years. Teachers' experiences from when they were students shape their theories about teaching and learning. These beliefs operate as filters for making meaning of their teacher preparation programs and classroom experiences (Pajares, 1992; Schneider *et al*., 2013; Zeichner and Tabachnick, 1981). Pilitsis and Duncan (2012) argue that for pre-service teachers to progress toward a more constructivist approach to teaching, TEPs should help students reflect on their beliefs through discussion and other meaningful activities. However, after being hired by a school, a teacher's practices and beliefs can be redefined through their experiences in the classroom (Ertmer, 2005). Research indicates that even beginning teachers exposed to constructivist training as TEP students tend to revert to more teacher-centered beliefs when they become full-time teachers (Borg, 2004). Zeichner and Tabachnick (1981) speculated that the notions and beliefs developed during TEPs were washed out by the teachers' experience in the classroom. Consequently, many beginning teachers select instructional strategies that are judged useful for controlling behavior over those that might be more useful for enhancing student learning. In this initial phase of teaching, as their images and beliefs shift, they also tend to focus more on their behavior than on the behaviors and outcomes of their students.

Veenman (1984) described the transition from pre-service teacher education to full-time teaching as a reality shock, a collapse of the ideals developed during pre-service education as teachers encounter the day-to-day reality of classroom life. Research, however, has highlighted moderating factors for maintaining constructivist beliefs, which are analyzed in this study. Smith *et al*. (2001) found that constructivist instruction methods were more commonly used in higher grade levels, classrooms with high proportions of higher-achieving students, and small schools. These authors found that better-prepared teachers were more likely to use a constructivist approach than their less-prepared counterparts. Constructivist teaching approaches were more common in schools with strong instructional leaders who supported innovation (Ertmer, 2005).

High-poverty classrooms are a factor of considerable debate about the most effective instruction practices. A common assumption is that direct transmission approaches would better serve low-income students, and higher-income students tend to benefit more from constructivist approaches (Chiatovich and Stipek, 2016; Smith *et al*., 2001). However, there is scarce empirical evidence to support these assumptions, and the evidence is mixed (Stipek, 2004). In one recent study, Chiatovich and Stipek (2016) showed that the relationship between instructional approaches, constructivist versus direct transmission, and student achievement is similar across students from different socio-economic groups.

Finally, there is evidence about other teacher beliefs, particularly the strength of their belief that all students can learn and teacher self-efficacy beliefs, which are associated with teachers' constructivist beliefs (Nie *et al*., 2013; Woolfolk Hoy *et al*., 2009). Self-efficacy refers to "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1994:71).

Methodology and Research Design

This study used a mixed methods explanatory sequential design to answer the extent to which early career Chilean teachers exhibit constructivist beliefs and how their pre-service year beliefs compare with their beliefs during their first few years of teaching (Cresswell, 2014). Quantitative analysis was used to identify if the factors i) teachers' background characteristics, ii) TEP characteristics, iii) first school assignments characteristics, iv) teachers self-efficacy, and "all students can learn" beliefs were predictive of an orientation towards constructivist beliefs of students in TEPs and later as early career teachers in their first years of teaching after graduating. Then, a small explanatory qualitative study was conducted to aid in the interpretation of the main findings of the study.

Sample and data sources

The orientation that guided this research was a longitudinal analysis approach based on teachers' orientation toward constructivist beliefs about instruction (Menard, 2002). The primary sample for the study is 101 early career teachers. These teachers were first surveyed in 2010 as part of a more extensive study of 1367 students in TEPs. Again, in 2013, 168 of these teachers were surveyed in a more extensive study as beginning teachers. The final sample of 101 participants were those who indicated they were working in schools in 2013. The explanatory qualitative data was from semi-structured, in-depth interviews with five teachers selected to represent various beliefs and experiences.

To overcome the response bias from non-respondents described by Cresswell (2014), an analysis was performed on the respondents and non-respondents to the follow-up survey. The results showed similar characteristics for the study variables with no statistically significant differences between the groups.

Survey measures

The variables included in the study are explained in Table I with means, standard deviations, and ranges of scores. The outcome variables are the teacher's constructivist beliefs. Most variables are self-explanatory, but the following may require explanation for some readers. The variables that are the study's focal measures are the survey data that measures the sample members' perceptions about constructivist beliefs and direct transmission beliefs regarding instruction. The data was collected at two points in time in 2010 and 2013 (Menard, 2002). The specific questionnaire items about teachers' constructivist beliefs and direct transmission beliefs about instruction were asked at each time point and are the same as the ones used in the Teaching and Learning International Survey (TALIS) (OECD, 2009).

Equal to the TALIS 2008 methodology, ipsative scores are used to analyze constructivist and direct transmission beliefs. The constructivist beliefs scale (CBS) is referred to as 'teachers' orientation towards constructivist beliefs.' Factor analysis was performed on the scale variables requiring one item to be removed that did not show a clear loading pattern, and the 2010 and 2013 surveys were adjusted appropriately. For each scale measure, the reliability was lower for the 2010 data than the 2013 data. Cronbach's alpha for the constructivist beliefs scale measured in the pre-service period is 0.643, and that for the direct transmission beliefs scale in this same period is 0.433. In contrast, Cronbach's alphas for the scales based on data from the beginning teaching years are .661 for the constructivist beliefs and 0.612 for direct transmission beliefs.

TABLE I
DESCRIPTIVE STATISTICS OF SAMPLE VARIABLES (N = 101)

Variables	Mean	SD	Description	Year, source and type of variable
Outcome Variables (Ipsative scale)				
Pre-service constructivist beliefs	0.29	0.32	Continuous min= -0.43 max= 1.29	2010-teacher report Constructed
Beginning teachers' constructivist beliefs	0.13	0.30	Continuous min= 1.14 max= 0.13	2013-teacher report Constructed
Predictor variables: Teacher background characteristics				
Public high school	0.40	0.49	1= yes 0=no (subsidized or private school)	2010-teacher report Direct measure
First priority when applying to university	0.68	0.47	1= yes 0= no (2nd or higher)	2011-teacher report Direct measure
Predictor variables: TEP characteristics				
Pre-service program member of CRUCH	0.45	0.50	1=yes 0= no	2010-TEP institution ID
T-Z pre-service selective and research	0.39	0.49	1= TEP selective and research oriented 0= non TEP selective and research	Direct measure (for all variables)
T-Z preservice selective and nonresearch	0.13	0.34	1= TEP selective-non research 0= non TEP selective-non research	
T-Z preservice nonselective and nonresearch	0.47	0.49	1= TEP non selective non research 0=non TEP non selective-non research	
Higher preservice program accreditation	0.23	0.42	1= yes (accredited for 6 or 7 years) 0 = no (accredited for 5 or less)	
Predictor variables: Characteristics of first school in which teachers started working				
Traditional public school	0.37	0.48	1= yes 0= no (subsidized or private school)	2013- school ID Direct measure
School low SES	0.53	0.50	1= yes 0= no (medium or high SES)	2013- school ID Direct measure
"Insufficient" performance in school's test scores	0.33	0.47	1= yes 0= no 'elemental' or 'adequate')	2013- school ID Direct measure
Small class size	0.38	0.49	1=25 or less students 0= more than 25 students	2013-teacher report Direct measure
Medium class size	0.24	0.43	1= between 26 and 34 students 0= not between 26 and 34 students	2013-teacher report Direct measure
Large class size	0.39	0.49	1= 35 or more students 0= less than 35 students	2013-teacher report Direct measure
Pedagogical support in school	0.30	0.46	1= yes 0= no	2013-teacher report Direct measure
Support from TEP Professor	0.50	0.50	1= yes 0= no	2013-teacher report Direct measure
Lower difficulty in adapting to school	0.29	0.45	1= yes 0= no (higher difficulty)	2013-teacher report Direct measure
Predictor variables: Teacher beliefs				
Personal self-efficacy beliefs	3.25	0.36	Continuous min= 2.33 max= 4.00	2013-teacher report Direct measure
External self-efficacy beliefs	2.76	0.50	Continuous min= 1.20 max= 3.80	2013-teacher report Direct measure
Belief that all students can learn	3.39	0.63	Continuous min= 1.00 max= 4.00	2013-teacher report Direct measure

TEP: Teacher Education Program, CRUCH: Council of Rectors of Chilean Universities, T-Z: Torres-Zenteno Teacher Education Program Classifications, SES: Socioeconomic Status.

In the characteristics of the Teacher Education Program, a TEP member of Council of Rectors of Chilean Universities (CRUCH), refers to the University being part of the CRUCH (Consejo de Rectores de las Universidades Chilenas). The Universities in this council are all considered high quality. Next, Torres and Zenteno (2011) classify universities by their level of undergraduate academic selectivity and whether they undertake research or are mainly teaching institutions. The measure "Torres-Zenteno (T-Z) pre-service selective and research" is a dummy variable with a value of 1 if teachers attended a pre-service program in a selective and research-oriented university and 0 if not. Selectivity refers to the incoming first-year class having an average national admissions exam score higher than the national average. The research or non-research category is similar but uses the value of research grants and academic papers published as the measurement tool. These variables intend to estimate the quality of the TEP. CRUCH, Research and Selective, and high years of accreditation indicate the highest quality.

In the characteristics of the first school in which teachers started working, "Pedagogical school support during the first year of teaching" is a dummy variable with a value of 1 if teachers declare receiving support from the pedagogical leadership unit (Unidad Técnica Pedagógica or UTP) in the schools in which they started working, and 0 if they declare not receiving support from the UTP. In Chile, all public and subsidized schools are required to have a UTP in charge of providing pedagogical support to improve teachers' practice. Regardless, 30% of the teachers in the sample reported receiving support from the UTP.

The specific questionnaire items about teachers' efficacy beliefs are based on Brouwers and Tomic's (2003) adaptation of the Emmer Hickman Teacher Efficacy Scale. The four-point Likert scale the teachers answered contained three items on Teacher Personal Efficacy and five items on Teacher External Efficacy. Factor analysis was performed, and the sub-factors of personal efficacy and external efficacy defined by the authors were coherent with the original scale. The reliability analysis shows that for beginning teachers, Cronbach's alpha personal efficacy beliefs scale is 0.502, and Cronbach's Alpha external efficacy beliefs scale is 0.698. Efficacy beliefs were not measured for student teachers in 2010. The belief that all students can learn measure is computed as teachers' responses to the single-item questionnaire, which asked about teachers' beliefs about their agreement with the Spanish translation of the following statement: I believe all students can learn. Teachers answered on a four-point Likert scale from strongly disagree (1) to strongly agree (4).

Descriptive statistics of sample variables

The survey analytic methods steps followed in the data analysis are based on Creswell (2014). The analysis tools used were differences in means, correlations, and multiple regression analysis. First, the variation in the constructivist beliefs scale was determined using the difference in means between pre-service training and the first years of teaching. Based on previous research (Borg, 2004; Zeichner and Tabachnick, 1981), a decrease was expected in the mean value for the constructivist beliefs scale from pre-service into the first years of teaching. Second, the variation in the constructivist beliefs scale, moderated by the different baseline variables, was analyzed using the difference in means between pre-service training and the first years of teaching constructivist beliefs, moderated by each relevant variable. Research suggests a decrease in scores on the constructivist beliefs scale from pre-service into the first years of teaching, with the degree of decrease depending on the moderating effects of the variables included in this study. Third, a correlation analysis was run to test basic relationships among the different beliefs' variables. Finally, a multiple regression analysis was performed to explore relationships between the various predictors controlling for potential confounding factors.

Results

First, the variation in the constructivist beliefs scale was determined using the difference in means between when teachers were in their TEPs and their first years of teaching after graduation. Table II presents the difference in CBS, the difference considering teachers' background characteristics, and the differences considering the characteristics of the TEP. Table III presents a similar analysis considering the characteristics of the school where teachers were hired to work after graduation.

As hypothesized, teachers reported significantly lower scores on the CBS during their first years of teaching than they reported during the last years of their pre-service training. Teachers' orientations towards constructivist beliefs, measured by their CBS value, decreased from pre-service training into their first years of teaching. However, the analysis shows differences in the results for diverse groups of teachers, defined by personal background characteristics, TEP characteristics, and characteristics of the school in which they start teaching.

Pre-service teachers' orientations towards constructivist beliefs are higher but not statistically significant for teachers who graduated from subsidized and private high schools (0.33), compared to the beliefs of their counterparts who graduated from public high schools (0.24). Once teachers start teaching, the orientation towards constructivist beliefs is similar for all groups of teachers, regardless of the background characteristics mentioned before.

Pre-service teachers' orientation towards constructivist beliefs was significantly higher for teachers whose TEP had higher accreditation status (0.47), were a member of the Council of Rectors of Chilean Universities (Consejo de Rectores de las Universidades Chilenas, CRUCH) (0.41), and had a Torres and Zenteno (2011) (T-Z) research and selective classification (0.40). Once teachers entered the teaching profession, their orientations towards constructivist beliefs decreased to levels typical of the average teacher, regardless of the characteristics of their TEPs.

Teacher background and pre-service training characteristics suggest that those students whose TEP had higher quality indicators were most likely to have had higher constructivist scale scores during pre-service. When they started teaching as beginning teachers, their scores decreased while their counterparts' scores stayed relatively flat. In contrast, there is no obvious pattern of differences for groups defined by coming from public high schools and their priority of teaching when applying to university.

Next, in Table III, a comparison of the difference of means is presented of the teachers' scores on the CBS pre-service and in the CBS score in the first years of teaching within sample subgroups defined by the characteristics of the school where new teachers were hired following their graduation from TEPs.

Regarding the school characteristics, beginning teachers' orientation towards constructivist beliefs was significantly higher for those who reported receiving pedagogical support in schools in which they work (0.27) compared to their counterparts whose schools did not have this quality (0.08). All subgroups of teachers had a decrease in constructivist beliefs. The decrease was notable

TABLE II
CONSTRUCTIVIST BELIEFS SCALE AND CHANGE FROM PRE-SERVICE INTO THE FIRST YEARS OF TEACHING

Variables		TEP		First years teaching		N	Mean diff.	t	Sig.
		Mean	SD	Mean	SD				
Constructivist beliefs scale		0.28	0.32	**0.13**	0.3	100	**0.15**	4.01	**0.000**
Teacher Variables									
Type of high school participant attended	Traditional public	0.24	0.31	0.13	0.28	39	-0.12	1.85	0.072
	Subsidized or Private	0.33	0.32	0.14	0.32	59	**-0.19**	3.78	**0.000**
		-0.07	0.06	0.01	0.06				
Priority of TEP in university application	1st	0.29	0.32	0.14	0.30	49	**-0.15**	3.27	**0.002**
	2nd or lower	0.26	0.37	0.14	0.26	24	-0.13	1.59	0.124
		0.03	0.08	0.00	0.07				
TEP Accreditation	6-7 years	0.47	0.31	0.17	0.34	21	**-0.30**	3.31	**0.003**
	3-5 years	0.24	0.31	0.13	0.29	75	**-0.10**	2.40	**0.019**
		0.23**	0.08	0.04	0.08				
TEP member of CRUCH	CRUCH	0.41	0.33	0.15	0.32	49	**-0.25**	4.28	**0.000**
	non CRUCH	0.19	0.28	0.13	0.28	24	0.06	1.15	0.256
		0.22**	0.06	0.02	0.06				
TEP T-Z Classification	Research / Selective	0.40	0.34	0.15	0.35	37	**-0.25**	3.82	**0.001**
	Non research / Selective	0.41	0.30	0.24	0.33	13	-0.17	1.98	0.070
	Non research / Non selective	0.16	0.26	0.10	0.25	46	-0.05	0.97	0.101
	Mean diff. Research / Selective	**0.19****	0.06	0.02	0.06				
	Mean diff. Non Research / Selective	0.13	0.09	0.12	0.09				
	Mean diff. Non research / Non selective	**-0.25****	0.06	-0.07	0.06				

**p< 0.01. Source: Survey: Teacher Education Programs: Student Teachers Perceptions (2010), Survey: Follow up survey of student teachers of 12 Chilean Universities (2013). TEP: Teacher Education Program, N: Number of teachers, Mean diff.: Difference between means. t: t-statistic for significance of difference of means, Sig.: Level of statistical significance, CRUCH: Council of Rectors of Chilean Universities, T-Z: Torres-Zenteno Teacher Education Program Classifications.

for teachers who started working in low-income schools (0.21), traditional public schools (0.23), in class sizes between 26 and 34 students (0.31), for beginning teachers who reported not receiving pedagogical support in schools in which they work (0.21), those who did not receive support from a professor of their TEP (0.21), and finally teachers who reported having a higher difficulty in adjusting to the school (0.18). It is interesting to note that the only subgroup of teachers whose decrease in their constructivist beliefs was not statistically significant were those who reported having received pedagogical support in the first schools where they taught following their completion of their TEP.

Constructivist beliefs by school characteristics

Multivariate regression analysis of the predictors was used to estimate the unique contributions of background characteristics, TEP attended, their ultimate teaching placement, and pre-service beliefs to explaining teachers' beliefs about constructivist values. Some results are presented in Table IV. In the second model, teachers' pre-service constructivist beliefs ([β= 0.25, p< 0.05]) are statistically significant in explaining the variation of beginning teachers' constructivist beliefs. When adding school characteristics, beginning teachers who received pedagogical support in the schools where they started teaching ([β= 0.20, p< 0.01]) reported significantly higher orientation towards constructivist beliefs than their counterparts.

When variables measuring beliefs are added in the fourth model, the coefficients on the measure of teachers' pre-service constructivist beliefs ([β= 0.17, p< 0.05]), teachers' external self-efficacy ([β = -0.18, p< 0 .01]), and teachers' belief that all students can learn ([β= 0.11, p< 0.01]) are statistically significant in explaining the variation of beginning teachers' constructivist beliefs. A teacher who more strongly believes that all students can learn, while having lower beliefs about external factors explaining student performance, is associated with a significantly higher orientation toward constructivist beliefs.

To test the moderating effect of relevant variables in the variation of constructivist beliefs from pre-service into the first years of teaching, an interaction term between student teachers' constructivist beliefs and the variable 'pedagogical

TABLE III
CONSTRUCTIVIST BELIEFS BY SCHOOL CHARACTERISTICS WHEN STARTING TEACHING

Variables		TEP		First years yeaching		N	Mean diff.	t	Sig.
		Mean	SD	Mean	SD				
School socioeconomic status	Medium and high	0.29	0.35	0.11	0.28	40	**-0.17**	3.13	**0.003**
	Low	0.30	0.31	0.10	0.25	45	**-0.21**	3.89	**0.000**
	Mean diff.			0.01	0.06				
Type of school	Subsidized or Private	0.27	0.31	0.13	0.32	59	**-0.14**	3.13	**0.003**
	Traditional public	0.34	0.34	0.11	0.24	35	**-0.23**	3.52	**0.001**
	Mean diff.			0.02	0.06				
Schools standardized test score (SIMCE Math)	Medium and high	0.28	0.31	0.09	0.26	57	**-0.19**	4.27	**0.000**
	Low	0.32	0.35	0.13	0.28	28	**-0.19**	2.61	**0.015**
	Mean diff.			-0.04	0.06				
Class size	Small (< 26)	0.31	0.29	0.13	0.29	38	**-0.19**	2.58	**0.014**
	Medium (26-34)	0.36	0.32	0.05	0.24	23	**-0.31**	5.27	**0.000**
	Large (> 34)	0.22	0.33	0.19	0.33	39	-0.03	0.52	0.604
	Mean diff. Small			-0.01	0.06				
	Mean diff. Medium			0.10	0.06				
	Mean diff. Large			0.09	0.06				
Difficulty in adapting to school where they work	Low (1- 4)	0.29	0.33	0.15	0.29	71	**-0.14**	3.38	**0.001**
	High (5-10)	0.27	0.29	0.10	0.31	29	**-0.18**	2.16	**0.039**
	Mean diff.			0.05	0.07				
School leadership support during first year of teaching	Yes	0.28	0.38	0.27	0.35	30	-0.01	0.15	0.882
	No	0.29	0.29	0.08	0.25	70	**-0.21**	4.79	**0.000**
	Mean diff.			**0.19****	0.07				
Support from TEP Professor in 1st year of teaching	Yes	0.27	0.28	0.15	0.32	47	**-0.13**	2.35	**0.023**
	No	0.33	0.30	0.12	0.35	46	**-0.21**	3.64	**0.001**
	Mean diff.			0.03	0.06				

**p< 0.01. Source: Survey: Teacher Education Programs: Student Teachers Perceptions (2010), Survey: Follow up survey of student teachers of 12 Chilean Universities (2013). TEP: Teacher Education Program, N: Number of teachers, Mean diff.: Difference between means. t: t-statistic for significance of difference of means, Sig.: Level of statistical significance.

support received at school' was included in the fifth model. The results show a statistically significant effect of the interaction term ([$\beta = 0.37$, $p< 0.05$]) as a predictor of the variability in beginning teachers' constructivist beliefs (Table IV).

Discussion and triangulation with qualitative interviews

Teachers' orientations toward constructivist beliefs decrease from pre-service into the first years of teaching (Table II). Qualitative, in-depth interviews identified some challenges faced by beginning teachers that help explain this decrease. All five teachers, regardless of their training or the schools in which they work, described feeling unprepared during their early teaching for dealing with specific situations, such as communicating with parents and managing classrooms. These findings align with Veenman's (1984) concept of "reality shock".

Despite the general decrease in constructivist beliefs from pre-service into the first years of teaching, there are differences across diverse groups of teachers, specifically in terms of background characteristics, TEP characteristics, and their beliefs.

Regarding teacher background characteristics, once teachers start teaching, orientation towards constructivist beliefs becomes similar across all groups, regardless of their background characteristics. However, high school graduates from subsidized or private schools who had applied to the teaching profession as their first option started with higher CBS scores but experienced a statistically significant larger decrease, reverting to levels similar to the average upon entering the profession. This suggests that the "reality shock" is stronger for this group compared to the average new teacher. These graduates might not have been adequately prepared for specific challenges, such as classroom management or parental communication, unlike those from public schools.

Regarding TEP characteristics, the difference in means analysis (Table II) showed that student teachers' orientation towards constructivist beliefs, measured by their CBS value, was higher for teachers whose TEP had higher quality characteristics. It also displays a statistically significant decrease in the orientation

toward constructivist beliefs similar to all teachers upon being hired after graduation. These results show that teachers who attend lower-quality TEPs are likelier to have a lower orientation toward constructivist beliefs when they are students, suggesting that these programs are less oriented towards a constructivist vision of the teaching and learning process. However, once teachers start teaching, regardless of higher or lower quality TEPs, all experience a decrease in their orientation towards constructivism to similar levels. The results indicate that the early years of teaching are challenging for all teachers, but perhaps more so for teachers oriented towards constructivist teaching who attended higher quality TEPs when they faced the difficulties of applying what they had learned in their teaching program in their classrooms.

The in-depth interviews with the teachers revealed some TEP characteristics that seem to have supported a higher orientation towards constructivism: i) frequent and early field experiences and ii) a positive perception of the pedagogical aspects of their TEP; that is, students valued the instructional methods they learned. The teachers who could sustain constructivist beliefs into their first years of teaching described field experiences that enabled reflection on their teaching, promoted connection/coherence to other aspects of their TEPs, and highlighted the perception of strong lesson-planning skills. These characteristics might have contributed to these teachers maintaining their constructivist views.

Regarding the characteristics of the first school in which teachers started working after graduation, the mean-difference analysis (Table III) shows that beginning teachers' orientation towards constructivist beliefs, measured by their CBS value, was significantly higher only for teachers who reported receiving pedagogical support in schools where they started working after graduation. In model 3 of the regression analysis (Table IV), the variable *Pedagogical support in school* [β= 0.20, p< 0.01] was significant when included with TEP and initial school variables. Teachers who received pedagogical support in the first school where they started working reported higher orientation towards constructivist beliefs. In the in-depth interviews, even teachers with high constructivist views during their student years mentioned how family context (e.g., poverty, drug abuse, violence) and having students with special needs in their classrooms (without additional support) adversely impacted their teaching and learning process.

The mean-difference analysis (Table III) shows that almost all groups of teachers experienced a decrease in their orientation towards constructivist beliefs, measured by their CBS value, from pre-service into their first year of teaching. However, the decrease was higher for beginning teachers who reported not receiving pedagogical support in schools where they work (0.21) and those who did not receive support from a professor of their TEP (0.21). It is interesting to note that the only time teachers did not experience a statistically significant decrease occurred when they received pedagogical support in the schools where they started working.

Consistent with these results, model 5 of the regression analysis (Table IV) reveals that the interaction term between student teachers' constructivist beliefs and pedagogical support in school is significant in predicting teachers' orientation towards constructivist beliefs, confirming that the decrease in teachers' orientation towards constructivist beliefs was higher for teachers who did not receive pedagogical support in the schools where they started teaching.

These results also suggest that some structural school characteristics pose greater challenges for maintaining constructivist beliefs when entering the teaching profession, including working in traditional public schools and schools with a majority of low-income students. However, the study shows that other school characteristics can reduce the negative effects and act as protective factors for constructivist beliefs during the first years of teaching. These factors include

TABLE IV
MULTIPLE REGRESSION ANALYSIS ON BEGINNING TEACHERS' CONSTRUCTIVIST BELIEFS

N= 80	Model 1	Model 2	Model 3	Model 4	Model 5
Characteristics of teacher education program					
T-Z preservice non selectivenand non-research	-0.08	-0.02	-0.04	-0.02	-0.03
Teachers' previous constructivist beliefs during preservice					
Student teachers' constructivist beliefs	-	**0.25***	**0.24****	**0.17***	0.01
School Characteristics					
School low SES	-	-	0.01	0.02	0.04
Pedagogical support in school	-	-	**0.20****	0.06	-0.04
Teachers' beliefs					
External self-efficacy beliefs	-	-	-	-0.18**	-0.17**
Personal self-efficacy beliefs	-	-	-	0.09	0.12
Belief that all students can learn	-	-	-	**0.11****	**0.10***
Moderating factor:					
Interaction term between constructivist beliefs and 'pedagogical support received at school'	-	-	-	-	**0.37***
Model R^2 (adj.)	0.01	**0.08***	**0.18****	**0.34****	**0.38***

*p< 0.05, **p< 0.01. Source: Survey: Teacher Education Programs: Student Teachers Perceptions (2010), Survey: Follow up survey of student teachers of 12 Chilean Universities (2013). N: Number of teachers, T-Z: Torres-Zenteno Teacher Education Program Classifications, SES: Socioeconomic Status, Model R^2 (adj.): Adjusted version of the R-squared statistic.

pedagogical support in schools, support from a professor from their teaching training program, and working with smaller class sizes. The in-depth interviews helped explain why the decrease in constructivist beliefs is more significant in traditional public schools or schools with a majority of low-income students. The challenges of early teaching are exacerbated when teachers work in under-resourced schools. In the interviews, teachers who did not hold onto constructivist beliefs cited limited school resources, poorly prepared teachers, large class sizes, high teacher turnover, work overload, and lack of teaching materials as barriers to constructivist beliefs and practices. Overall, they reported receiving either inadequate or no school support. Additionally, in the interviews, the teachers who held onto constructivist views when starting teaching described having access to more school support, such as effective supervision, class observation, collaboration among teachers, and school leaders who expressed confidence in their capabilities. One new teacher even participated in an induction program.

Regarding teachers' self-efficacy and beliefs about students' learning capabilities, model 5 of the regression analysis (Table IV) revealed that teachers' external self-efficacy beliefs [β= -0.18, p< 0.01] and teachers' belief that all students can learn [β= -0.10, p< 0.05] are significant in predicting beginning teachers' orientation towards constructivist beliefs. Beginning teachers with higher beliefs about external factors, such as home environment and family background, as primary determinants of student performance, have on average a lower orientation towards constructivist beliefs. Conversely, teachers who more strongly believe all students can learn have, on average, a stronger orientation towards constructivism. Consistent with these results, the in-depth interviews revealed that teachers who started with high constructivist beliefs also had strong beliefs in all students being capable of learning, given an adequate learning environment. However, they also emphasized the need to understand the contexts in which children live, especially low-income children, to help them learn.

Some limitations of the study are the following. Due to data availability, this study did not consider some critical aspects, such as grade level and subject matter. Future research could also introduce more precise measurement variables for constructivist beliefs and key predictors, such as the quality of teacher education programs (TEP). Finally, the study analyzes teachers' beliefs in the context of Chile, which imposes limits on generalizing the implications and findings to other countries and realities.

Some policy implications include the importance of understanding the teaching profession as a continuous trajectory of learning and improvement, from pre-service to the early teaching years and beyond. The transition from pre-service to beginning teachers is a critical time in a teacher's career for sustaining beliefs about the teaching and learning process, such as constructivism. Teacher education can contribute to the development and sustainment of teachers' constructivist beliefs throughout their careers by ensuring that TEP field experiences are designed to be early, frequent, comprehensive, meaningful, and connected with theory. Furthermore, it can enhance pedagogical approaches to strengthen teaching practices.

Finally, schools can actively support and sustain teachers' constructivist beliefs during their early years by implementing comprehensive, high-quality strategies for beginning teacher support, especially for those who start their careers in challenging or under-resourced environments.

ACKNOWLEDGEMENT

The authors would like to acknowledge the support of the Universidad de Tarapacá through the UTA-MAYOR No. 5751-24 project.

REFERENCES

Bandura A (1994) Self-efficacy. In Ramachaudran VS (Ed.), *Encyclopedia of human behavior* (Vol. 4). Academic Press. NY, USA. pp. 71-81.

Borg M (2004) The apprenticeship of observation. *ELT Journal 58*: 274-276.

Brooks JG, Brooks MG (1993) *In search of understanding: The case for constructivist classrooms*. Association for Supervision and Curriculum Development. Alexandria, VA, United States. 136 pp.

Brouwers A, Tomic W (2003) A test of the factorial validity of the teacher efficacy scale [electronic version]. *Research in Education 69*: 67-78.

Buehl MM, Beck JS (2015) The relationship between teachers' beliefs and teachers' practices. In Fives H and Gill MG (Eds.), *International handbook of research on teachers' beliefs*. Routledge. NY, USA. pp. 31-47.

Cabezas V, Gallego F, Santelices V, Zarhi M (2011) *Factores correlacionados con las trayectorias laborales de docentes en Chile, con especial énfasis en sus atributos académicos*. Reporte FONIDE noviembre, Ministerio de Educación, Santiago, Chile.

Chiatovich T, Stipek D (2016) Instructional approaches in kindergarten: What works for whom? *The Elementary School Journal 117*(1).

Creswell JW (2014) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 4th edition. Sage. Thousand Oaks, CA, USA.

Ertmer PA (2005) Teacher Pedagogical Beliefs: The Final Frontier in Our Quest for Technology Integration? *Educational Technology Research and Development 53*: 25-40.

Kagan DM (1992) Implications of research on teacher belief. *Educational Psychologist 27*: 65-90.

Kim JS (2005) The effects of constructivist teaching approach on student academic achievement, self-concept, and learning strategies. *Asia Pac Educ Rev 6*: 7-19.

Levin BB (2015) The development of teachers' beliefs. In Fives H and Gill MG (Eds.), *International handbook of research on teachers' beliefs*. Routledge. NY, USA. pp. 48-65.

Levin BB, He Y, Allen MH (2013) Teacher beliefs in action: A cross-sectional, longitudinal follow-up study of teachers' personal practical theories. *Teacher Educator 48*: 1-17.

Levitt KE (2002) An Analysis of Elementary Teachers' Beliefs Regarding the Teaching and Learning of Science. *Science Education 86*: 1-22.

Loyens SM, Rikers RM, Schmidt GH (2009) Students' conceptions of constructivist learning in different programme years and different learning environments. *British Journal of Educational Psychology 79*: 501-514.

Marcelo C (2009) Los comienzos en la docencia: un profesorado con buenos principios. Profesorado. *Revista de Currículum y Formación del Profesorado 13*: 1-25.

Menard S (2002) *Longitudinal Research, second edition*. Sage. Thousand Oaks, CA USA. 94pp.

Nie Y, Tan GH, Liau AK, Lau S, Chua BL (2013) The roles of teacher efficacy in instructional innovation: Its predictive relations to constructivist and didactic instruction. *Educational Research for Policy and Practice 12*: 67-77.

OECD (2004) *Teachers Matter: Attracting, Developing and Retaining Effective Teachers*. OECD. Paris, France.

OECD (2009) *Creating Effective Teaching and Learning Environments: First Results from TALIS*. OECD. Paris, France.

Ortúzar M, Flores, C Miles C, Cox C (2009) *Aspectos de la formación inicial de docentes y su influencia en el rendimiento académico de los alumnos*. Universidad Católica, Centro de Políticas Públicas, Santiago. 33 pp.

Pajares MF (1992) Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research 62*: 307-322.

Piaget J (1967) *Biologie et connaissance (Biology and knowledge)*. Gallimard. Paris, France. 510 pp.

Pilitsis V, Duncan RG (2012) Changes in belief orientations of preservice teachers and their relation to inquiry activities. *Journal of Science Teacher Education 23*: 909-936.

Santiago P (2017) OECD *Reviews of School Resources: Chile 2017*. OECD Reviews of School Resources, OECD Publishing, Paris, France.

Shulman LS (1986) Paradigms and research programs for the study of teaching. In: Whittrock MC (Ed.), *Handbook of research on teaching*. 3rd ed., Macmillan. NY, USA. pp. 1-36.

Schneider C, Pakzad U, Schlüter K (2013) The Influence of Personal School Experience in Biology Classes on the Biology-Related Beliefs of Students in University Teacher Education. *Journal of Education and Training Studie 1*: 197-210.

Smith JB, Lee VE, Newmann FM (2001) *Instruction and achievement in Chicago elementary schools: Improving Chicago's schools*. Consortium on Chicago School Research. Chicago, Illinois, USA.

Stipek D, Givvin K, Salmon J, MacGyvers V (2001) Teachers' beliefs and practices related to mathematics instruction. *Teaching and Teacher Education 17*: 213-226.

Stipek D (2004) Teaching practices in kindergarten and first grade: Different strokes for different folks. *Early Childhood Research Quarterly 19*: 548-568.

Torres R, Zenteno ME (2011) El sistema de educación superior: una mirada a las instituciones y sus características. In M. Jiménez and F. Lagos (Eds.), *Nueva geografía del sistema de educación superior y de los estudiantes*. Foro de la Educación Superior. Santiago, Chile. pp. 13-77.

Veenman S (1984) Perceived problems of beginning teachers. *Review of Educational Research 54*: 143-178.

Wang J, Odell SJ (2002) Mentored learning to teach according to standards-based reform: A critical review. *Review of Educational Research 72*: 481-546.

Woolfolk Hoy A, Hoy WK, Davis H (2009) Teachers' self-efficacy beliefs. In K. Wentzel, and A. Wigfield (Eds.), *Handbook of motivation in school*. Lawrence Erlbaum. Mahwah, NJ, USA. pp. 627-654.

Wu YT, Tsai CC (2005) Effects of constructivist-oriented instruction on elementary school students' cognitive structures. *Journal of Biological Education 39*: 113-119.

Zeichner KM, Tabachnick BR (1981) Are the effects of university teacher education "washed out" by school experiences? *Journal of Teacher Education 32*: 7-11.