



Comisión Nacional de Investigación
Científica y Tecnológica - CONICYT

TEAM GRANTS FOR RESEARCH IN SOCIAL SCIENCES AND HUMANITIES 2011

FINAL REPORT

INSTRUCTIONS

1. The following report must be thoroughly filled up indicating the general and specific results of the Research Team Grant.
2. Reviewers' suggestions on the previous report must be referred to.
3. The signatures of Main Researchers currently abroad may be included digitalized in another page.
4. Include all necessary appendices to show the outcomes of the project which must be sent to the Program in a digital version only.

Concerning publications remember to include in the digital appendices the letters or email messages confirming reception or acceptance, as well as the corresponding digital copies. Only published works that declare acknowledgements to this project will be considered as resulting products from this grant.

Concerning theses (undergraduate, master's and/or PhD's) resulting from the project, remember to include in the digital appendixes the cover pages and executive summaries of each one of them.

Concerning courses, seminars, conferences, workshops where members of the project took part presenting results, dissemination events or others organized by project members, remember to include in the digital appendixes the copies of the corresponding programs, if available.

5. Once completed, the current report must be sent in printed and digital version to the following address:

***Programa de Investigación Asociativa - CONICYT
Moneda 1375 - Piso 5, Santiago.***

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Comisión Nacional de Investigación
Científica y Tecnológica - CONICYT

TEAM GRANTS FOR RESEARCH IN SOCIAL SCIENCES AND HUMANITIES 2011

FINAL REPORT

I. PROJECT PRESENTATION

PROJECT TITLE		CODE
<i>School Effectiveness Improvement in Chile.</i>		SOC 1104
PROJECT DIRECTOR	SIGNATURE	
Cristian Bellei Carvacho		
MAIN INSTITUTION		
Universidad de Chile		
ASSOCIATED INSTITUTIONS		
UNICEF Fundación Minera Escondida Fundación Educacional Arauco Asociación Chilena de Municipalidades Universidad Diego Portales Fundación Educacional Oportunidad		
PERIOD INFORMED		
December, 5th 2012 – January 2016		



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II. RESUMEN EJECUTIVO

Esta sección no deberá extenderse más allá de tres páginas. Resuma los logros del proyecto considerando los objetivos específicos del Instrumento:

1. Crear líneas nuevas de investigación y/o reforzar aquellas existentes, que generen un impacto científico medible a nivel nacional e internacional.
2. Desarrollar y/o consolidar programas de formación de investigadores en las áreas de Ciencias Sociales y Humanidades que permitan formar masa crítica altamente calificada para contribuir al desarrollo futuro de estas ciencias.
3. Integrar a los/las investigadores/as de estas ciencias a circuitos académicos nacionales e internacionales, a través del establecimiento de redes con centros de estudios e investigación en estas áreas que tengan reconocimiento internacional.
4. Contribuir al desarrollo económico y social de Chile ya sea de manera directa o a través del mejoramiento directo o indirecto de políticas públicas.

Dado que este resumen debe ser asequible a público general, le solicitamos hacer uso de lenguaje simple o explicaciones cuando términos técnicos así lo requieran.

Investigación desarrollada: comprendiendo el mejoramiento escolar

El desafío más importante de la educación escolar chilena es iniciar y sostener procesos de mejoramiento a gran escala, especialmente en las escuelas que educan a los niños de menor nivel socioeconómico. Este desafío constituyó el corazón del presente proyecto, cuyo propósito fue comprender cómo algunas escuelas básicas chilenas han mejorado su capacidad para ofrecer más y mejores oportunidades de aprendizaje a sus estudiantes (en general y tomando en cuenta las diferencias iniciales) en diferentes contextos sociales e institucionales, e identificar los factores que facilitan y dificultan dicho mejoramiento. Para ello, el proyecto Anillo Mejoramiento de la Efectividad Escolar en Chile incluyó tres líneas de investigación: (1) explicar el mejoramiento de la efectividad escolar, enfatizando el área de matemáticas (donde el país ha tenido más dificultades para mejorar); (2) explorar la sostenibilidad del mejoramiento escolar; y (3) comprender el potencial aporte de la asistencia técnica educativa externa (ATE) al mejoramiento escolar (una herramienta en la que se ha invertido gran cantidad de recursos públicos en los últimos años). Durante estos tres años el equipo de trabajo logró desarrollar el conjunto de las actividades de investigación comprometidas, obteniendo resultados que consideramos grosso modo relevantes para el campo académico y el sistema educacional.

Con el propósito de contar con una medida compleja y cuya evolución pueda ser observada en el mediano-largo plazo, nuestro equipo de investigación creó un Índice de Desempeño Educativo (IDE), el cual fue aplicado al conjunto de escuelas del país con información disponible. El análisis del IDE permitió estimar qué proporción de escuelas chilenas había mejorado (40% aprox.), estaba estancada (35% aprox.) o disminuyó su desempeño (25% aprox.) durante la década de los 2000s; también permitió concluir que una fracción menor al 10% de las escuelas experimentó procesos sostenidos y relevantes de mejoramiento en el período. Adicionalmente, se encontró que, aunque el mejoramiento escolar hizo disminuir en parte la inequidad del logro educacional, la desigualdad socioeconómica entre las escuelas limita severamente la equidad en educación.

Estos hallazgos vuelven más relevante aplicar una mirada integral al fenómeno del mejoramiento escolar, que incluya la institucionalidad, las políticas, y el contexto, pero que comprenda igualmente los procesos internos de gestión institucional, el trabajo pedagógico-curricular y la cultura escolar, y que entre también a la sala de clases. Esa ha sido nuestra perspectiva. Para ello (además de profundizar en los análisis estadísticos), desarrollamos un conjunto de estudios cualitativos (principalmente estudios de caso de escuelas que experimentaron procesos de mejoramiento escolar sostenido en el tiempo, escuelas en sectores de pobreza previamente identificadas como especialmente efectivas, y escuelas que habían trabajado previamente con programas ATE) y observaciones estructuradas de salas de clases (en que aplicamos dos instrumentos internacionalmente validados: Classroom Assessment Scoring System, CLASS, y Mathematical Quality of the Instruction, MQI).

Nuestros hallazgos muestran lo complejo y difícil del mejoramiento: complejo, por el conjunto de factores interrelacionados; difícil, por la fragilidad que observamos al estudiar los procesos escolares en el mediano plazo. Sintéticamente. Nuestra matriz de análisis mostró la relevancia de los factores contextuales, especialmente las dinámicas locales comunitarias y del mercado escolar (en el caso chileno, enormemente dinámico y socialmente segregado), por un lado, y las políticas educacionales (la década pasada fue muy intensa en este aspecto), por el otro. Por cierto, las escuelas no son afectadas mecánicamente por el contexto y la forma en que sus actores "procesan" dicho contexto (especialmente los responsables de la gestión institucional) resulta crítica. Esto queda muy claro al observar el efecto de las políticas educacionales: mientras para algunas escuelas éstas resultaron herramientas claves en sus procesos de mejoramiento, para otras fueron más bien un problema e incluso tuvieron efectos negativos. Con todo, fue posible observar que –en general– la subvención escolar preferencial (SEP, quizás la política educacional más relevante de la década pasada, que incluye un enorme aumento de recursos, el desarrollo de un plan de mejoramiento y un esquema de sanciones a las escuelas que no mejoran sus resultados académicos) tuvo un efecto positivo en los procesos de mejoramiento escolar; en cambio, el uso de asesores externos (ATE) no mostró efectos positivos sostenidos.

A nivel escolar, nuestros resultados muestran con detalle la relevancia del liderazgo directivo para iniciar y sostener procesos de mejoramiento, así como la importancia de acumular y desarrollar el saber profesional docente en las escuelas, organizar un riguroso trabajo pedagógico-curricular, y producir y nutrir una cultura escolar que alimente la dimensión subjetiva del quehacer escolar con un sentido de comunidad y corresponsabilidad. Estos componentes se retroalimentan mutuamente, y cuando alguno de ellos comienza a horadarse, la sustentabilidad del mejoramiento escolar se pone en riesgo. Hay muchos factores que pueden incidir negativamente en este sentido. Por ejemplo, la llegada de un nuevo director que no logra identificar los desafíos de la escuela e inicia cambios que no acumulan sobre los avances previos; el reemplazo de docentes experimentados por otros que no son socializados en las prácticas de trabajo de la escuela; o la modificación en la composición de los estudiantes que no va acompañada de un ajuste en las prácticas de trabajo escolar para responder a sus particulares necesidades. En este sentido, el grado de institucionalización del trabajo de gestión organizacional y de gestión pedagógico-curricular de las escuelas mostró ser decisivo para que éstas sostuvieran en el tiempo sus procesos de mejoramiento. Combinando factores como estos, elaboramos una tipología de "trayectorias de mejoramiento" (mejoramiento puntual, incipiente, en vías de institucionalización, e institucionalizado), que caracteriza dichos procesos según su grado de complejidad, sistematicidad, profundidad, profesionalismo, legitimidad, entre otros; permitiendo en definitiva identificar diferentes estadios de desarrollo del mejoramiento escolar.

Finalmente, el mejoramiento escolar genuino se expresa en mayores oportunidades de aprendizaje para los estudiantes. La observación de prácticas pedagógicas de matemáticas (realizada en una muestra de escuelas con mejoramiento sostenido de su desempeño) mostró clases altamente estructuradas, productivas, ordenadas, y centradas en la labor del profesor más que en las oportunidades de los niños de exponer e intercambiar ideas, e involucrarse en actividades de indagación o análisis; también se vio que los problemas disciplinarios en el aula

aparecen menos importantes y son mejor resueltos que en la población general. Por último, más que un patrón único, se observó una alta complejidad y diversidad de prácticas pedagógicas que llevan a resultados similares; así, en cada aula fue posible encontrar múltiples rasgos positivos de la enseñanza que permitieron a los profesores conducir una buena clase de matemáticas; y aunque con errores y omisiones, estos fueron compensados por otros elementos de la enseñanza efectiva de mejor dominio. Integrar analíticamente estos hallazgos con los obtenidos por los estudios de caso a nivel institucional mostró ser un enorme, pero promisorio desafío que nuestro equipo de investigación apenas ha podido comenzar a abordar.

Colaboración con el sistema educacional y difusión de resultados

Los hallazgos del proyecto, especialmente la documentación de estrategias de mejoramiento y la identificación de “buenas prácticas”, han sido ampliamente diseminados entre la comunidad científica, los diseñadores de política, y los directivos y docentes del sistema escolar. La intensa agenda de publicaciones de diferente tipo (artículos científicos, libros, notas técnicas, guía de trabajo, infografía web) y de actividades de difusión también diversas (congresos científicos, conferencias, talleres, medios de comunicación, web institucional, cursos), han permitido al proyecto alcanzar un público amplio y heterogéneo.

En la dimensión académica, el proyecto ha publicado artículos en revistas internacionales de reconocido prestigio en el campo, presentando versiones preliminares en importantes congresos científicos internacionales. Esto, junto al diálogo y cooperación (con variados grados de intensidad) con académicos internacionales (especialmente aunque no exclusivamente del Comité Científico Internacional), ha permitido al equipo insertarse en la comunidad internacional dedicada a estas temáticas. En el plano nacional, el proyecto publicó dos libros (“Lo aprendí en la escuela. ¿Cómo se logran procesos de mejoramiento escolar?” y “Nadie dijo que era fácil. Escuelas efectivas en sectores de pobreza, diez años después”) que han alcanzado amplia difusión, y sus resultados han sido presentados en múltiples seminarios y conferencias.

En el campo de las políticas educacionales, los resultados de los estudios han sido tenidos en cuenta, ya sea por la participación directa de algunos investigadores del proyecto en comisiones o consultas del Ministerio de Educación y el Congreso Nacional (e.g. el diseño de la nueva educación pública, la nueva carrera profesional docente, o el ajuste de las políticas de evaluación de aprendizajes). Por ejemplo, dos de los investigadores del proyecto participaron en una comisión del Ministerio de Educación que revisó el sistema nacional de evaluación (SIMCE); los hallazgos del libro “Lo aprendí en la escuela” fueron intensamente utilizados en el análisis de la comprensión, valoración y usos del SIMCE por parte de docentes y directivos y sus efectos positivos y negativos sobre el mejoramiento de las escuelas. Asimismo, el Ministerio de Educación solicitó al equipo la elaboración de una guía de trabajo para el sistema escolar (basada en los hallazgos del mismo estudio) para apoyar los procesos de reflexión, planificación, e implementación de prácticas de mejoramiento efectivas, la cual ha sido difundida en la web institucional del Mineduc y distribuida en 20 mil ejemplares a todas las escuelas del país (un material similar ha sido solicitado por el Mineduc respecto del libro “Nadie dijo que era fácil”). Por último, la Agencia de la Calidad, organismo oficial encargado de evaluar y entregar orientaciones a las escuelas para su mejoramiento, ha utilizado y difundido ampliamente los resultados de nuestros estudios para enriquecer su trabajo, tanto de evaluación como de orientación.

Finalmente, el proyecto ha hecho grandes esfuerzos para colaborar con actores del sistema escolar. Esto se ha expresado en una gran cantidad de seminarios y conferencias en que se han presentado los resultados, así como la elaboración de una infografía disponible en la web, todo lo cual ha hecho que los estudios alcancen un nivel masivo de difusión. Complementariamente, el equipo ha realizado múltiples talleres sobre mejoramiento escolar, analizando las implicancias de los resultados del proyecto para sus realidades escolares particulares; los talleres se han realizado siempre a solicitud de actores locales (incluyendo la cooperación con nuestra instituciones aliadas nacionales), en diferentes zonas del país, con directivos de escuela,



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docentes, supervisores del Ministerio de Educación, estudiantes de pedagogía y profesionales de la administración local de educación pública. Los aprendizajes de esta experiencia de trabajo directo con actores del sistema escolar alimentaron un curso de verano y el diseño del diplomado sobre mejoramiento escolar, ambos dirigidos a directivos escolares.

Consolidación de una línea de estudios y desafíos futuros

El proyecto Anillo ha permitido dar sistematicidad a una línea de investigación que había sido desarrollada de modo irregular por el equipo académico. Esto se ha logrado mediante la colaboración con un amplio grupo de investigadores nacionales, no sólo del equipo, sino de diferentes instituciones: alrededor de 36 investigadores (la mayoría en etapas iniciales de su carrera) han participado directamente en los estudios del proyecto; a quienes se suman 6 tesis de estudiantes del proyecto.

A futuro, el Centro de Investigación Avanzada en Educación consolidará esta línea de trabajo, por cuanto ella es una de las áreas prioritarias del recientemente adjudicado financiamiento Basal (programa de Conicyt), cuyo horizonte temporal son cinco años, renovables. Los principales desafíos que se espera abordar son, por un lado, extender los estudios de mejoramiento escolar a los niveles pre-escolar y secundario; y por el otro, profundizar la comprensión del mejoramiento escolar y complejizar su perspectiva. En este sentido, es muy relevante estudiar una gama más amplia de resultados (no solo aprendizajes en matemáticas y lenguaje), incluyendo otras asignaturas, dimensiones sicosociales (como el bienestar, la autoestima, y la convivencia), y la formación ciudadana. El propio proyecto Anillo permitió colaborar con una serie de instituciones, lideradas por la Universidad de Harvard, en un proyecto de investigación sobre la promoción de "habilidades para el siglo XXI" en los currículos y políticas educacionales.

Otra línea de investigación y desarrollo que se espera consolidar está referida al liderazgo escolar. Para ello, investigadores del equipo participan en el consorcio de instituciones académicas que obtuvo un fondo del Ministerio de Educación (por cuatro años) para la creación del "Centro Chileno para la Excelencia en Liderazgo Educativo". Liderado por la Pontificia Universidad Católica de Valparaíso, lo integran además la Universidad de Chile, Universidad de Concepción, Fundación Chile y el Ontario Institute for Educational Studies de Canadá. Una de las cinco líneas principales del proyecto es la de investigación y evaluación de Políticas y Prácticas en Liderazgo Educativo, la que es coordinada por dos investigadores del equipo Anillo.

Finalmente, ambos proyectos mencionados tienen la misión de consolidar la colaboración con los actores del sistema escolar, lo cual permitirá continuar el trabajo iniciado en el Anillo de desarrollo de metodologías de difusión de conocimiento, generación de capacidades y trabajo colaborativo en red, con docentes y directivos, con el propósito de potenciar los procesos de mejoramiento a nivel de las escuelas. Dos desafíos de especial interés para el centro son combinar las dimensiones institucionales con el trabajo de aula (aspecto en que el proyecto indagó solo inicialmente), y acompañar el proceso de reforma de la institucionalidad de la educación pública chilena, aportando el conocimiento generado para potenciar las capacidades de los nuevos "servicios locales de educación" de apoyar a sus escuelas y promover el trabajo colaborativo entre pares.



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III. EXECUTIVE SUMMARY

This section should have no more than three pages. Summarize the project's achievements considering the specific objectives of this grant:

1. To create new lines of research and/or strengthen existing ones, which generate a measurable national and international impact.
2. To develop and/or consolidate training programs for researchers in the fields of Social Sciences and Humanities that will allow the creation of a highly qualified critical mass to contribute to the future development of these sciences.
3. To incorporate researchers in these sciences into national and international academic circuits, by means of building networks with world renowned study and research centers in these areas.
4. To contribute to Chile's economic and social development, either directly or through the improvement of public policies.

As this summary should be affordable for non-experts in the area, please use simple language or explanations for technical terms.

Research conducted: Understanding school improvement

The most important challenge in Chilean school education is to begin and sustain large scale improvement processes, especially in schools educating children from lower socioeconomic levels. This challenge was the base of this project, to understand how some Chilean elementary schools had improved their ability to offer more and better learning opportunities to their students (in general and considering the initial differences) in different social and institutional contexts, and identify factors that facilitate and hinder this improvement. To this end, the Anillo project Improving School Effectiveness included three lines of research: (1) explaining the improvement of school effectiveness, emphasizing the area of mathematics (where the country has had most difficulty in improving); (2) exploring sustainability of school improvement; and (3) understanding the potential contribution of external technical services (ETS) to school improvement (a tool that has received a great amount of public resources investment in the last years). During these three years, the team has developed the research activities defined in the project design, obtaining results that, broadly speaking, we consider relevant for the academic field and the education system.

In order to have a complex measure whose evolution may be observed in the medium-long term, our research team created the Index of School Performance (ISP), which was applied to all Chilean schools with available information. The ISP analysis enabled estimating the proportion of Chilean schools that had improved (about 40%), were stagnant (about 35%) or had lowered their performance (about 25%) during the decade of the 2000s. It also allowed us to conclude that a fraction under 10% of the schools experienced sustained processes and relevant improvement over the period. Additionally, it was found that, although school improvement partially lowered inequity of the educational achievement, socioeconomic inequality among schools severely limits equity in education. These findings make it more relevant to apply a comprehensive view in school improvement, including the institutional dimension, education policies and the social context, but also including internal institutional management processes, pedagogical-curricular work and school culture, and also to go inside the classroom. This has been our perspective. To this end (in addition to expanding the statistical analysis), we developed

a set of qualitative studies (mainly case studies of schools experiencing sustained school improvement processes in time, schools in areas of poverty previously identified as prominently effective, and schools that had been working with ETS programs), and structured observation of classrooms (where we applied two internationally validated instruments: Classroom Assessment Scoring System, CLASS and Mathematical Quality of the Instruction, MQI).

Our findings show the complexity and difficulty of improvement: Complex, because of the interrelated factors involved; difficult, due to the fragility we observed in studying the medium term school processes. Synthetically: The use of our conceptual framework to analyze the case studies showed relevance of contextual factors, especially local community dynamics and the school market (in the Chilean case, highly dynamic and socially segregated), on one hand, and educational policy (the last decade was intense in this aspect), on the other. Schools are not mechanically affected by the context and how their actors “process” this context (especially those responsible for institutional management, school leaderships and school local authorities) is critical. This is made clear by observing the effect of educational policies: While for some schools they were key tools in improvement processes, for others, they were mainly a problem and even had negative effects. However, it was observed that –in general- Preferential Voucher program (SEP, for its name in Spanish, Subvención Educativa Preferencial, which is perhaps the most relevant educational policy of the past decade, including a huge increase of resources, developing an improvement plan and a scheme of sanctions for schools that do not improve their academic results) had a positive effect of school improvement processes; however, using external consultants (ETS) did not show sustained positive effects.

At the school level, our results show in detail the relevance of the principal’s leadership to start and sustain improvement processes, as well as accumulate and develop professional teaching knowledge in schools, organize rigorous pedagogical-curricular work, and produce and nurture a school culture to feed the subjective dimension of the school environment with a sense of community and co-responsibility. These components nurture one another, and when one of them start weakening, school sustainability is at risk. Thus, there are many factors that may have a negative effect on this respect. For example, the arrival of a new principal who does not manage to identify the school challenges and starts changes that do not add on previous progress; replacement of experienced teachers for others who are not properly introduced to the work practices of the school; or modifying student composition without adjusting school work practices to respond to their particular needs. In this sense, the degree of institutionalization of organizational management work and pedagogical-curricular management in schools was decisive for them to sustain their improvement processes over time. Combining factors like these, we elaborated a typology of “improvement paths” (“specific”, “incipient” improvement, “in the process of institutionalization” and “institutionalized”) that characterize these processes according to their degree of complexity, comprehensiveness, depth, legitimacy, among others; enabling to identify different states of school improvement development.

Finally, genuine school improvement is expressed in greater learning opportunities for students. Observing teaching practices in mathematics classes (in a sample of schools with sustained performance improvement) showed highly structured, productive, orderly classrooms, based on the teacher’s work more than the opportunity of students to present and exchange ideas, become involved in activities of inquiry or analysis. It was also observed that disciplinary problems in the classroom were less important and were better resolved than in the general population. Finally, more than a unique pattern, high complexity and diversity in teaching practices leading to similar results were observed. Thus, in each classroom, multiple positive traits in teaching were found, enabling teachers to conduct a good mathematics class. Although there were some errors and omissions, they were compensated by other effective teaching elements that were better controlled. Analytically integrating these findings with those obtained as a result of institutional level case studies was a huge but promising challenge that our research team has barely begun to take on.



Collaboration with the educational system and results dissemination

The findings of this project, especially in strategic improvement documentation and identifying "good practices," has been widely disseminated among the scientific community, policy makers and teachers, school leadership, and managers of the school system. The intense agenda of different types of publications (journal articles, books, technical notes, work guides, web info graphics) and also diverse types of dissemination activities (scientific congresses, conferences, workshops, communications media, institutional websites, courses) have allowed the project to reach a broad and heterogeneous audience.

In the academic dimension, the project has published articles in highly regarded international journals in the field, presenting preliminary versions in important international scientific congresses. This, in addition to dialogue and cooperation (on several levels of intensity) with international scholars (especially but not exclusively with the International Scientific Committee), has allowed the team to link their work with the international community on these topics. On the national level, the project published two books ("*Lo aprendí en la Escuela ¿Cómo se logran procesos de mejoramiento escolar?*"-I Learned it in School. How Are School Improvement Processes Achieved?- and "*Nadie dijo que era fácil. Escuelas efectivas en sectores de pobreza, diez años después*" -Nobody said it was easy. Effective Schools in Poverty Areas, Ten Years Later) have been widely disseminated and their results have been presented in multiple seminars and conferences.

In the field of educational policy, the study results have taken into consideration, by indirect participation of some of the project's researchers in commissions or consultations of the Ministry of Education and National Congress (e.g. the design of the new public education, the new professional teaching career, or the adjustment of learning assessment policies). For example, two of the project researchers participated in a commission of the Ministry of Education that revised the national evaluation system (SIMCE for its name in Spanish); the findings of the book "*Lo aprendí en la escuela*" were intensely used in the analysis of comprehension, valuing and uses of SIMCE by teachers and managers, and their positive and negative effects on the actual school improvement. Likewise, the Ministry of Education asked the team to develop a working guide for the school system (based on the findings of the same study) to support processes of reflection, planning and implementation of effective improvement practices, which has been disseminated on Ministry's institutional website and has been distributed in over 20,000 copies to all the schools in the country (the Ministry of Education has requested a similar material from the book "*Nadie dijo que era fácil*"). The Quality Agency -official organism in charge of assessing and delivering orientation to schools for their improvement- has used and broadly disseminated the results of our studies to enhance their work in both assessment and orientation.

Finally, the project has gone to great effort in collaborating with actors of the school system. This has been expressed in an important number of seminars and conferences where results have been presented, as well as the elaboration of an infography available on the website, all of which has enabled the results to reach mass level dissemination. Additionally, the team has carried out several workshops on school improvement, analyzing the implications of the project results for their particular school realities; workshops have been carried out at the request of local actors (including cooperation with our national partner institutions), in different zones of the country, with school principals, teachers, Ministry of Education Supervisors, students of teacher preparation programs, and professionals of local administration of public schools. The lessons of this direct work experience with actors of the school system supplied a summer course and the design of a certified program on school improvement, both aimed at school directors.

Consolidating a research strand and future challenges

The Anillo project has allowed us to organize and provide continuity to a line of research that had been developed irregularly by our academic team. This has been achieved by working jointly with



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a group of national researchers, not just of the core team, but from different institutions: 33 researchers (most of them in the initial stages of their careers) have directly participated in projects of the study, plus six graduate students doing their master thesis within the project.

In the future, the Center for Advanced Research in Education will strengthen this line of work, because it is a priority area of the recently awarded Basal funding (a CONICYT program), whose time frame is of five years, which is renewable. The main challenges we will tackle are, on the one hand, to extend the studies of school improvement to pre-school and secondary levels; on the other, to deepen the understanding of school improvement and increase the complexity of our research approach. In this sense, it is important to study a broader range of results (not only mathematics and language academic achievement), including other curriculum subjects, psychosocial dimensions (such as wellbeing, self-esteem, and coexistence), and citizenship education. The Anillo project itself enabled collaboration with a number of institutions lead by Harvard Graduate School of Education, in a research project about how "21st Century skills" have been promoted in curricula and educational policy in six countries.

Another line of research and development expected to be consolidated is school leadership. To this end, team researchers participate in a consortium of academic institutions that was awarded a Ministry of Education grant (for four years) for the creation of the "Chilean Center for Excellence in Educational Leadership." Lead by Pontificia Universidad Católica de Valparaíso, it is also integrated by Universidad de Chile, Universidad de Concepción, Fundación Chile and the Ontario Institute for Educational Studies of Canada. One of the five main lines of the project is the research and assessment of Policies and Practices in Educational Leadership, which is coordinated by two researchers of the Anillo team.

Finally, both mentioned projects have the mission of consolidating collaboration with practitioners of the school system, which enables continuing the work started with the Anillo project of developing methodologies of knowledge dissemination, capacity building and collaborative networking, with teachers and school principals, to strengthen the improvement processes at the school level. Two particularly interesting challenges are to combine the institutional dimensions with classroom work (an aspect the project only investigated initially), and to collaborate with the process of reform of the Chilean public education sector, contributing with the knowledge generated to strengthen capacities of the new "local education services" for supporting their schools and promoting collaborative work among peers.

IV. ACTIVITIES

Specific Objective 1.

Year 1

1.1. Construction and analysis of databases: completed.

Databases for 4th grade students were updated for all Chilean schools with available data: those with 15 or more students taking part in the SIMCE test for the 2002- 2012 period. At the same time, a national database was developed for 8th grade students for the 2005-2011 period and a second one for 10th grade students for the 2003- 2012 period. Learning performance trajectory indicators were developed for all the schools included in the databases, as well as complementary indicators for each school by grade and year: socioeconomic level, academic selection, school effect, enrollment, mobile averages of learning outcomes, internal efficiency, full school day, and public/private character, as some of the most important indicators.

1.2- Preparation of analytical report: completed.

An analytical report was prepared, based on econometric analyses. The results were included in a master thesis in economics completed in 2013.

Year 2

No planned activities

Year 3

No planned activities. However, during this year a paper containing the main findings of this research strand has been prepared and accepted for publication (Valenzuela, Bellei & Allende, 2016; see appendices).

Specific objective 2.

Year 1

2.1. Analysis of databases: completed

2.2. Preparation of analytical report: completed.

An analytical report was prepared, based on econometric analyses. International literature on learning trajectories was reviewed, identifying a lack of these types of studies. The results were included in a master thesis in economics completed in 2013.

2.3. Technical note with the results (1.2 and 2.2) for policy makers and researchers: completed
Two technical notes were elaborated and published (see appendices).

2.4. Technical note with the main results (1.2 and 2.2) for principals and teachers: completed.
This technical note was replaced by the elaboration of a "Guide for school improvement" which was electronically distributed to all Chilean public and voucher schools by the Ministry of Education in 2015, and will be distributed in print in 2016.

2.5. Write a paper with the main results: completed

The initial results were first presented in the annual conference of the International Congress for School Effectiveness and Improvement (Santiago, 2013) and then addressed in a paper already published (Bellei et al, 2015; see appendices).

Year 2

No planned activities

Year 3

No planned activities. However, between September and December a technical report was prepared for the Education Quality Agency: "Improvement Trajectories in high-schools in the Chilean School System" to replicate the quantitative analysis conducted in 2013 for elementary education in secondary education throughout the country. This report is being used for the discussion on public policies in the sector by the Agency.

Specific Objective 3.

Year 1

3.1. Translating and adapting coding guidelines of teaching practices: completed.

The guides for the codification of math instruction were developed by Harvard University. They were translated from English to Spanish and applied to several previous videotaped lessons in order to validate and adapt them, adding examples and precise instructions.

3.2. Train and certify judges for coding teaching practices: completed.

The 10 persons who administer these guides were trained but because of the language, could not be examined through the process designed by Harvard University to certify them as expert judges. The observation of the recorded lessons that Harvard requires for granting certificates requires a proficiency in English that our trained judges don't possess. However, we discussed the criterion used by us in the application of the coding guidelines in Spanish with Alejandra Sorto, who has relevant experience in applying the instrument both in English and in Spanish.

3.3. Validate coding guidelines: completed.

The aforementioned guidelines in the Spanish version were empirically validated through the multiple coding of previous videotaped mathematic lessons and discussed with national experts and Alejandra Sorto.

3.4. Video record of math classes and survey and test application for teachers: completed.

11 schools participated in the study. Fieldwork was conducted in all of them; 51 sessions of math classes were video recorded during the first round. Surveys concerning teaching conceptions and tests on teaching knowledge were applied to all the 17 teachers already involved in the study. In the original proposal it was stated that 24 math teachers' classes would be recorded, but 5 schools had only one math teacher in the fourth grade). The mix of two different code systems involved using two video cameras in each classroom.

Year 2

3.5. Video record of math classes (2nd round): completed.

Because our research focus was the school, it was interesting to observe classroom management and teaching capacities in fourth grade in 2013 and 2014 in two different cohorts of students. Since our unity of analysis is the school, we decided to continue the study following the same cohort of students filmed in 2013, now in their 5th grade (most of the times with a different teacher). By doing this we were able to capture within school variability of teaching practices and mathematics content knowledge among a larger sample of teachers and in more than one grade. Continuing with the criteria adopted in 2013, two classrooms were recorded in each grade if available. This allowed for constructing a dynamic image of the schools and their classroom processes, in order to analyze within-school classroom practices variation.

3.6. Video coding (1st round): completed.

3.7. Video coding (2nd round): completed.

3.8. Grading teacher tests and codifying teacher surveys: completed.

The coding of all the instruments applied in the first and second rounds of math lessons observation was performed. The video coding included two different instruments: Classroom Assessment Scoring System (CLASS) and Mathematical Quality of the Instruction (MQI). The tests assess two components of the Mathematical Knowledge to Teach (MKT) and the survey is the one that has been used by the TEDS-M project about teachers' ideas and beliefs on math teaching and mathematical knowledge tests. In addition, pupils' drawings of their mathematic classes were gathered and codified according with international protocols used in another Chilean project with a similar sample, led by Main Researcher Leonor Varas (AKA 09 PIA CONICYT on the development of pupils' and teachers' mathematical understanding and performance in dealing with open-ended problems).

3.9. Statistical data analysis: completed.

3.10. Preparing analytical reports of results: completed.

Year 3

3.11. Technical note with the results for policy makers and researchers: replaced by other activities, see below.

3.12. Technical note with the main results for principals and teachers: replaced by other activities, see below.

3.13. Write two papers analyzing the main results: completed.

During 2015, information of a total of 38 teachers from 4th to 6th grade was analyzed along with the results obtained through both classes' observation instruments, and the students' perspective (drawings). The work of the year focused on generating a book chapter and writing two articles to scientific journals; one of them is already accepted, the second one's acceptance is pending (see appendices).

Specific Objective 4.

Year 1

4.1. Adjustment of the study design and construction of data collection instruments: completed. A research protocol was designed for the case studies, and secondary information and documents to be included in the research were identified (see appendices). Additionally, interview guidelines were created for each type of school actors involved, as well as tools for the observation of classroom activities and the school daily routines and facilities.

4.2. Elaboration of fact sheets for each school with information from secondary sources: completed.

Fact sheets were elaborated using secondary information on the trajectories of the 14 schools included in the study between 2002 and 2012. These factsheets contain information regarding school indicators, SIMCE students' results and parents' questionnaires, and teacher performance assessments.

4.3. Fieldwork to collect data in participating schools: completed.

The 14 schools included in the 2002 study were invited and accepted to take part in the study. Fieldwork was conducted in all of them, in eight regions.

Year 2

4.4. Analysis of data and elaboration of case studies of schools: completed.

The researchers systematized the findings of their case studies, and introduced secondary information to elaborate their reports. A workshop to present and discuss preliminary findings was organized. Final reports were completed.

4.5. Cross cases analysis: completed

4.6. Report of school case studies and cross cases analysis: completed

4.7. Technical note with the results for policy makers and researchers: replaced by other activities, see below.

4.8. Technical note with the main results for principals and teachers: replaced by other activities, see below.

4.9. Write a paper with the main results: completed.

A book containing the 14 case studies, cross cases analysis and quantitative findings was published in November 2015. A paper is being prepared and will be sent to an international journal for publication in March 2016.

Year 3

No planned activities. However, the book launch took place in November 2015 in the Santiago International Book Fair, and the researchers have participated in many dissemination activities, as stated in the general activities description in this section and in the productivity report (see outreach section also).

Specific objective 5.

Year 1

No planned activities

Year 2

5.1. Data base of the econometrics analysis: completed.

Actualization of the School Performance Index for 4th grade schools in the whole country (up to 2012)

Estimation of the School Performance Index for 8th grade and 10th grade schools in the whole country

5.2. Preparation of analytical report:

The analytical report was incorporated as a book chapter in our publication *Lo Aprendí en la Escuela*. The chapter presents the methodology used to select the schools incorporated in the study, and also the key findings about stability/volatility of the school improvement processes.

5.3. Technical note with the results for policy makers and researchers: replaced by other activities, see below.

5.4. Technical note with the main results for principals and teachers: replaced by other activities, see below.

5.5. Write a paper with the main results: rescheduled for year 3.

Year 3

No planned activities. However, research has been continued. From a database of nearly 4,000 elementary schools in Chile, we studied the main variables associated to schools' trajectories in our Education Performance Index (IDE) over the 2002-2013 period: socioeconomic and demographic conditions; specific time effects (for 2002-2013); public policies – SEP, full school day and shared financing; schools' educational management; and institutional dependency of schools. The paper describing the results of the study is in progress.

Specific objective 6.

Year 1

No planned activities

Year 2: activities were rescheduled for year 3

6.1. Construction and analysis of databases

6.2. Preparation of analytical report of the results

Year 3

6.1. Construction and analysis of databases

We added data regarding schools expenses in ETS in the frame of SEP law to the same structure of the databases of nearly 4,000 elementary schools analyzed in previous years of this project in relation to schools performance evolution. Data was provided by the Superintendence of Education and other secondary sources of the Chilean school system.

6.2. Preparation of analytical report of the results. Done.

6.3. Technical note with the results for policy makers and researchers: replaced by other activities, see below.

6.4. Technical note with the main results for principals and teachers: replaced by other activities, see below.

6.5. Write a paper analyzing the main results.

The results of this study are contained in the same paper that reports associated factors to the inter-temporal evolution of the Chilean educational system during the period from 2002 to 2013 (specific objective 5), that is in its final phase of drafting.

Specific objective 7.

Year 1

No planned activities

Year 2: activities were rescheduled for year 3, and study was reformulated (approved by CONICYT).

7.1. Adjustment of the study design and elaboration of data collection instruments

7.2. Selection of the cases for the study

Year 3

7.3. Design of the instruments to collect information: Instruments to produce qualitative data were designed. Survey guidelines appropriate to the actors interviewed (directors and teachers) and sample criteria (implementation of different programs) were created.

7.4. Definition of the sample and selection criteria of the case study: Sample criteria to distinguish the potential heterogeneous effect of ETS in schools in relation to internal and external conditions were defined. The sample criteria refer to the Program the school worked with and the potential contribution of ETS during implementation. The selection was made and the schools meeting the sample criteria were contacted.

7.5. Data collection field work: Field work was conducted with schools selected from the sample; 23 interviews were held.

7.6. Analytic report: An analytic report that describes the results of the case study in detail, individually and case by case was prepared. This report will be useful in the elaboration of a scientific paper.

7.7. Technical note for educational policy designers and researchers: A synthetic report of the main finding was prepared to be easily used by other researchers and policy designers.

7.8. Technical note for directors and teachers: A synthetic report of the main finding was prepared to be easily used by school directors and teachers.

Global Activities

Year 1

1. Workshop with associated institutions: completed.

In August 2013, a first meeting was held with the National Advisory Committee (composed by associated institutions, including the national organization of the public schools). A workshop with the project's International Scientific Committee was also developed in January 2013 in Santiago, during the ICSEI conference. David Reynolds, Alma Harris and Tony Townsend were present. The protocol for the case studies related to research strand 2 was translated and shared with the committee members, and we received some suggestions and comments from them.

2. Present the Project and initial results in the annual conference of municipalities: completed.

We understood this collaboration as a transference device. On the one hand, it allows for a direct communication of the research findings to public schools administrators, informing directly the processes there are involved to; on the other hand, it feeds and engages the researchers with the everyday experience of the public school system dynamics.

3. Organize a seminar to present the initial results: rescheduled for year 2.

Year 2

4. Workshops with associated institutions: completed.

The meeting took place in December 2014. Fundación Oportunidad and Fundación Educacional participated.

5. Workshop with member of International Scientific Committee.

In August 2014 a workshop with Professor Richard Elmore was organized. There, we discussed ours and others teams' research findings on school improvement in Chile.

6. Present the results in the annual conference of the Association of municipalities

Trying to respond to the large interest in the book, we participated in different activities organized by municipal governments in Santiago, Valparaíso, Antofagasta, Iquique and Villa Alemana. There, we collaborated with public schools administrators, principals, heads of technical units and teachers.

7. Organize a seminar to present the results.

The book was launched in a seminar at the National Public Library, in May 2015. The Secretary of Education presented the book, along with two of the studied schools principals and a researcher. More than 300 persons attended.

8. Other dissemination and outreach activities.

Year 3

9. Prepare a certified program on school effectiveness and improvement in Chile: completed.

The proposal of this certified program design, which has been completed, strives for participant understanding of the complexity of school improvement and for students to be able to apply new knowledge in their everyday practice in Chilean schools. The proposal was approved by the authorities of Universidad de Chile.

10. Organize a large seminar to present the results: completed.

The seminar was held in October, 2015. We decided to present the results of our research project that have the potential of directly impacting the in-classroom work of teachers, and it was aimed at teachers. Robert Pianta, creator of the CLASS instrument we used in our quality analysis of classroom interaction attended the seminar: He presented the main findings obtained in applying the instrument in different cultural settings. Several other experiences directed toward improving classroom work were also presented. More than 300 teachers, principals and academic directors attended. Subsequently, two workshops for teachers, to support teacher work in the classroom were held. One focused on delivering tools for teaching support to students; the second, on improving class management in Math classes. 80 teachers attended these workshops.

11. Workshop with associated institutions:

Instead of a holding a workshop, we decided to collaborate with 3 associated institutions (Fundación Oportunidad, Fundación Educacional Arauco, and Universidad Diego Portales) in the organization of the aforementioned public seminar, directed to disseminate the project's research findings regarding within classroom teacher-pupil interaction improvement. Associated institutions presented the work they do in this area. Fundación Oportunidad presented "Un Buen Comienzo", a project directed to improve preschool teacher skills; Fundación Arauco, their reading and writing improvement program, focused on enhancing teachers' skills for

accompanying the process in children from grades 1st to 4th; and Universidad Diego Portales shared their work with CLASS assessment system.

12. Workshop with member of the International Scientific Committee.

In November, 2014, a school improvement workshop was held with Vincent Dupriez, member of the international scientific committee of the project, in Santiago. The findings of all the research strands of the Anillo project were presented, with the participation of other academic teams working on the subject. During the workshop we delved into different academic approaches to school improvement.

13. Write the final report of the project: completed.

14. Organize workshop to discuss the main results with policy makers, authorities from the Ministry of Education and its agencies, and members of the Parliament, and; 15. Present the results in the annual conference of the Association of municipalities; and Technical Notes.

Starting the second year of the project's execution, all the project members have developed an intense activities agenda to support the improvement of Chilean education, with emphasis on supporting the improvement of public schools. This work has involved holding and participating in multiple workshops and seminars attended by students, and actors of both the school system (principals, teachers, heads of technical units) and the government level (local or municipal governments, Ministry of Educations, Quality Agency, Superintendence of Education, and Parliament). In parallel, we have developed materials to contribute with daily practices in school improvement that have been disseminated through our own digital media and by the Ministry of Education. Finally, we have appeared numerously in press, where we have been able to communicate the findings of the research to a broad audience. These tools have been much more effective in communicating the results of our research than the technical notes we had originally planned for. Some of them are:

- i. Collaborative activities with the school system.
 - o During year 3, numerous workshops were held with actors of the school system around the project results. In 2015, 8 workshops were held, in which around 400 actors attended, from the Metropolitan, El Maule, Biobío and Valparaíso regions. These workshops led to the reflection of the school system actors on the implications of the project results for their schools (see the detail in the productivity report).
 - o School Improvement Paths Summer Course (free). With 25 participants, all professionals from the school system, a course on School Improvement Paths was held. It focused on the main findings of the research developed in this project. The completion of this course enabled piloting some of the modules of the certificate course.
- ii. Practical material developed.
 - o In addition to the material used in workshops and seminars, an interactive infographic was created to disseminate the project's results (which has been visited 5,437 times in CIAE's website) and a reflection guide for school system actors, commissioned and distributed by MINEDUC to all the schools in the country (see materials in annexes).
- iii. Collaborative activities with the governmental level.
 - o During 2015, 11 seminars were attended, with over 2000 actors of the school systems from the Tarapacá, Metropolitan, Valparaíso, Maule and Biobío regions. In these workshops, the main results of the project were disseminated and discussed.
 - o Two of the main researchers of the project collaborated in formulating the draft bill that will create new institutional design of public education in the country and have been invited to the Parliament to comment the scope of the proposal. During these participations, the research findings have been used as evidence to support the proposals of institutional re-design, especially those related to providing technical support to the schools.
 - o The two associate researchers of this project participated in a governmental

commission devoted to revise the national system standardized learning assessment in the country's school system, and the use of the results of these evaluations. The findings of the project contributed with evidence on the impact of these evaluations on the schools.

- The project members were invited to present the main research findings to the Ministry of Education.
- One of the project associate researchers was a consultant to the Ministry of Education to update the "national framework of guidance and school leadership," using some of the project findings as inputs.

iv. Press Coverage.

- Press articles: Total: 35.
- 2014: 25
- 2015: 10
- Written Press: 5
- Web: 20
- Radio: 6
- TV: 3



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V. OUTPUTS

In this section refer to the results of the project related to each of the specific objectives of the grant and based on the three year productivity reported in the http://www.portaldelinvestigador.cl/en/pia_reportes.

Do not provide lists of outputs but refer to the total outcomes during the development of the project explaining relevant aspects of the processes behind the results.

It could be considered any of the following fields required in the Productivity System: indexed Publications, Books, awards, Organization of scientific events, Participation in Scientific Events, Collaboration, thesis, Postdoctoral Fellows, Outreach Activities, Patents.

This Anillo project was organized around 3 research strands, each containing specific objectives. Below, we indicate the process guiding to the elaboration of the main results and products of the different research strands.

1. Explaining school effectiveness improvement, with an emphasis on mathematics:

Specific objective 1: To identify the factors associated with the improvement of primary school effectiveness, exploring the presence of heterogeneous effects according to the relevant characteristics of the schools and their pupils.

Specific objective 2: Compare the trajectories of educational improvement in the Chilean school system with international evidence.

Specific objective 3: To study the contribution to students' academic achievements of teacher-pupil interaction in general terms, (emotional support, classroom management and pedagogic support) and specifically the quality of math teaching, (pedagogic knowledge of the discipline, quality of math teaching and beliefs about mathematics and its instruction) in schools which have systematically improved their effectiveness.

As indicated in the project design, this line of research continued a research project started in 2012 from collaborative work between the Center for Advanced Research in Education of the Universidad de Chile, and UNICEF Chile. The project investigated the improvement trajectories of Chilean elementary schools. Before the Anillo project began, databases had been elaborated and analyzed, identifying schools with sustained improvement trajectories (under 9% of the schools in the country), and case studies of 12 of these schools were conducted, having been selected according to additional criteria such as territorial distribution, size and dependency.

Under the Anillo project, the comprehensive analysis of the case studies was conducted, which led to identifying factors associated to the improvement of these schools (specific objective 1), and to identifying four typologies of school improvement trajectories according to the history of improvement documented in the research. Then, these trajectories were analyzed in the light of international evidence (specific objective 2).

The set of case studies, quantitative findings and analyses were exposed in a book published in 2014 (Bellei et al., 2014). At the same time, three academic articles were produced. The first paper focuses on trajectories of school effectiveness improvement experienced by Chilean elementary schools over the last decade, using econometric analysis and controlling for potential confounding factors. This article (Valenzuela, Bellei and Allende, 2016) has been recently accepted for publishing in an ISI journal. The second article presents an empirical typology of school improvement trajectories and it has been accepted for publishing in an ISI journal. The third article delves on factors associated to school improvement and it is in its final stage of elaboration. The results of this research strand were also presented in the ICSEI congresses of



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2013 and 2015 and in a panel during the Third Interdisciplinary Research Congress on Education, Chile 2014.

The enormous interest in the results of this research arising from actors of the school system: Schools, administrators, actors at the governmental level, forced us to reformulate the communication strategies of our findings and to begin an intensive collaboration agenda with the school system. This interest was expressed in the purchase of over 800 copies of the book by Chilean schools for their libraries, and numerous invitations to participate in a diversity of activities aiming toward school improvement. In terms of outcomes, this has translated into the elaboration of an infographic created by the team that indicates the different improvement paths taken by Chilean schools (<http://www.ciae.uchile.cl/docs/LoAprendiEscuela/>); and a school improvement guide

(<http://ww2.educarchile.cl/PORTAL.HERRAMIENTAS/mejoraescolar/contenido-web/Apoyo-orientaciones/1-PME/7-Escuelas%20que%20mejoran.pdf>) requested by MINEDUC that will be distributed to all public and voucher schools in the country during 2016. Likewise, CIAE has prepared an intense agenda in organizing and participating in school improvement workshops, which has been described in the outreach activities in the productivity report.

4 theses developed under the project are linked to the development of this study: 1) "The level of institutionalization of curricular management in schools with school improvement trajectories in Chile" (Catalán, 2014); 2) "Concept of quality used in the qualitative investigation on Effectiveness and School Improvement in the last decade in Ibero-America" (Bustos, 2014); 3) "Effectiveness of highly selective Chilean Public Schools in Higher Education: What explains observed differences?" (Allende 2015), and 4) "Market and Educational Improvement: Case studies on School Improvement Trajectories in Schools in Competitive Contexts in Chile, 2000-2010" (Carrasco, 2015)

Regarding the third objective in this research strand, a study was conducted to deepen the understanding of the 12 schools with sustained improvement trajectories, investigating classroom practices and delving into Mathematics teaching in them. To this end, studies in 10 of the schools were conducted for two consecutive years following the same student cohort in 4th and 5th grades. The study was developed using two systems of video registration to assess the quality of instruction, CLASS and MQI. Knowledge assessment tests were also applied to the mathematics teachers, and children's drawings representing their mathematics classes were collected and analyzed. Independent teams coded the collected data.

From the research findings, a chapter of the book (accepted for publication) and two academic articles (sent to scientific journals) have been elaborated (one of them accepted for publication in a Scopus indexed journal). A presentation was also made during the Interdisciplinary Conference on Research in Education (CIIE for its name in Spanish Congreso Interdisciplinario de Investigación en Educación) in Santiago in 2014, and another one is CIES 2015 (Washington D.C.).

Regarding collaboration with the school system, an international seminar was held, "Classroom improvement: Experiences in research and teacher capacity building" (Santiago, October 2015), and two workshops for teachers: Teaching support for students: Tools and examples based on current perspectives; and Management of the Mathematics classroom, each with 40 participants. Although other activities were developed under this funding, the international collaboration project Anillo (INT1305) was aimed mainly toward developing this research objective.

In this project, we shared the experience of applying the MKT and MQI tests in Chile and Texas, USA. The MQI instrument is highly inferential; therefore it is difficult to attain reliable and comparable measurements in diverse cultural contexts. To this end, video recordings of mathematics lessons in both countries were shared. They were translated, requiring application guidelines for joint work and judges of common protocol were trained. These results led to applying adapted versions of this instrument with another 51 teachers of 6 schools in Santiago (with the project Improving Mathematics of the Ministry of Education), training a group from Paraguay in its application. Also, they use in a bilateral project funded by AMEXCID and AGCI in Chile and Mexico, to study mathematics teachers in their first years of exercise, is under consideration. In this sense, project INT 1305 has enabled us to strengthen collaboration



networks in Latin America, an aspect observed by the evaluators of the first progress report of the project.

Furthermore, this collaborative project has partially made it possible to finance the participation of researchers in this project in the Global Education Innovation Initiative, led in Harvard University by Fernando Reimers, aiming to investigate the actions carried out by six countries seeking to incorporate the development of 21st century skills in school education. From the participation in this study, we elaborated a book chapter published by Harvard Education Press (Bellei and Morawietz, 2016), whose draft was presented in the AERA conference 2015.

2. Exploring the sustainability of school improvement:

Specific objective 4: To understand long term evolution in depth, (approximately a decade) of schools in poor environments previously considered to be highly effective, linking internal and external processes that have had an impact on the school, with their actual status in terms of educational performance.

Specific objective 5: To analyze the level of stability/volatility of the processes to improve effectiveness, estimated from schools over the last decade, exploring factors associated with the sustainability of school improvement.

A second line of research, related to sustainability of school improvement, included two investigations. The first proposed developing a follow-up study from a research conducted in 2002-2003 by the main researcher of this project (Bellei et al, 2004). The study investigated a set of 14 schools that – working in contexts of poverty – had outstanding results in standardized tests implemented in the Chilean education system. Thus, the follow-up study proposed to study the long term evolution (10 years) of those 14 especially effective schools, investigating data reporting their evolution in quantitative terms and conducting case studies (specific objective 4).

During the development of this project, we conducted case studies and cross-cases analysis, quantitative analyses, and integrated the collected data.

The results of this research recently gave rise to a published book (Bellei et al., 2015) and will be collected in an academic article that is in its final phase of elaboration. A preliminary version was presented in the ICSEI 2016 congress (Glasgow, Scotland).

The purchase of one thousand copies of the book by the Ministry of Education that will be distributed to school directors and professionals in charge of providing technical support to schools provides evidence of the interest in this research and its potential to support the school system. To strengthen these contributions, we have presented the findings of this research in seminars organized by the Quality Agency (Santiago, December, 2015), municipalities, administration of public schools of their districts (Chiguayante, January, 2016), Pontificia Universidad Católica de Valparaíso (Valparaíso, January, 2016), and Pontificia Universidad Católica de Chile (Santiago, January, 2016).

Meanwhile, the development of objective 5 is linked to a quantitative study, which has implied elaborating and analyzing data bases of public information. This study has investigated how different school improvement initiatives launched by the government during the last decade (2002-2013) relate to the evolution of schools' performance. This study includes the main improvement policies launched during the period: full school day, Preferential school subsidy, co-payment. A paper that presents the results of this research objective is being prepared.

3. Understanding the contribution of educational technical assistance to school improvement:

Specific objective 6: Identify the role (if they have one) that the external educational technical assistance providers have played in improving schools within the framework of the SEP law.

The articles by Osses, Bellei and Valenzuela, and Bellei & González (see annexes), where we



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describe the Chilean ETS policy; discuss the ETS policy implementation; review the empirical evidence on the effects of ETS services in schools; and critically analyze the ETS policy as an instrument for school improvement collect the findings of the initial stage of this study. Additionally, the thesis "Municipal school managers and their role in hiring and using ETS services: Case study for the Metropolitan Region" (Rubio, 2013), developed under the project, is linked to its development.

In a second stage, the role of ETS in the context of the SEP law was comprehensively analyzed in the databases described with regard to the progress toward objective 5, as part of the same study. The findings will be presented in the same paper in progress.

Specific objective 7: Analyze the potential heterogeneous effect that the technical assistance providers have on school improvement and the internal characteristics of the schools that condition their impact.

After reformulating this study, approved by CONICYT in March of 2015, this continuity study was taken on, based on a related previous investigation on implementing external technical services in schools of the region of Antofagasta. The providers of this programs are the main providers of external technical services of the country. Thus, the research consisted in conducting case studies in three schools, two years after the end of interventions, to identify the sustainability of the contributions in time. Having ended the fieldwork in August of 2015 and the case studies in November of that year, the comprehensive analysis of the information is in progress. Finally, the thesis "Trajectories of School Change and Improvement in the Region of Antofagasta" (Aguilera, 2013), developed under the project, is linked to the development of this study.

Others.

The set of findings of this Anillo project have been systematized and make up the curriculum of a school improvement course. The first version was held in January of 2012 in the CIAE facilities at Universidad de Chile. 25 school leaders participated in the course. This enabled piloting the contents of the future certified program in school improvement. Its implementation has been approved by Universidad de Chile and it is planned for the 2016 academic year (March to December).



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VI. HIGHLIGHTS

In no more than three pages, indicate the main outcomes and/or activities which must be considered the most significant results of the project. Please consider the specific objectives of this grant.

The main research results (especially of the third year) and project achievements will be described following three general objectives, and additionally an overall appreciation of the project collaboration to the educational system will be included.

1. *Explaining school effectiveness improvement, with an emphasis on mathematics*

On average, Chilean schools have evolved positively in their performance during the last decade; however, the improvement is not generalized: Fewer than 50% of the schools have improved in the period and an important part of them has been unable to sustain improvement and make it comprehensive. Although improvement has mainly benefitted schools educating lower socioeconomic level students, we found that the absolute performance level of the schools is strongly conditioned by the social composition of the students, thus attaining high levels of performance is an exceptional achievement for these schools. This is reinforced by the high level of socioeconomic segregation among schools.

The analysis has enabled us to identify relevant variables to explain the evolution of schools' educational performance during the 2002 to 2013 period. The main results allow us to draw three main conclusions: i) during the past decade, a cycle of intense changes has been present in the educational performance of the Chilean school system, which has deteriorated up to 2006 (concurrently with the student movement demanding structural reforms to the school system), followed by a cycle of improvement between 2008 and 2011 (concurrent with the initial implementation of the preferential voucher program, SEP), and then a general and important deterioration in 2013 (in principle, not associated to any apparent change in the school system); ii) the implementation of the SEP has generated sustained improvement in the participating schools. This has not only brought on greater educational effectiveness but it has also reduced the performance gaps between more vulnerable schools and those with higher SES; other public policies (such as the full school day) have had minimum effect on elementary schools' improvement trajectories; iii) improvement in socioeconomic conditions of Chilean families – greater parental education and higher income – is the second most relevant variable associated with the positive evolution of the national education performance during the period. However, the identified factors do not account for more than 10% of the evolution experienced by the schools over the period, which suggests that the internal processes (such as the evolution of leadership teams, capacity building of teachers or other within school innovations) may better explain the different school improvement trajectories. Hence the relevance of having complemented these large-scale statistical analyses with case studies and qualitative analysis.

Case studies of schools that steadily improved their performance during the past decade showed the relevance of comprehensively observing these processes, considering the inter-relationships between the context of the schools, their institutional management, pedagogical-curricular work and the school culture. To understand the diversity of these improvement processes, we elaborated a typology of "improvement paths" (specific, incipient, in the process of institutionalization, and institutionalized) that characterize these processes according to their degree of complexity, comprehensiveness, depth, legitimacy, among others; enabling to identify different states of school improvement development. An important implication of this analysis for school management is to show how the challenges and priorities of the schools change over time.

Finally, research on these cases of sustained school improvement has also "entered the classroom," analyzing mathematics teaching practice through class observation and other

instruments. Three key findings arise from the analysis. First, lesson analysis -using CLASS and student perception of their classes through the analysis of their drawings- indicated that schools have highly structured, productive and orderly lessons that are based more on teachers than on providing opportunities for students to present and exchange ideas, and become involved in investigation or analysis. Second, the classroom observation instruments, the ways of scoring and standards, deliver valuable information to define a clear aim regarding quality of teaching interaction that should be sought by the Chilean education system. However, in conducting a qualitative analysis of the performance descriptions behind the quantitative scores of these instruments, high complexity and diversity of teaching practices leading to the same results is observed. Thus, in each classroom, multiple positive teaching traits were found that enable teachers to conduct a good mathematics lesson. Although with some errors and omissions, these were compensated by other effective teaching elements that were better mastered. Finally these findings show the importance of creating a complex class description, combining interaction elements (CLASS), Mathematical Quality of Instruction (MQI) and student perception (drawings). Each dimension provides complementary and not contradictory contributions to study what happens in mathematics classes.

2. Exploring the sustainability of school improvement

An increasingly important issue for studies on school effectiveness improvement is to what extent can improving schools sustain their processes over time, and what factors influence the sustainability/reverses of these improvement processes at the school level. This question has been practically ignored by academic research in Chile. As we concluded from our previous study (see Obj. 1), for Chilean primary schools, during the last decade, to sustain improvement processes was as difficult as to initiate them. We tackled this issue (which requires long term observations of schools) by conducting a follow-up study of 14 "effective schools" that had attained students' academic achievement, significantly higher than comparable schools, which were studied in 2003. Our follow-up study estimated the schools' performance between 2002 (when were identified as "effective schools") and 2013, and conducted case studies to understand what were the conditions, factors and processes that explained this evolution; what difficulties and challenges they confronted, what characteristics, previously identified as factors for higher effectiveness, remained and what have been significantly transformed.

Although both performance indicators and qualitative case studies showed heterogeneous and complex pictures, we concluded that -in general terms- approximately half of the fourteen studied schools had maintained or improved performance and internal processes, whereas the other half showed considerable decline in the quality of their processes and results. We identified three broad dimensions and several key factors to explain the differences in the observed sustainability. First, changes in the context in which the schools operate, particularly, the geographic location, the local community, and the characteristics of the 'school market' affecting the school, modified the school intake and the school-community relationship, to preserve the prestige of the school turned to be critical; complementarily, although for some schools, educational policies implemented during the period had a compensatory role, for others they aggravated the decline process. Second, the institutional dimension was particularly relevant, especially to make careful and wise decisions about the hiring of new teachers and school principals, and to guarantee satisfactory working conditions for teachers; also, school principals played a key role in supporting teachers work and "buffering" external influences (including both policy and contextual changes). Finally, we found the sustainability of school processes-outcomes required to preserve an equilibrated functioning of the "internal nucleus" of the educational effectiveness (our third dimension) composed by the professionalism and capacities of the teachers, the curricular and pedagogical management of the school, and the culture and school climate features; although several factors affected this internal nucleus, a key issue was the level of institutionalization of the working processes, which allowed some schools to overcome both contextual and internal challenges they faced during the decade, specially to make adaptive adjustments and to socialize new members (teachers and students) in the school culture.

3. *Understanding the contribution of educational technical assistance to school improvement*

As part of the analysis of explanatory factors of the evolution of educational performance in elementary schools (see point 1), variables related to the investment in external technical services (ETS) were included, carried out by schools with SEP resources. Results showed that greater per-student expenditure in external technical services is not related to an improvement trajectory statistically different from zero, considering both the global performance index at the school level and the SIMCE results of Mathematics or Reading. This suggests that – on average – greater ETS investment is not improving the performance of Chilean primary schools.

To understand school dynamics related to these results, a qualitative study of two ETS programs was conducted (both renowned programs at a national level) implemented over at least 3 years in a group of schools in the northern zone of the country. In the studied cases – two years after having concluded the intervention – it was observed that the ETS programs generated some positive internal effects in schools during the implementation, although only some of them were maintained after the program ended. The sustained effects are related to i) monitoring teacher work by principals, ii) monitoring students' learning results, iii) some achievements in class organization in terms of preparation and structuring during the lessons. The program also produced some ambivalent effects, such as dependency of external instruments for classroom planning and assessment. The study concluded that internal school processes (such as teaching management, the effort of complying with the demands of education policy, and continuity of directors that valued and participated in the Program since its inception), as well as the quality of external advisors and the valuation of the didactic model offered by the Program, were crucial in producing and sustaining positive effects. On the other hand, the positive effects, were not sustained when principals established dependent relationships with the ETS providers, where there was high teacher turnover, or the school replaces the program methods for others. Another influencing element was when ETS programs reduced the quality of the materials and did not keep alignment with the curriculum.

Overall, our findings show that external technical services may play a complementing role, but they are not a protagonist of school improvement processes. The instruments and advice of ETS programs may enhance and enrich school improvement processes, but the internal capacities and dynamics within schools (which are not replaced by ETS providers) are the ultimate key to improvement. Certainly, ETS programs may also produce undesirable effects.

Cross-cutting objective: Collaboration with the educational system and results dissemination

The findings of this project, especially in strategic improvement documentation and identifying "good practices," has been widely disseminated among the scientific community, policy makers and teachers and managers of the school system. The intense agenda of different types of publications (journal articles, books, technical notes, work guides, web info graphics) and also diverse types of dissemination activities (scientific congresses, conferences, workshops, mass media, institutional websites, courses) have allowed the project to reach a broad and heterogeneous audience. A particularly valuable experience has been the direct collaboration with practitioners of the school system (facilitated by the elaboration of a working guide on school improvement –at the request of the Ministry of Education – based on the book "*Lo aprendí en la escuela*"), and through workshops for specific audiences in different cities along the country (i.e. school principals, teachers, Ministry of Education supervisors, students of teacher preparation programs, and professionals of the local public school administrations), attended by over 300 professionals. The lessons of this work experience with actors of the school system supplied a summer course and the design of a certified program on school improvement.



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VII. LESSONS LEARNED

The following section can be used in case of available information related to the possible difficulties, inconveniences or similar issues in the management of the project within the host institution, between CONICYT and the host institution, institution and researchers or any other combination of participants and activities involved. Information provided in this section must be concise, stating all variables involved and outcomes. Do not extend further than two pages.

This information could be used to improve the practices in future initiatives.

During the development of the Anillo project, we have identified four relevant lessons to be considered for future versions of the program, especially to continue its support to the field of social sciences:

1. *Resources and Management.* When it is not exclusively based on available secondary sources and data (as has been our case), research in social sciences is expensive; for ambitious projects (as this one), they exceed the financing margins of the Anillo project. Additionally, these costs are considerably higher in the data collection phases, which require more flexible management in the timing of the resources.
2. *Time projection of the Anillo research.* Establishing and strengthening a multidisciplinary inter-institutional working team, creating relationships and collaboration with the international academy, and establishing substantive links with actors of the field (in our case, the educational system), require an enormous investment of time far exceed the three years defined by the program. Unfortunately, the Anillo funding does not allow renewal of successful projects, which could consolidate and project this investment.
3. *Complexity of working with the school system.* Research and collaboration with the school system, especially with school principals and teachers, faces great and increasingly scarce time availability (the school calendar is full of activities) and uncertainty (several emerging events such as massive strikes and public demonstrations that have taken place in Chile over the last years). This forces researchers to build strong adaptability capacities in their programming and to be empathetic to gain complicity with school agents. It also requires institutions in charge of the Program to be understanding and flexible facing these events.
4. *Timing and character of scientific production.* The timing involved in publishing journal articles in renowned international journals is extensive. Since in these cases it is difficult to report "research in progress", the study must be concluded to elaborate them. After this, the process of peer review and editorial evaluation may easily be extended for over a year and it is not unusual for it to take two years. Consequently, for a three year project, where empirical evidence is not always available during the first year, to meet the goals of this type of publication is extraordinarily demanding. Additionally, publishing books with national editorials (although they have an independent editorial committee, as is our case with LOM Ediciones) is not recognized in calculating scientific productivity in this dimension. Although we understand and support the priority given to publishing in renowned international journals, we believe it is important to revise valuation given to these "high impact" (academic and professional) publications in the field of education (and social sciences in general), which may include academic books.

VIII. COMMENTS TO PREVIOUS EVALUATIONS

Refer to the observations and/or suggestions stated by the reviewers in the last evaluation. Explain how the research team worked on those comments and/or suggestions. Please do not extend further than two pages.

Evaluator observations to Year 2 report:

Below we present the observations by international evaluators to the second progress report of this Anillo project and how they were addressed during the last year of execution.

- The first evaluator indicated that one of the main challenges of school effectiveness studies was how to go from identifying the factors enabling improvement in a group of schools to triggering massive processes of school improvement. It was suggested to address two issues:

- 1) How and why the effective schools and teams learned to be effective.
- 2) Identify the lowest number of adaptable practices and strategies explaining most of the improvement in school effectiveness.

As indicated by this evaluator, data collection had finished when these relevant observations were raised. However, we have been able to include them in activities and products of the project, and in the research design of a project we will conduct starting in 2016. Regarding the former, these reflections have been addressed in the Guide for School Improvement elaborated for MINEDUC (see annexes). Likewise, these questions will be relevant in two studies the CIAE research team for school improvement will begin in 2016, delving into school effectiveness: The first will investigate effectiveness in secondary education institutions with improvement trajectories and the other will address effectiveness in preschools and its relationship with quality. Finally, we expect to address these questions through future undergraduate and graduate thesis researches guided by members of this research team. All the material collected in fieldwork has been systematized, transcribed and catalogued, making it available for future research.

- The second observation to the second year report is related to the delay and vagueness of the study on external technical services in schools and their contribution to improving school effectiveness and support, research strand 3 in the study design.

This study was made up of two specific objectives, **Specific objective 6**: Identify the role (if they have one) that the external educational technical assistance providers have played in improving schools within the framework of the SEP law; and **Specific objective 7**: Analyze the potential heterogeneous effect that the technical assistance providers have on school improvement and the internal characteristics of the schools that condition their impact.

The study linked to objective 6 has been developed during year 3 of the project development, resulting in the elaboration of the paper that is under conclusion. Regarding objective 7, the study was reformulated at the beginning of 2015, and the proposal accepted by CONICYT. It is important to note that before this, the team elaborated a paper published in an international journal (Osses, Bellei, Valenzuela, 2015) to better position the design within available knowledge. The new proposal aimed toward follow-up on the contribution of external technical services to schools in the region of Antofagasta, carried out by CIAE in 2011 and 2013, visiting the schools 2 years after the intervention to study their sustainability. The study was conducted during year 3 of the project and consisted of conducting case studies in three schools, and elaborating a comprehensive report. The main findings are presented in the highlights section.

Santiago, January 2016.