ASSESSMENT OF STUDENT LEARNING THROUGH THE USE OF SEMI-CONTEXTUALIZED MEASURES IN MEDELLIN

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Abstract

The purpose of this article is to present a 2014 Fulbright proposed evaluation framework and to analyze recent findings resulting from the administration of contextual measures anchored on local instructional practices of LEARNING BY DOING and academic standards from the National Education Ministry in Colombia in the areas of Mathematics, Language & Literacy and Inquiry-Based Learning. The goal of the Fulbright grant funded project was to explore, examine and analyze the structure, scope and extent of implementation of the ALIANZA MODEL (Learning by Doing) in five municipalities situated in the southwest region of Medellin in Colombia, in order to propose an Evaluation Framework to measure the extent of implementation and level of educational effectiveness in the region. The ALIANZA MODEL was originally designed to improve the quality of education for students attending designated public schools in grades K -11, with the goal to bridge and close the academic achievement gap within the region. The specific objectives of the ALIANZA MODEL were defined: 1) Facilitating and enhancing learning in mathematics, language arts and investigation as pedagogical strategy; 2) Contributing to the improvement of the processes of educational management and cultural transformation of public schools; 3) Creating inter-municipal networks to strengthen actions for the improvement of quality and equity of education in the region; 4) Strengthening the confidence of both private and public sectors in the implementation of public education policies; and 5) Strengthening

Professional Development Models of teachers so that they would have a positive and effective impact on students learning.

Keywords: Learning by Doing, Experiential Learning, Assessment of Learning, Evaluation Research, Educational Effectiveness

Introduction

The ALIANZA MODEL started its implementation in 2003 in Antioquia (Colombia) through support provided by Fundación Empresarios por la Educación, Fundación Proantioquia, Comfama and Centro de Ciencia y Tecnología de Antioquia (CTA).   Currently ALIANZA MODEL is executed in eleven municipalities with resources provided by Fraternidad Medellín, Fundación Dividendo por Colombia, Fundación Bancolombia and the above mentioned entities. The ALIANZA MODEL was designed to reduce identified deficiencies in student learning and academic achievement by replacing the current methodology of *learning by repetition* - which has proven to be inefficient in the knowledge appropriation process - with the new proposed methodology of *Learning By Doing* (Caine, Caine & McClintic, 2002; English, 2013; Poikela & Poikela, 1997).   The national standardized tests known as **Pruebas Saber** and the national tests **Olimpiadas del Conocimiento** conducted in Colombia for elementary age students (Grades 5 – 9) were used to measure academic achievement and gains in Alianza Model schools in mathematics, inquiry-based learning and language/literacy. Results of student learning had not shown significant growth during the last few years for schools implementing Alianza Model teaching strategies. Therefore, the purpose of the 2014 Fulbright grant funded project was to 1) Design an evaluation system able to assess base line data on assessment of student learning ; 2) Redefine a support strategy in the classroom through AULA-TALLER coordinated with Teacher Professional Development through JORNADAS PEDAGOGICAS; 3) Restructure the model according to trends and international standards; 4) Provide new methodology for the development of content presented in math and language workshops for teachers and students; 5) Identify model indicators to measure the impact and management of outcome measures; and 6) Conceptualize and present an evaluation framework designed to assess and report on baseline data and final evaluation of student learning over a multi-year project implementation.

Theoretical model

The design for evaluation research and student-centered assessment is based on the premises and operational principles of *Understanding by Design* from Wiggins and McTighe (1993, 2007, 2012, 2013), and the multi-

layer institutional approach to evaluation research originated in the field of Sociology and Public Education Policy. In the context of institutional assessment research, the framework utilized for this study is an adaptation of the National University (2014) *Assessment Guide for the School of Education*. This framework positions the collection of data for candidate measures programmatic measures, and institutional measures in the context of looping back to original institutional learning outcomes, program learning outcomes, and course learning outcomes. The process of using assessment data (Marsh, 2007) to loop back into program design, program outcomes, course outcomes and candidate competencies is imported to the K-11 public school environment located in the southwest of Medellin. As a result of a preliminary review of the data, a proposed Evaluation Framework for ALIANZA MODEL was proposed at the classroom level, at the school site level and at the municipal level for educational public policy (Messick, 1989; Popham, 1999). The proposed Evaluation Framework was presented to the Center of Science and Technology in March, 2014. After sharing the proposed Evaluation Framework to Center of Science and Technology, all review and feedback was taken into consideration in order to improve such framework during for the following Phase of research.

This framework capitalizes on the notion that institutional assessment and evaluation is most effective when triangulated through the use of multiple direct and indirect measures at various levels of implementation. For our research study, the levels of implementation are the classroom level **(Gestion de Aula)** (Stecker , Fuchs & Fuchs, 2005); the school site **(Gestion Institucional**) and the municipality (**Gestion de Contexto**). The composite of measures respond to context-based measures in the classroom (local measures) used and administered by the classroom teacher, semi-contextualized measures at school site level designed and administered by personnel from the Center of Science and Technology of Antioquia; and decontextualized measures provided to all students at national level in Colombia across direct and indirect measures for student academic achievement.

This article is focused on the comparative analysis of student achievement data resulting from the administration of three semi-contextualized measures at the classroom level only (**Gestion de Aula**) administered during February, June and October 2014 in the areas of Mathematics, Inquiry-Based Learning and Language/Literacy for Alianza public schools. These measures also known as Initial Measure (**Prueba Inicial: P1**), Intermediate Measure (**Prueba Intermedia: P2)** and Final Measure (**Prueba Final:P3**) were developed by members of the Alianza team at the Center of Science and Technology (CTA) under the direction of Dr. Clara Amador-Lankster, Fulbright Senior Specialist for the project. The goal of their design and administration was to gather data on student learning aligned to the academic expectations contained in the subject-matter standards provided by the Colombian National Ministry of Education and anchored on student learning resulting from *learning by doing* across Mathematics, Inquiry Learning and Language/Literacy. The analysis of results will reveal distinct patterns of achievement across time, across subject matter and across municipalities for students served by the Alianza Model. It is critical to point out that his data analysis must be framed within a more comprehensive Evaluation Framework that contains student learning data as per Contextualized Classroom measures, Semi-Contextualized Intermediate Measures and Decontextualized National Test Measures. Triangulation of these three lines of data will provide a layered, richer understanding of student learning and academic achievement as a result of the Alianza Model intervention over time.

Data Collection and Analysis

Data was gathered from the administration of three semi-contextualized measures at the classroom level (*Gestion de Aula*) administered during February, June and October 2014 in Mathematics, Inquiry –Based Learning and Language/Literacy for Alianza public schools. Each measure was designed with item questions aligned to competencies listed by the Colombian Ministry of Education for the pertinent grade level and subject –matter. The following competencies were measured per subject-matter:

Mathematics:
- Interpretative Competence (*componentes numérico variacional; geométrico métrico*)
- Propositional Competence (*componentes numérico variacional; geométrico métrico*)
- Argumentative Competence (*componentes numérico variacional; geométrico métrico)*

Inquiry-Based Learning:
- Interpretative Competence
- Argumentative Competence
- Recognition of Scientific Language Use

Language/Literacy:
- Interpretative Competence for Literal Comprehension
- Interpretative Competence for Inferential Comprehension

Levels of Academic Achievement were based on the grade level expectations as per the Colombian Ministry of Education in the subject matter or content area for 3rd – 5th grades.

LEVEL	DESCRIPTION	AREA	POINTS
ADVANCED	Student academic achievement is advanced for the competencies within subject matter and grade level as defined by the ranges of performance listed on this chart.	Mathematics	Above 64%
		Language	Above 68%
		Inquiry Learning	Above 78%
SATISFACTORY	Student academic achievement is adequate for the competencies within subject matter and grade level as defined by the ranges of the performance listed on this chart.	Mathematics	Between 49% - 63%
		Language	Between 49% - 68%
		Inquiry Learning	Between 59% - 78%
LEVEL	DESCRIPTION	AREA	POINTS
MINIMUM	Student academic achievement is minimal for the competencies within subject matter and grade level, as defined by the ranges of the performance listed on this chart.	Mathematics	Between 32% - 48%
		Language	Between 44% - 48%
		Inquiry Learning	Between 32% - 58%

INSUFFICIENT	Student academic achievement is inadequate for the competencies within subject matter and grade level, as defined by the ranges of the performance listed on this chart.	Language	Below 32%
		Mathematics	Below 44%
		Inquiry Learning	Below 32%

Results from initial data collection in Mathematics are presented in two categories: 1) Average Achievement per Level of Competence and 2) Average percentage of students by level of competence,
by measure administered and by municipality.

Mathematics

AVERAGE   ACHIEVEMENT   BY   LEVEL   OF   COMPETENCE (Sample Size P3 = 164)
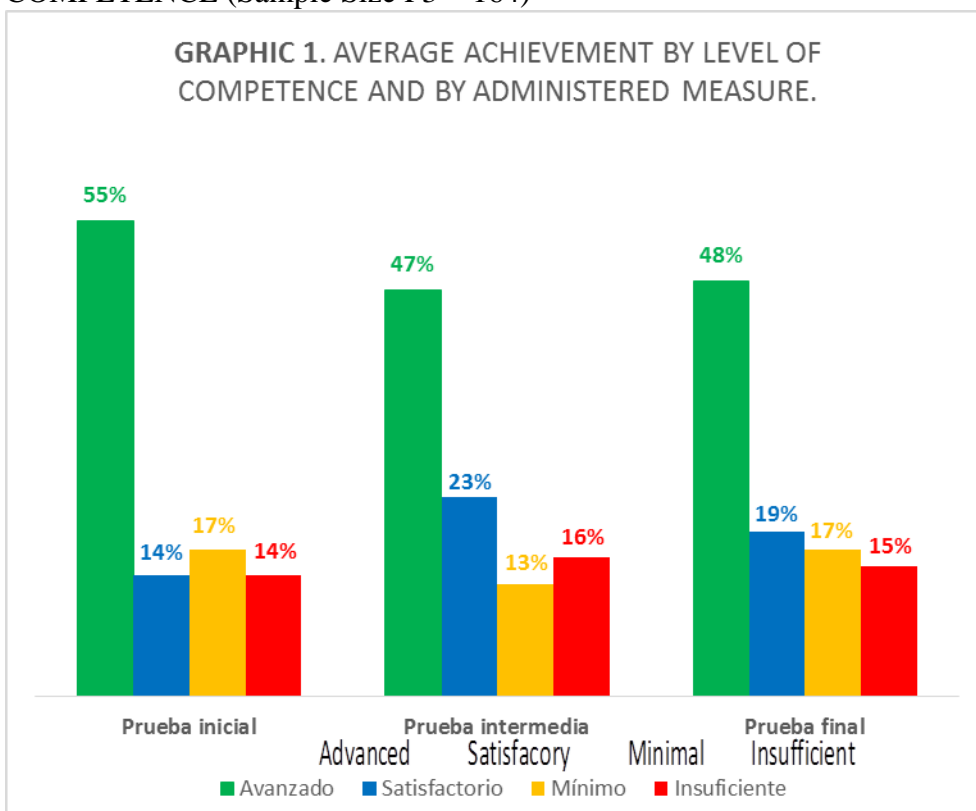
The average number of students reaching Advanced and Satifactory Levels in the initial measure totals 69%, en the intermediate measure 70% and the final measure 67%. There is evident stability of the average number of students reaching the Advanced Level for the final measure (48%) and the intermediate (47%). While it is also noted that 85% meet adequate expectations for these competences.

Over the course of these three administrations, it is evident that the majority of students are placed on the Advanced and Satisfactory levels,

while about one third of the students are at the minimal and/or insufficient levels. Over time the level of achievement is maintained and the hope is to have fewer and fewer students at levels below meeting competencies as a result of Alianza Model best practirces.

Mathematics

General percentage of students by level of achievement, by municipality

GRAPHIC 2. GENERAL PERCENTAGE OF STUDENTS BY LEVEL OF ACHIEVEMENT, BY MUNICIPALITY, AND BY ADMINISTERED MEASURE
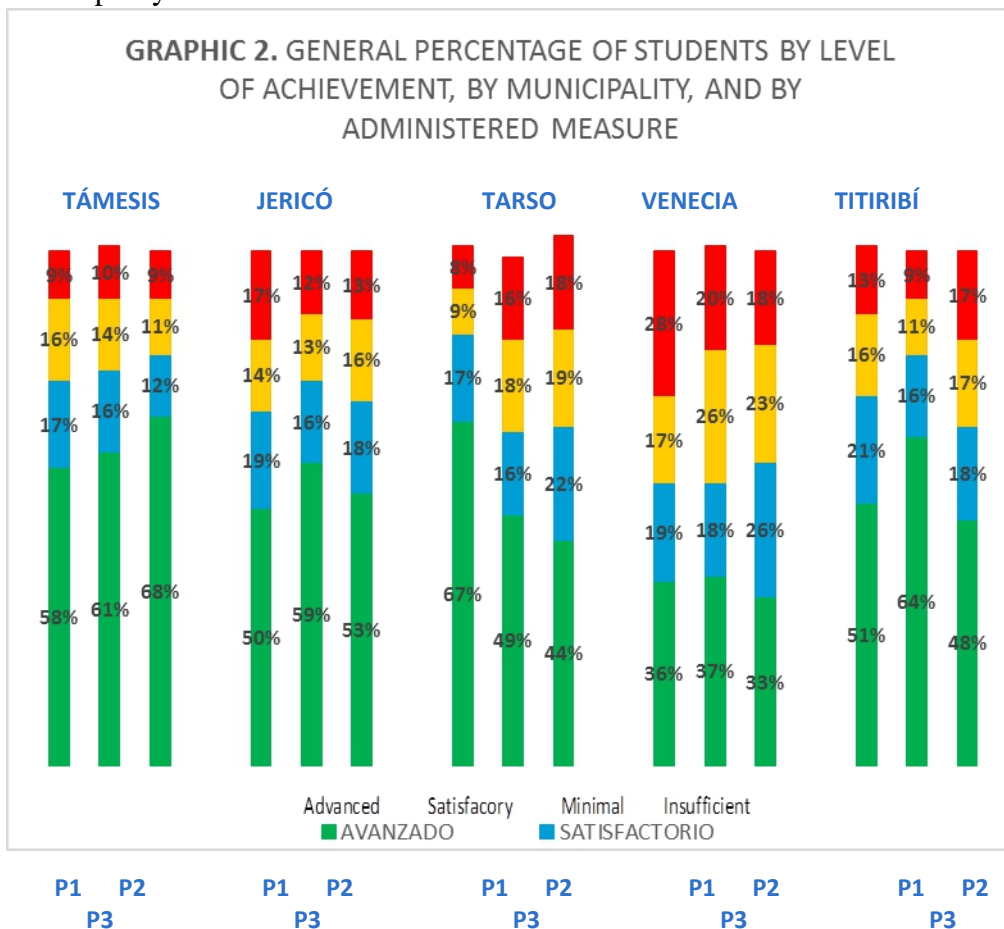
Based on a first analysis we can see that over 80% of students in all municipalities have reached a Satisfactory Level when meeting the competencies expected for that grade in Mathematics. Additionally, the general percentage of students reaching the Advanced level is greater that the percentage for any other level of performance, resulting in a steady pattern of achievement over time.

On average, Tamesis has shown the highest level of achievement at the Advanced Level with 68% of the studentt and at the Advanced and

Sastisfactory levels with 77% of the student population. On average, Venecia has shown 38% for Advanced level, 26% for Satisfactory, 23% for Minimum and 18% for
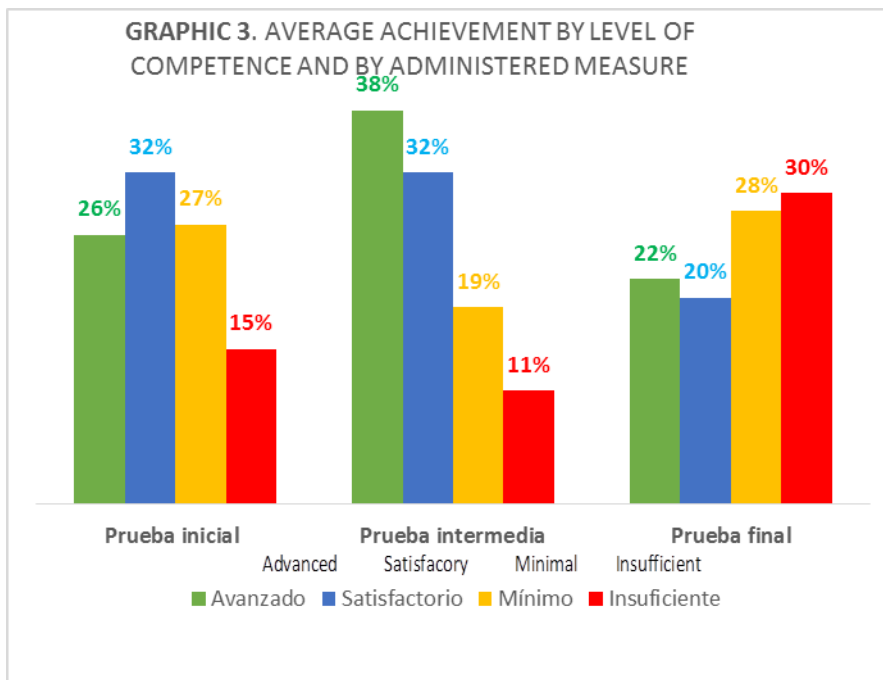
Insufficient levels. On average, Venecia has 33% of students reaching the Advanced Level, 26% reaching the Satisfactory level, 23% reaching the Minimum Level and 18% reaching the Insufficient level. the highest level of achievement at the Advanced Level with 68% of the studentt and at the Advanced and Sastisfactory levels with 77% of the student population. Venecia is in sharp contrast with Tamesis as it relates to overall academic achievement even though both municipalities have received the Alianza Model intervention.

On average, Tarso has 67% of students reaching the Advanced Level in the Initial Measure (February 2014); followed by 49% in the Intemediate Measure (Mayo 2014) and followed by 44% in the Final Measure (October 2014). This gradual decrease in performance has also been confirmed by the increase of students reaching the Insufficient level over time. It is critical to understand the reasons for this tendency to lower academic achievement. On average, Jerico has 53% of students reaching the Advanced Level, 18% reaching the Satisfactory level, and 13% reaching the Insufficient level in the Final Measure. Finally, Titiribi has 48% in the Advanced Level, 18% in the Satisfactory Level, 17% in the Minimum Level and 17% in the Insufficient Level. Titiribi got its best and most promising results during the Intermediate Measure with 91% of students. Like the municipality of Tarso, Titiribi exhibits a 17% percetage of students at the Insufficient level, whereas Tarso shows 18% of students at that same level for the Final Measure.

Inquiry-based learning
AVERAGE ACHIEVEMENT BY LEVEL OF COMPETENCE (Sample Size P3 = 192)
Results from initial data collected in Inquiry Learning are presented in two categories: 1) Average Achievement per Level of Competence and 2) Average percentage of students by level of competence, by measure administered and by municipality.

GRAPHIC 3. AVERAGE ACHIEVEMENT BY LEVEL OF COMPETENCE AND BY ADMINISTERED MEASURE

	Prueba inicial	Prueba intermedia	Prueba final
	Advanced	Satisfacory	Minimal	Insufficient

Avanzado ■ Satisfactorio ■ Mínimo ■ Insuficiente

A first analysis of Inquiry Learning (Graphic 3) shows that the highest performance by students was achieved during the Intermediate Measure with 70% of students achieving at the Satisfactory or Advanced Levels. The final measure showed that only 42% of students achieved Satisfactory or above – a drop of close to 30% of the students between May 2014 and October 2014 administrations.

The lowest achievement reached in the Final Measure can be explained by a myriad of factors, but one of them is the fact that students were asked to work in research groups for Inquiry Learning. However, this measure was administered to individual students and was designed to assess individual student learning, not learning in groups. This type of assessment measure is not designed to assess the practices that take place within the structure of research groups.

Inquiry-based learning

GENERAL PERCENTAGE OF STUDENTS BY LEVEL OF ACHIEVEMENT, BY MUNICIPALITY

GRAPHIC 4. PERCENTAGE OF STUDENTS BY LEVEL OF ACHIEVEMENT, BY MUNICIPALITY, AND BY ADMINISTERED MEASURE
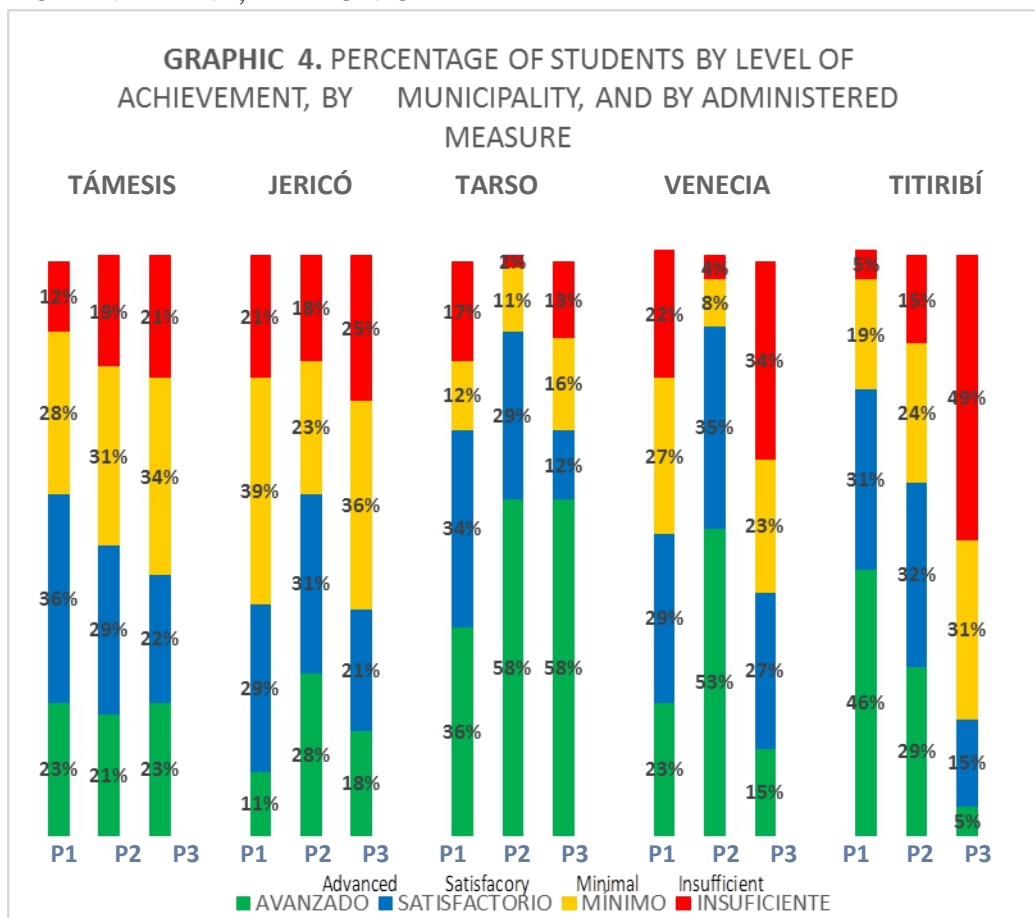
Based on a first analysis, we can see that over 50% of students in most municipalities have reached a Satisfactory Level or above when meeting the competencies expected for that grade in Inquiry Learning. However, there is a trend towards lower achievement in the Final Measure across all municipilaties under study. Tarso and Venecia exhibit the highest level of Inquiry Learning achievement in their

Intermediate Measure. In the case of Jerico, Tarso and Venecia there was an evident drop in achievement from the Intermediate Measure to the Final Measure.

On average, Tarso has shown the highest level of achievement at the Advanced and Satisfactory Level with 70% of the students in the Initial Measure, followed by 87% of the students in the Intermediate Measure and followed by 70% of the students in the Final Measure. This is a remarkable

achievement for Inquiry-Based Learning, since it is not directly taught in public schools as a designated subject-matter. On average Tamesis shows that about 79% of students were able to reach Minimum Level or above for Inquiry Learning, situating this municipality just below Tarso.

Venecia shows a remarkable drop in achievement from the Intermediate Measure (88%) to the Final Measure (42%) in the attainment of the Satisfactory and Advanced Levels. Currently the Alianza Team is examining a host of variables that may explain this sharp variation for the municipalities affected.

Titiribi shows that close to half of the students (49%) completing the Final Measure achieved at Insufficient Level , with 31% of students achieving at the Minimum Level for a total of 80% of the stuedents attaining a level below Satisfactory. These results are in sharp contrast with the results derived from the Initial Measure where Titiribi had 24% of students below Satisfactory Level. It is obvious that several factors have caused this drop to take place including, but not limited, to variation in the support provided to teachers in the classroom and facilitators of Learning By Doing; variation of personnel trained by Alianza Team and others.

Finally Jerico demonstrates a certain level of stability over time with its highest achievement during the Intermediate Measure where 59% of students achieved Satisfactory and/or Advanced Levels. Overall Jerico follows the same pattern of decreased achievement for the Final Measure as is the case with other municipalities.

Language/literacy
AVERAGE ACHIEVEMENT BY LEVEL OF COMPETENCE (LITERAL COMPREHENSION)
Results from initial data collected n Language/Literacy presented in two categories: 1) Average Achievement per Level of Competence and 2) Average percentage of students by level of competence, by measure administered and by municipality.
GENERAL PERCENTAGE OF STUDENTS BY LEVEL OF COMPETENCE,AND BY ADMINISTERED MEASURE (Sample Size P3 = 172)

GRAPHIC 5. AVERAGE ACHIEVEMENT BY LEVEL OF COMPETENCE, AND BY ADMINISTERED MEASURE
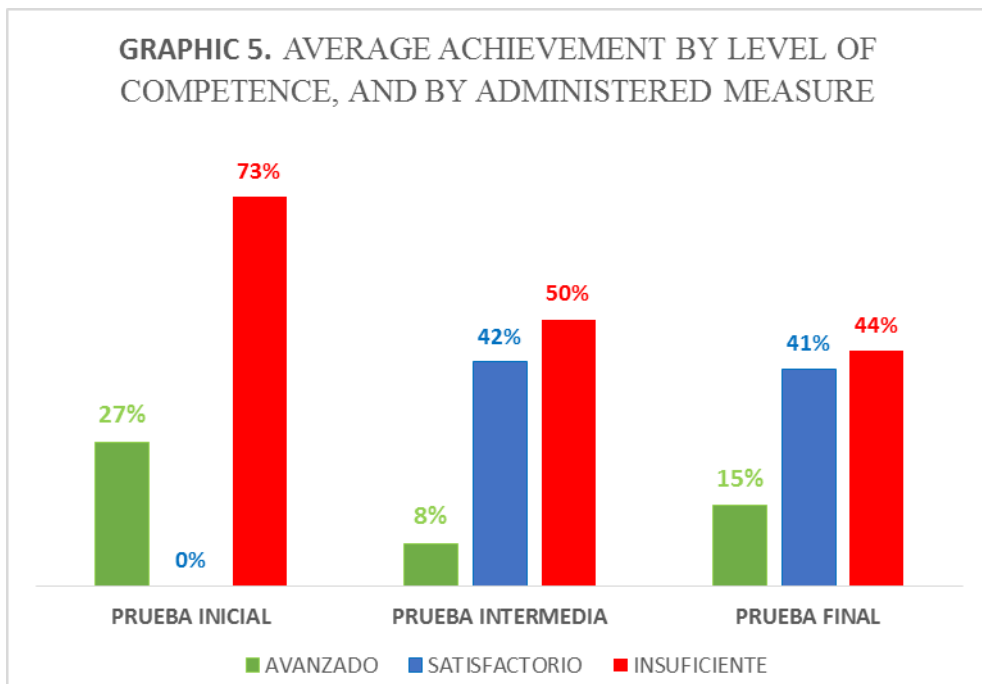
Language/Literacy is an area that has experienced several shifts in the conceptualization and administration of measures over time due to important personnel changes for this area within the Alianza Team. Three levels of performance have been reported due to no results present for the Minimum Level. Graphic 5 exhibits a general upward trend in achievement over time when we see that attainment of Satisfactory and/or Advanced Levels shifted from 27% of students (Initial Measure) to 56% of students (Intermediate Measure) to 56% of students (Final Measure) in Literal Comprehension.

In the Initial Measure, 73% of students scored at the Insufficient Level which was an alarming result for basic Literal Comprehendion of texts. The downward trend in achievement is evident over the three measures, even though the final administration exhibits that 44% of students are still demonstrating an Insufficient Level of achievement. Language and Literacy is foundational and critical to the development of Learning to Read and Reading to Learn. Since students in the sample come from grades 3 – 5, this data point reveals that the Alianza Team needs to focus attention to intervention and targeted resources to the preparation of facilitators and teachers in Language and Literacy.

Language

GENERAL PERCENTAGE OF STUDENTS BY LEVEL OF ACHIEVEMENT,
BY MUNICIPALITY

GRAPHIC 6. PERCENTAGE OF STUDENTS BY LEVEL OF ACHIEVEMENT, BY MUNICIPALITY, AND BY ADMINISTERED MEASURE
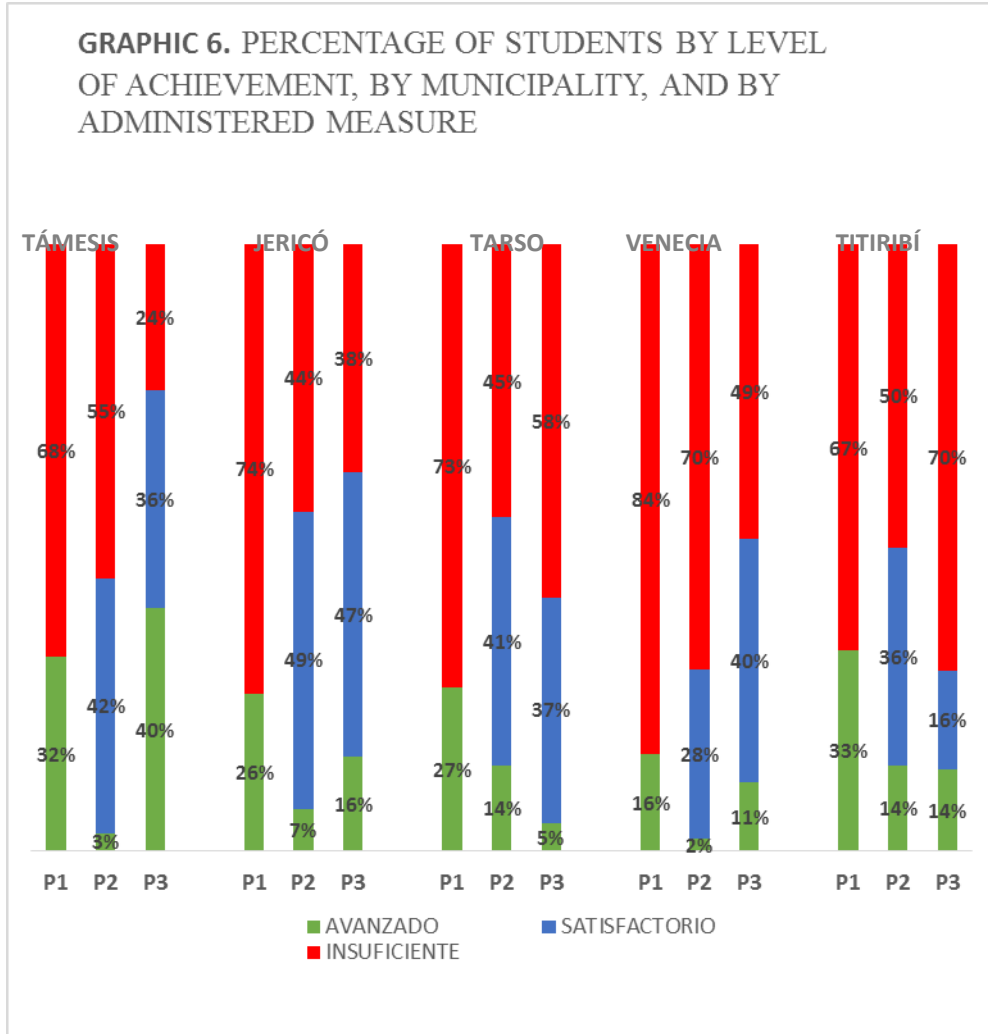
Tamesis represents the highest achievement results with 76% of students attaining Satisfactory and/or Advanced Levels, followed by Jerico with 63% of students and followed by Venecia with 51% of students at that level. Tamesis is the only municipality with a higher percentage of students achieving Advanced level (40%) than students achieving Satisfactory Level (36%). This trend requires future examination so that the Alianza Team can replicate some of the context variables impacting teaching practices for targeted student learning.
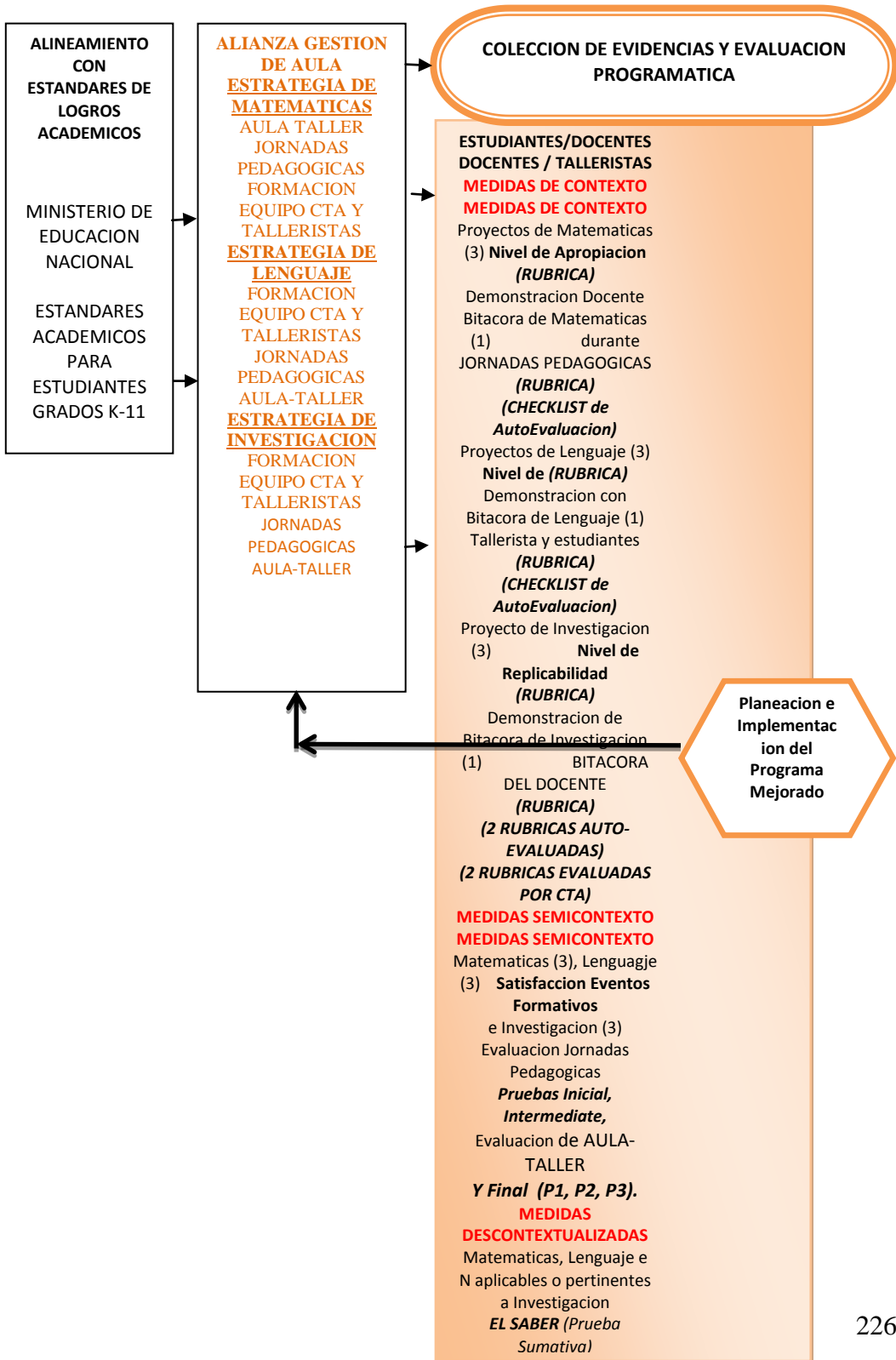
Jerico has the second highest achievement for Language/Literacy when compared to other municipalities, showing that the number of students at the Insufficient Level has decreased over time from 74% (Initial Measure) to 44% (Intermediate Measure) to 38% (Final Measure). Venecia also shows a considerable upward trend of achievement when an inter-measure comparison is made (P1:16%; P2:30%; P3: 51%) that reveals an increased number of students have achieved the Satisfactory and/or Advanced Levels. These results are relevant when we consider the fact that Venecia has been characterized by high rurality, abseentism, and institutional resistance to implementation of *Learnig By Doing* teaching strategies.

Finally Tarso and Titiribi both show the lower results in Language/Literacy achievement across the board, as evidenced by a considerable drop in the number of students reaching Satisfactory/Advanced Levels of attainment. On the other side, Tarso shows 45% of students at Insufficient Level in the Intermediate Measure and 58% in the Final Measure. Whereas Titiribi exhibits an even sharper decline for the same level of competence moving from 50% to 70% of students at the Insufficient Level. This latter decline in achievement may be attributed partially to the fact that there were consistent problems with student attendance where the administration of the Final Measure had to be repeated in order to secure a threshold level for the sample being assessed. These results in Titiribi impacted greatly the general achievement level across municipalities for the entire administration of Final Measure (P3).

Conclusion

Analyzing the results of the administration of these three semi-contextualized measures must be framed within the comprehensive Alianza-Fulbright Evaluation Framework proposed by Amador-Lankster (2014) as depicted in Graphic 7 in relation to the overall measurement of educational effectiveness of Alianza Model.
**ALIANZA-FULBRIGHT EVALUATION FRAMEWORK FOR EDUCATIONAL EFFECTIVENESS
(GRAPHIC 7, AMADOR-LANKSTER, MARCH 2014)**

ALINEAMIENTO CON ESTANDARES DE LOGROS ACADEMICOS

MINISTERIO DE EDUCACION NACIONAL

ESTANDARES ACADEMICOS PARA ESTUDIANTES GRADOS K-11

ALIANZA GESTION DE AULA
ESTRATEGIA DE MATEMATICAS
AULA TALLER
JORNADAS PEDAGOGICAS
FORMACION EQUIPO CTA Y TALLERISTAS
ESTRATEGIA DE LENGUAJE
FORMACION EQUIPO CTA Y TALLERISTAS
JORNADAS PEDAGOGICAS
AULA-TALLER
ESTRATEGIA DE INVESTIGACION
FORMACION EQUIPO CTA Y TALLERISTAS
JORNADAS PEDAGOGICAS
AULA-TALLER

COLECCION DE EVIDENCIAS Y EVALUACION PROGRAMATICA

ESTUDIANTES/DOCENTES DOCENTES / TALLERISTAS
MEDIDAS DE CONTEXTO
MEDIDAS DE CONTEXTO
Proyectos de Matematicas (3) **Nivel de Apropiacion** *(RUBRICA)*
Demonstracion Docente Bitacora de Matematicas (1)   durante JORNADAS PEDAGOGICAS
(RUBRICA)
(CHECKLIST de AutoEvaluacion)
Proyectos de Lenguaje (3) **Nivel de** *(RUBRICA)*
Demonstracion con Bitacora de Lenguaje (1) Tallerista y estudiantes
(RUBRICA)
(CHECKLIST de AutoEvaluacion)
Proyecto de Investigacion (3)   **Nivel de Replicabilidad**
(RUBRICA)
Demonstracion de Bitacora de Investigacion (1)   BITACORA DEL DOCENTE
(RUBRICA)
(2 RUBRICAS AUTO-EVALUADAS)
(2 RUBRICAS EVALUADAS POR CTA)
MEDIDAS SEMICONTEXTO
MEDIDAS SEMICONTEXTO
Matematicas (3), Lenguagje (3) **Satisfaccion Eventos Formativos**
e Investigacion (3) Evaluacion Jornadas Pedagogicas
Pruebas Inicial, Intermediate,
Evaluacion de AULA-TALLER
Y Final (P1, P2, P3).
MEDIDAS DESCONTEXTUALIZADAS
Matematicas, Lenguaje e N aplicables o pertinentes a Investigacion
EL SABER (Prueba Sumativa)

Planeacion e Implementacion del Programa Mejorado

226

This comparative analysis of semi-contextualized measures (P1, P2, P3) reveals important trends in student learning as measured by the administration of Initial, Intermediate and Final Measures aligned to current standards and competencies expected from the Colombian Ministry of Education, supported by best practices in teaching and *Learning By Doing.*

Based on the analysis by area, by administration over time, by municipality, the Alianza Team will be implementing the following recommendations in terms of extent, quantity and quality of implementation in FY2015 and FY2016 in order to utilize this body of data to inform the planning, budget allocation for future program improvement.

Recommendations for Mathematics, Inquiry-Based Learning and Language/Literacy:

1. The Alianza Team will maintain the systematic work initiated with teachers and facilitators in order to strengthen the preparation and development of teachers institutiaonally:
   i. Alianza Team will increase the number and frequency of JORNADAS PEDAGOGICAS with the joint participation of both teachers and facilitators together;
   ii. Alianza Team will reconceptualize the professional learning of teachers in the classroom:
       a. Teachers and Facilitators will work in pairs during Jornadas Pedagogicas;
       b. Facilitator will model strategies in-classroom for teachers to observe actively inside the classroom;
       c. During the AULA-TALLER, teachers and facilitators will begin to co-apply strategies together gradually; and
       d. After the AULA-TALLER is over, teachers will begin to implement strategies by themselves with gradually increased levels of sophistication with the support of the Alianza Team by use of asynchrnous communication or synchronous communication via virtual platforms, WEBEX or SKYPE on demand.
   iii. Alianza Team will gather data on the professional learning acheved by teachers in their application of new strategies in the classrooms;
   iv. Alianza Team will implement this proposed Evaluation Framework in 2015/2016 in order to assess levels of student learning by area, by municipality, by level of teacher use of best practices in *Learning By Doing.*

The following Graphic 8 exhibits the three lines of action for program improvement resulting from the initial analysis of this data set.

Additional recommendations will be provided when student learning data is triangulated across Contextualized, Semi-Contextualized and Decontextualized measures over time.

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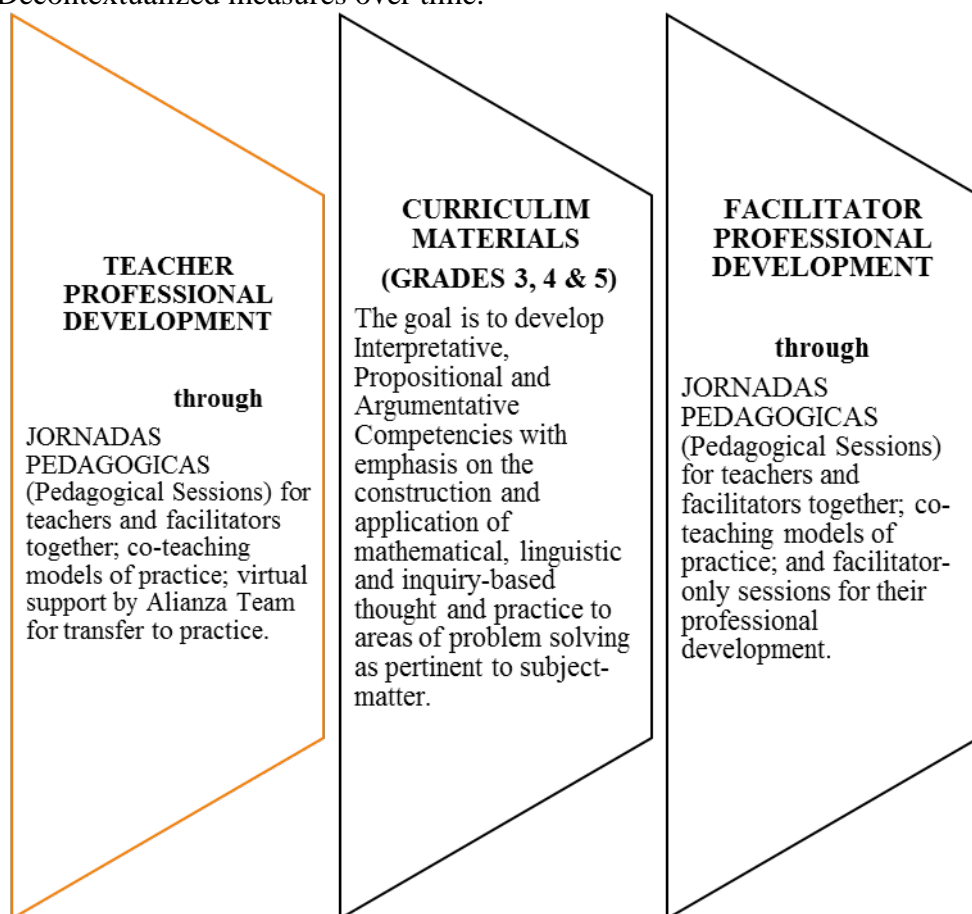
Graphic 8 : Adapted by Clara Amador-Lankster from Adriana Lozano,2014)

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