

The Impact of Five Hours vs. Ten Hours of Teacher Professional Development on
Student Achievement

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Abstract

The purpose of this study was to determine whether providing teachers with a set number of professional development hours would impact students' achievement on Student Learning Outcome assessments. Teachers were randomly selected to participate in either a five-hour professional development group or a ten-hour professional development group. Both groups of teachers administered a pretest to students prior to receiving professional development and a posttest after receiving a month of professional development. The design of this experiment was quasi-experimental using a pretest and posttest comparison to examine the data. Achievement gains from pretest to posttest were compared between students in the five-hour and ten-hour groups. The gains in the five-hour group were greater. In order to completely understand the impact that professional development has on student achievement, more comprehensive research should be considered.

CHAPTER I

INTRODUCTION

Overview

As the demand for teachers to be effective grows and the measurement of their effectiveness becomes more commonly determined by students' achievement, so does the demand for professional development and other instructional supports. Each year educational trends and instructional strategies change; therefore, enhancing professional practices may offer support with student achievement in the classroom.

The purpose of this study is to determine whether support provided by the mentor teacher in the form of a set number of professional development hours will have an effect on the number of students able to meet the target Student Learning Outcomes (SLO) score at the end of the interval of instruction. This will be a quasi-experiment, for all participants will be provided with support but one group will receive more hours of support than the other.

To conduct this study, the researcher first identified all the non-tenured teachers. Those teachers represent the target population of this study. That population will then be subjected to purposive sampling; only non-tenured teachers who are at the midpoint assessment and have less than 50% of their students on track for meeting or exceeding the SLO target score at the end of the interval of instruction will be sampled. Those teachers will then be randomly placed in one of two groups.

Experimental group one will receive five hours of professional development from the mentor teacher for one month. Experimental group two will receive ten hours of professional development from the mentor teacher for one month. At the end of the

interval of instruction, both student groups will be assessed through an SLO assessment; the two groups' performances will be compared to determine whether the support of the mentor teacher in working to improve teachers' professional practices helped to increase student achievement as determined by the percentage of students meeting or exceeding the SLO target score.

Statement of Problem

This study investigates the relationship between the number of professional development service hours provided to teachers and student achievement as determined by the students' scores on student learning outcome assessments.

Null Hypothesis

The percentage of students in group one that will reach the target SLO score will be the same as the percentage of students in group two that will make the SLO target score.

Operational Definitions

Independent variable- The number of hours of professional development support provided by the mentor; either five or ten hours per month.

Dependent variable- The Student Learning Outcome (SLO) score or status, either not reaching the identified target or reaching the identified target score.

Mentor support - Mentor support in this study is defined as at least five hours of professional development a month.

Student achievement - Student achievement in this study is defined by meeting or exceeding the target score on SLO at the end of the interval of instruction.

Professional Development- Teachers in each group will receive a specific number of hours in which they will participate in conferences and informal learning opportunities situated in practice.

Group 1- Teachers randomly selected to receive five hours of professional development from the mentor each month to support their professional practices.

Group 2- Teachers randomly selected to receive ten hours of professional development for the mentor each month to support their professional practices.

CHAPTER II

LITERATURE REVIEW

Overview

This review of the literature focuses on the topic of mentoring teachers. Specifically, the study looks into how teacher support does or doesn't translate into student success. Section one outlines the role and benefits that a mentor teacher provides. Section two discusses professional practices that can be shared with novice teachers that work well. Section three focuses on how mentors can aid in connecting the professional practices to individual teachers in a suitable and meaningful way. Finally, section four provides reflections and adjustments that must be made in the mentoring programs.

Role and Benefits of a Mentor Teacher

The overall role of a mentor is to promote the growth and development of novice as well as veteran teachers (Klausmeier Jr., 1994). Often, beginning teachers are given a full program and are expected to improve students' learning right away with little to no period of apprenticeship. Mentor teachers are assigned to help these novice teachers face their new challenges through reflective practices and professional conversations.

Education is a concept that has perennially been built on best practices and applied activities that sufficiently help teachers acclimate to the new challenge. Guskey (as cited in Moore, Kohan, Kraska, & Reames, 2011) suggests that activities that encourage and/or promote the thinking about the rights and wrongs of a lesson, such as journaling and/or plus/delta scripting, are strategies that new teachers can use to better their adjustment to the profession.

Aside from providing the logistical supports for the profession, mentor teachers also act as a collegial and emotional support for some of the most challenging phases of a teacher's career (Jaspers, Meijer, Prins, & Wubbels, 2014). Many consider a mentor teacher a person who wears many hats. While the role is ever-changing, the complexity of it remains the same. The role of a mentor teacher is often a complex task and requires specific mentoring skills, such as interpersonal skills and knowledge about mentoring, as well as being able to teach about teaching (Jaspers et al., 2014). The skills and knowledge necessary to be an effective mentor teacher take time to obtain and develop (Orland-Barak, 2001). Some tasks that a mentor must perform do not come with formal training but rather come from having had relatable experiences that provide mentor teachers with the knowhow and advice for persevering through tough times and challenges. This is the start of the complex side of mentoring. Mentors must be able to read their teachers and determine what they are feeling and what each may need professionally. The job requires the mentor to be both knowledgeable and inquisitive in a way that will benefit the mentee. With the information that they obtain through conversations and observations with the teacher, mentor teachers are then responsible for supporting teachers with practicing and acquiring the knowledge, beliefs, and skills that will enable them these new professionals to teach effectively. According to Orland-Barak (2001), learning to mentor is like "learning a second language of teaching" (p. 54).

With short exposure to the realities of teaching, many new teachers become frustrated and stressed to the point of illness, and they often depart from the profession instead of seeking help with learning the skills they need (Klausmeier Jr., 1994). The support of a mentor can help to alleviate some of this overwhelming feeling. For one, the

feedback a mentor provides can help to limit the possible mistakes made by the teacher so that the students in the class are not harmed (Jaspers et al., 2014) as well as improve the confidence and determination of the teacher. It is important for the teacher to stay mentally healthy because if a teacher starts to experience self-doubt or second guess his or her own ability, it will adversely affect the students. According to Pajares (as cited in Jaspers et al., 2014, p. 107) people's beliefs and perceptions strongly affect their behavior. Therefore, what the teacher believes about him or herself and his or her ability to teach will dictate the level of success of the students he or she serves.

A study by a Rankin County school to determine the effects of a resident mentor teacher on student achievement in mathematics reported that having mentors for math teachers resulted in improved teaching skills, increased teacher self-respect, and renewed enthusiasm for teaching (Wilkins, 1997).

Relationship between Professional Development and the Effectiveness of Teacher Performance

For decades the presence of professional development for educators has, at times, fallen on deaf ears and has also been said to be a true benefit to those who receive it earnestly and with an open mind. This dichotomy has led to extensive research, and it shows layers of phases that have led to effectiveness among teachers and educators. According to Borko (2004), research on professional development occurs in three distinct phases. The phases progress from research on single site studies focused on a program's impact on teachers as learners to research on a given program enacted by facilitators at multiple sites to research comparing multiple PD programs enacted at multiple sites. The focuses on teachers and how they are impacted assumes that teachers that are better

prepared logically translates into better student performance. Studies and research have found that teachers who are participatory in professional development seem to harness an array of enhanced skills which can lead to better classroom performance.

The use of inquiry teaching strategies can result in a marked improvement in content knowledge. Banilower, Heck, and Weiss (2007) reported similar positive relationships between hours of PD and self-reported teacher attitudes, beliefs, time spent on science, and perceptions of preparedness to teach inquiry-based science as evidence that the presence of effective professional development can impact instruction.

Although this research exists, studies that connect PD to student learning are few, and those that connect to learning as measured by high stakes tests or address the question of how much of a given kind of professional development is needed to show its impact at the student learning level are even fewer. It is then deduced that a continuum of studies exist and that extensive research continue to show that a link to certain content may show more effective examples of professional development as the concept of enhancing education and its standards maintains throughout the country.

Professional Practices that Work

In order to be effective, professional development must provide teachers with the means to directly implement what they learn into their instruction. The rationale for professional development, according to Sparks and Hirsh, (as cited in Moore et al., 2011) is that it leads to improvement in professional practices and, in turn, improvement in student learning. Therefore, what matters most is what teachers learn and how it connected to their teaching styles and students' needs.

Professional development should enhance teachers' knowledge of the content as well as improve their understanding of student thinking about that content. The alignment of practical professional practices and teachers' actual work experience is also vital to consider. If teachers and school leaders are going to invest energy and resources into promoting professional development and practices, an understanding must be achieved about the kinds of learning that help teachers develop and grow in ways that will serve all their students well, even as expectations of students and schools change every day (Lunenburg & Irby, 2011)

Therefore, it is critical that a mentor be able to read the personalities along with the strength and weaknesses of those professionals with whom they work. Being able to effectively interpret key skills in a beginning teacher enables a mentor to accurately suggest and assign strategies and practices that fit the philosophy and style of each teacher (Ermeling, Hiebert, & Gallimore, 2015). The act of being able to assess teachers can be grouped into four categories, according to Klausmeier, Jr. (1994). The first is personal and emotional development. Second is developing effective instructional strategies. Third involves aiding in developing successful management techniques, and last is developing methods for interacting successfully with others in the school setting.

Klausmeier, Jr. (1994) begins his explanation of these strategies with discussing how best to support the personal and emotional development of beginning teachers. The area of personal and emotional development is deemed to be the most important; for that reason, beginning teachers should be guarded against being isolated. Frequent collegial and informal meetings to discuss concerns and gain new insight are essential. Such experiences will encourage beginning teachers to try new things and take more risk. It

then becomes the mentor's job to praise new ideas or classroom techniques. Additionally, mentors should encourage risk taking and experimentation and be supportive even if some attempts fail.

The best professional practices focus on an activity instead of achievement according to Ermeling et al. (2015). While in many cases best practices are whatever keeps students engaged and the learning lively, it is considered counterproductive to make such practices the focus without including those key factors.

Connecting the Practice with the Person

Many teachers are called to showcase competence on all fronts as soon as they are assigned their respective positions within their schools. The challenge is for schools to recognize that there is a preconceived notion that “good teachers” do not need resources to better educate them and that, in becoming mentors, their expertise will automatically carry over to their work with a beginning teacher. One of the focuses that has received attention as of late is teacher efficacy. Tschannen-Moran and Hoy (as cited in Kleinsasser, 2014) suggest that “a teacher’s efficacy belief is a judgment of his or her capabilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated...” (p. 169). There are a host of cognitive theories that speak to this notion, but the experience of that teacher speaks has the most validity when it comes to interacting with students.

There has been some value found in teachers possessing a sound dosage of self-efficacy. In the past, self-efficacy, the belief in one’s own abilities, has rarely been considered an important trait for teacher quality, but it is a rising star in the latest research on characteristics that make a teacher most effective in the classroom. In fact, a study by

Dembo and Gibson (1985) found that teacher self-efficacy had a greater effect on the reading outcomes of fifth-grade students than teacher experience or teacher education. The study examined teachers' classroom practices to account for differences in student outcomes associated with teacher characteristics. Jasper et al. (2014) reported that teachers with a higher sense of self-efficacy provided more support for student learning and created a more positive classroom environment. This finding is consistent with most common sense practices that are geared toward building the esteem and confidence of a teacher, especially a newly hired one.

Teacher who possess both a strong and robust belief in their own abilities and who maintain their health are bound to achieve a level of success even early on in their career. There is a succinct link between the efficacy of a teacher and the condition of his or her mind, body, and spirit. Health and well-being are two keys to an educator creating a productive and joyous classroom. With most teachers, however, students come first and individual, personal health comes second or not at all. The good news is it that it only takes a few minutes a day to decompress, energize, and revitalize the body and mind. Best of all, many self-care techniques can be practiced in the classroom with students, so everyone benefits. Activities like moving more and sitting less, creating a culture of support, and eating healthy foods are a few techniques that educators can use to better balance their everyday experiences (Kleinsasser, 2014).

Skaalvik and Skaalvik (as cited in Kleinsasser, 2014) concluded that teacher perceptions of the school context, teacher self-efficacy, collective teacher efficacy, teacher burnout, teacher job satisfaction, and teachers' beliefs about factors external to teaching all put limitations on what teachers feel they can accomplish. This is certainly

fodder for potential beliefs that teachers develop over time that can definitely taint their overall perceptions of what they have chosen to do.

Reflections and Adjustments

The systemic use of formative and summative assessments is part of the ongoing instructional process. Formative assessments are check points in the learning process to inform instruction, grouping, intervention, or enrichment strategies. Summative assessments are given to test for mastery of the learning goals and standards for that respective course of study (Barnett, 2011). The correct use of these streams of data has been a question for years. Recent educational reform has driven the discussion regarding how to use data from those aforementioned assessments to better inform instruction. Now there is an argument that if teachers engage all learners with a so-called “rigorous” curriculum and then monitor their progress and adjust instruction as needed, that all students can be successful, according to Diamond (as cited in Barnett, 2011). The accountability pressure that educators experience has affected the way they may teach. There are cases where students are taught “to the test” by well-intentioned educators in an effort to increase standardized test scores to meet those pressures. There are also teachers who are married to the assessment and progressive model of instruction and the collection of data on measured growth. This allows the results of that method to dictate how and what they teach.

Using data to inform instructional practice has transformed many school districts by providing increased student achievement. In three Maryland schools, a survey was completed to determine if there was a relationship between instruction and assessment performance (Guthrie, Schafer, & Secker, 2000). Guthrie et al. (2000) found that

constructing data that revealed what practices were working to monitor students' growth helped to change the instruction in response to the growth of the students (as cited in Barnett, 2011). The use of reflection was revealed as a means to evaluate students' existing knowledge, build the understanding of their educational experience, and enrich their experience to build new knowledge (Barnett, 2011). Reflection provides constant re-evaluation of instructional methods that allows both teachers and students to change their experiences and actively engage in the learning process as stated by Bulkley et al. (as cited in Barnett, 2011).

In order to effectively use data to help increase student achievement, there has to be a positive relationship between data-driven instruction and student achievement. This can be measured by issuing pre- and posttests and also with the effective implementation of formative and summative assessments. Demonstrating the importance of using data to inform instruction and providing the students with benchmark assessments for data that are aligned with standards, allowing the data to inform teaching practice, and participating in professional development that provides research-based methods can positively affect the achievement gap. Educators must apply the adjustments that are essential to growth not only as a professional but, more importantly, as educators. Utilizing the best practices to adjust to the profession and its demands is hugely important to teaching students.

CHAPTER III

METHODS

Design

The population of interest for this study is all the non-tenured teachers at a Baltimore County high school. Participating teachers will be responsible for selecting a critical skill within their course curriculum. Students in the participating teachers' classes will receive a pre-assessment of the teacher's choice to assess students' knowledge of the chosen critical skill. The data received from those assessments will help to determine the instructional planning and preparation needed to assist students with reaching mastery in that skill. Once the skill is identified and the students are pre-assessed on their knowledge of the skill, participating teachers will present the skill expectations in a Student Learning Objective (SLO). The SLO will present the following details to support the purpose and expectations for the chosen skill:

- Outcome Statement- Identification of critical skill(s).
- Outcome Rationale- Explanation of the content that will be addressed by the chosen skill and which standards align to the chosen skill.
- Student Population- Students who will be included in the SLO.
Description of the course, grade level, and number of students involved.
- Interval of Instruction- Explanation of the duration of the course that the SLO will cover, include beginning and end dates.
- Targets and Evidence- Explanation of which growth target(s) students can be expected to reach.

- Rationale for Target- Explanation of information being used to inform the creation of the SLO and establish the amount of growth that should take place within the time period.

Once the SLO is developed and teachers are halfway through the interval of instruction for the chosen skill, the participating teachers will administer a midpoint assessment to measure the progress of their students. At that point, non-tenured teachers with less than 50% of their students on track to achieving the SLO target score will be chosen to receive professional development from the mentor. Although each teacher teaches a different subject, his or her SLO will focus on essay writing within the content area. Teachers will all use the same Partnership for Assessment of Readiness for College and Careers (PARCC) essay rubric to assessment the students' post assessment essay.

The teachers participating in the study will be randomly placed in one of two groups. Group one will consist of five teachers who will receive five hours of professional development support from the mentor, and group two will consist of five teachers who will receive ten hours of support. Each teacher in group two will start his or her hours off by having a data meeting with the mentor teacher. In this meeting the teacher will be guided through a student work analysis process to determine the best strategies and next steps for the remaining interval of instruction. Both groups of teachers will be provided with a one-hour professional development workshop each week on varying instructional topics to support their work in the classroom. In addition to weekly group professional development workshops, group two will also receive one-on-one support from the mentors through observations and sessions involving feedback and small group strategic discussion.

At the end of the interval of instruction, each teacher will administer a chosen post assessment on a selected skill. The students' scores will be used to determine the percentage of students who mastered the chosen skill which will be scored using the SLO rubric.

Participants

This study consisted of ten non-tenured teachers. The group consisted of the following: three language arts teachers, two math teachers, two science teachers, two social studies teachers, and one foreign language teacher. The classes of the participating teachers consisted of students in grades 9-12. The teachers' years of experience breaks down as follows: four are first-year teachers, and six are transferring teachers. The ages of the teachers are as follows: four teachers are in their 20's, three teachers are in their 30's, two teachers are in their 40's, and one teacher is his/her 60's.

Instrument

The percentage of students mastering the chosen skill for each teacher will be given a score based on the SLO rubric. This rubric compares the target score percentage reported by the teacher in the SLO plan to the actual target percentage at the end of the interval of instruction.

Teachers are then awarded points based on how close to the target percent they were able to come. The chart below establishes the number of points earned for the SLO based on the percent of students who meet the target.

Table 1

SLO Rubric

Points Earned/Student Performance											
100%	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%	
90-100	86-95	81-90	77-85	72-80	68-75	63-70	59-65	54-60	50-55	45-50	25 points 90-100% of target met
80-89	76-85	72-80	68-76	64-71	60-67	56-62	52-58	48-53	44-49	40-44	20 points 80-89% of target met
70-79	67-75	63-71	60-67	56-63	53-59	49-55	46-51	42-47	39-43	35-39	15 points 70-79% of target met
60-69	57-66	54-62	51-59	48-55	45-52	42-48	39-45	36-41	33-38	30-35	10 points 60-69% of target met
< 60	< 57	< 54	< 51	< 48	< 45	< 42	< 39	< 36	< 33	< 30	5 points Less than 60% of target met
No data provided											0

Example: (SLO Target set in increments of ten or five, similar to the chart above):

1. Identify the SLO Target in blue. (Principal or teacher establishes a SLO where 95% of students are to meet a target in mathematics.)
2. Review SLO evidence. After examining evidence, it was determined that 71% of students met the mathematics target.

Procedure

Each group will be invited to a meeting to explain the services that will be provided to them over the next four weeks. The cycle of professional development services will begin with group two. Each teacher in group two will meet one-on-one with the mentor to discuss the results of his or her midpoint assessment and to analyze student work. A plan for the implementation of the strategies that will promote student growth in the chosen skill will be developed. Each group will convene during week one wherein strategies will be discussed regarding the use of rigorous questioning from teacher to student and how to prepare the students for peer questioning as well. These sessions will

occur after school for one hour and 25 minutes, and the teachers will be given materials that will assist with the implementation of the key strategies for instructional enhancement.

During week two, a focus on student-centered learning will be implemented. This approach will equip the teachers with strategies that will help to enable the students to experience lessons that are college-and career-ready and that stress that learning is personalized, flexible, and can take place anytime and anywhere. This week, group two will also participate in a small group discussion that emphasizes that questioning and academic discourse strategies can increase student achievement. The students will be encouraged to share personal experiences that are a manifestation of how this discourse approach has helped them process information better.

In week three, the teachers will be provided a dose of professional development that stresses evidence-based learning and the steps needed to corroborate what the students find as a result of research and effective assessment strategies. These strategies include summaries and reflections, visual representations of information, and collaborative activities. Also in week three, group two services will include an informal observation that will result in data collection that speaks to the frequency of student engagement and the number of students on task. This will be followed with constructive feedback and reflection sessions with the mentor that will result in providing and securing next steps toward enhancement of instruction.

Week four will be conducted two weeks before the collection of SLO data. Teachers will reflect on their current status and what else needs to occur to ensure that projected SLO targets are met. Group two will participate in a one-on-one meeting during

which a return to data analysis strategies will occur. Whereas an analysis of student work was done to develop next steps, this analysis will look at how to prepare the teachers to look effectively at the end product from their students to determine the level of mastery and how to prepare targets and outcomes for the next school year. Below (Table 2) is a table that comprehensively lays out the services and focuses that each group will experience in a manner that stresses consistency and follow-up to ensure effective accountability and copious documentation for both the teachers and mentor.

Table 2

Monthly Services and Focuses by Group

Group	Week 1		Week 2		Week 3		Week 4	
	Service	Focus	Service	Focus	Service	Focus	Service	Focus
Group 1 (fivehours)	PD Work-shop	Academic Discourse	PD Work-shop	Learner Centered Env.	PD Work-shop	Assessing During Instruction	PD Work-shop	Reflection on growth and goals for cont.
Group 2 (tenhours)	PD Work-shop	Academic Discourse	PD Work-shop	Learner Centered Env.	PD Work-shop	Assessing During Instruction	PD Work-shop	Reflection on growth and goals for cont.
	One on One meeting	Data/ Student work analysis	Small Group Discussion	How do questionin g and discourse strategies increase student achvmt.?	Obser vation / Feed-back Sessio n	Collect data on students and freq. of engageme nt in academic discourse	One on One Conf.	Introductio n of Strategies for Data and Student Work Analysis

CHAPTER IV

RESULTS

This experiment was conducted to determine whether providing teachers with professional development would have an impact on students' scores on their Student Learning Outcome assessment. Pre- and posttest data were gathered on students. Two sets of data analyses were performed on the pretest and posttest at the .05 level. A *t*-test was used to determine whether there were significant differences in the experimental (ten-hour group) and control (five-hour group) groups' pretest, posttest, and growth scores. Table 3 shows the results for the pretest scores. Graph 1 shows the distribution of the pretest scores for both groups.

Table 3

Two-Sample t: Pretest by Group

Method

μ_1 : mean of pre when group = 10HRS
 μ_2 : mean of pre when group = 5HRS
Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Estimation for Difference

Difference	95% CI for Difference
-4.689	(-6.805, -2.574)

Descriptive Statistics: pre

group	N	Mean	StDev	SE Mean
10HRS	109	2.6606	2.4465	0.2343
5HRS	90	7.350	9.866	1.040

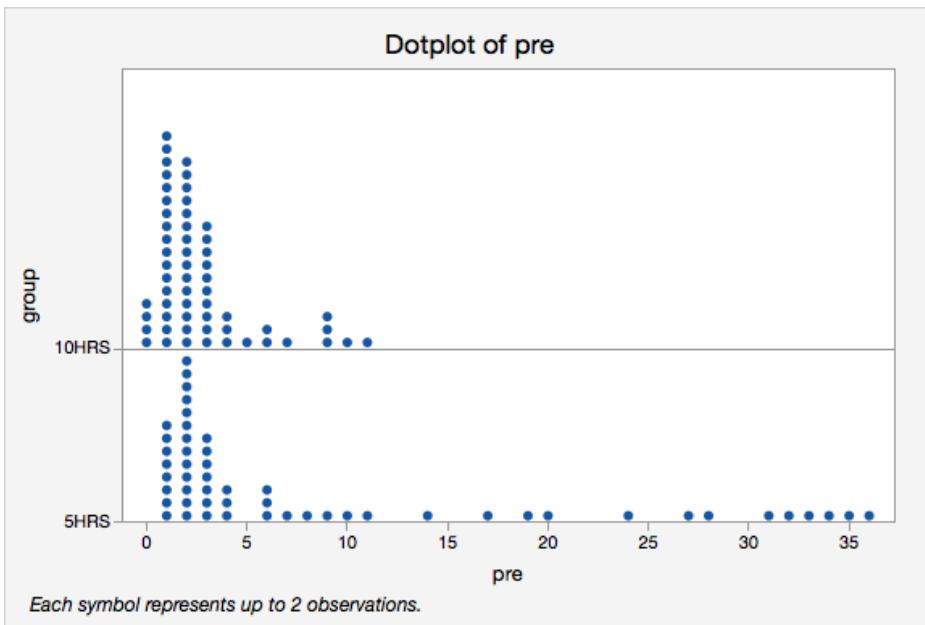
Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$
Alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$

T-Value	DF	P-Value
-4.40	98	<0.0001

Graph 1

Distribution of Pretests for Ten-hour and Five-hour Groups



The t-test was statistically significant for the pretest, $p < .0001$, and therefore, the null hypothesis, that the average pretest score will be the same for students whose teachers received five hours of PD and students whose teachers received ten hours of PD, was rejected. The five-hour PD group was skewed to the upper pretest score range compared with the ten-hour PD group. This skew had the effect of elongating the standard deviation of the five-hour PD group and increasing the mean score.

Table 4

Two-sample t: Posttest by Group

Method

μ_1 : mean of post when group = 10HRS
 μ_2 : mean of post when group = 5HRS
 Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Estimation for Difference

Difference	95% CI for Difference
-5.807	(-8.228, -3.386)

Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$

Alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$

T-Value	DF	P-Value
-4.76	99	<0.0001

Descriptive Statistics: post

group	N	Mean	StDev	SE Mean
10HRS	109	4.1651	3.0292	0.2901
5HRS	90	9.972	11.244	1.185

Graph 2

Distribution of Posttests for Ten-hour and Five-hour Groups

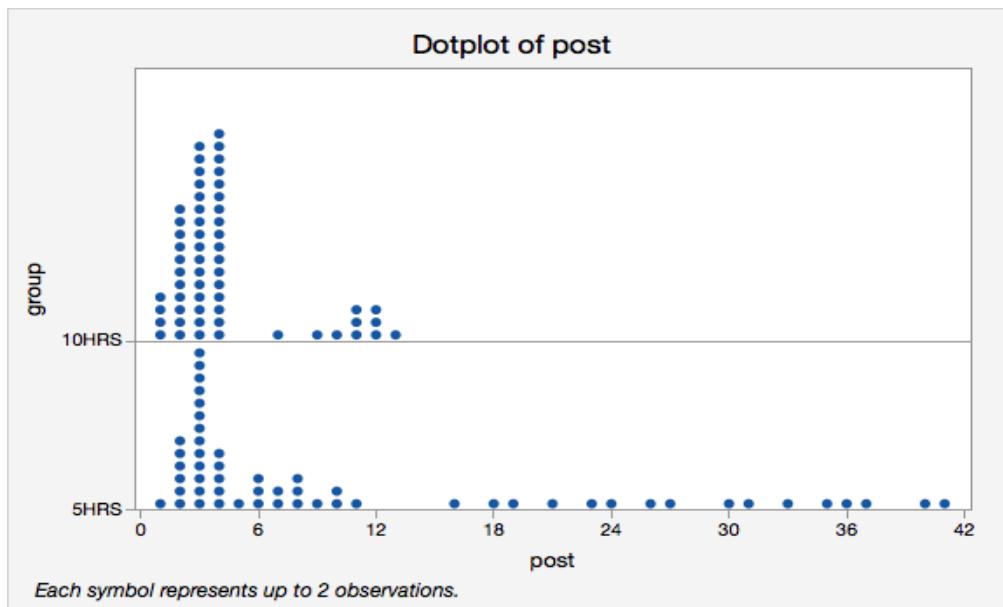


Table 5 shows whether the number of professional development hours attended by the experimental group made a difference in the growth scores (pre/post) of the students. Graph 3 shows the distribution of the growth scores for both groups. The *t*-test

was statistically significant at the .05 level ($p = .0070$); therefore, the null hypothesis that the average growth score will be the same for students whose teachers received five hours of PD and students whose teachers received ten hours of PD was rejected at the .05 level of significance. In addition to higher mean pretests and posttests, the five-hour PD group had larger mean growth scores than the ten-hour group.

Table 5

Sample t: Growth by Group

Method

μ_1 : mean of gain when group = 10HRS

μ_2 : mean of gain when group = 5HRS

Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Estimation for Difference

Difference	95% CI for Difference
-1.0809	(-1.8599, -0.3020)

Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$
Alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$

T-Value	DF	P-Value
-2.75	114	0.0070

Descriptive Statistics: gain

group	N	Mean	StDev	SE Mean
10HRS	109	1.5413	1.4564	0.1395
5HRS	90	2.6222	3.4878	0.3676

Graph 3

Distribution of Gains for Ten-hour and Five-hour Groups

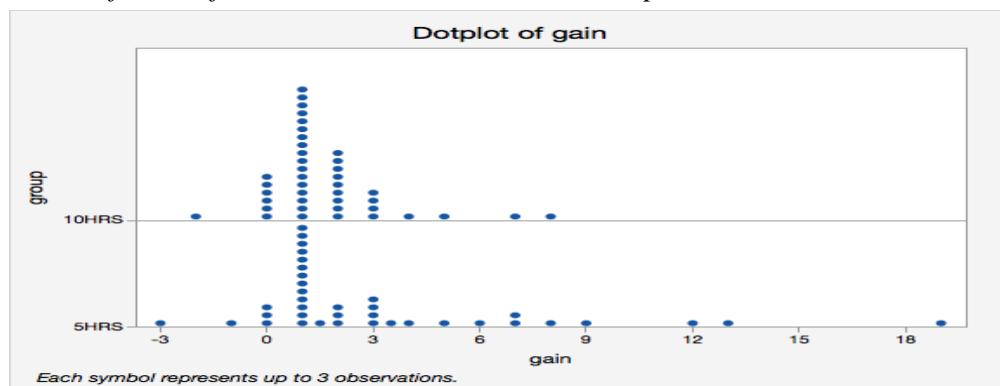


Table 6 compares the percentage of growth targets that were met by the ten-hour and five-hour groups. Differences in percentages are compared by the Chi-Square

statistic, while differences in means are compared by the t-test. The percentages of growth targets met by the ten-hour and five-hour groups do not differ significantly at the .05 level ($p = .8687$). Therefore the null hypothesis that the ten-hour and five-hour groups will have the same percentage of growth targets met is not rejected.

Table 6

Percentage of Growth Targets Met within PD Group

Rows: group		Columns: met	
	N	Y	All
10HRS	18	91	109
	16.51	83.49	100.00
5HRS	15	75	90
	16.67	83.33	100.00
All	33	166	199
	16.58	83.42	100.00
<i>Cell Contents:</i>		Count	
		% of Row	

Chi-Square Test

	Chi-Square	DF	P-Value
Pearson	0.00	1	0.9770
Likelihood Ratio	0.00	1	0.9770

CHAPTER V

DISCUSSION

The purpose of this study was to determine whether the number of professional development (PD) hours received by teachers would be related to students' scores on Student learning Objectives (SLO). A quasi-experimental design was used to compare student achievement on pretests, posttest, and gain SLO scores after their teachers received either five or ten hours of PD related to S.T.A.T.

The null hypothesis was that the percentage of target SLO growth scores would be the same on average for students whose teachers received five hours or ten hours of PD. This hypothesis was rejected as the five-hour group had significantly higher mean gain scores, in addition to significantly higher mean pre- and posttest scores.

Implication of Results

Student average gains were greater for the five-hour group. This result suggests that doubling the number of hours of PD from five to ten won't necessarily correlate with increases in student achievement as measured by SLO assessments. During the final PD session, teachers in the ten-hour group reported feeling overwhelmed trying to implement the practices introduced. Too much of a good thing may negatively impact executing effective instruction. Teachers in the five-hour group, on the other hand, reported feeling that the amount of PD allowed them enough time to try new instructional approaches without being overwhelmed. The five-hour teachers also felt they had sufficient time to make adjustments before moving on to another instructional practice.

Theoretical Consequences

There are not many educational theories that recommend a specific amount of PD or try to link more PD time to student achievement. This study suggests that, up to a point, more PD may be associated with higher student achievement. At some threshold, however, additional PD may become counterproductive. The exact threshold was not determined by this study. What can be said is that students whose teachers received five hours of PD in one month gained more than students whose teachers received ten hours of PD. Providing teachers with instructional practices and support and giving them adequate time to implement, adjust, and own the instruction proved more effective for student SLO achievement than simply increasing the amount of PD time.

Threats to Validity

Several factors may have adversely affected this study. One major threat concerns teaching experience. Although the teachers were randomly assigned to five-hour or ten-hour PD groups, the five-hour group was comprised of more experienced teachers. This may have enabled the teachers in the five-hour group to have more confidence to implement new strategies while managing the other instructional routines. This threat, which arose from different compositions of the teachers in the two PD groups despite random assignment, implies the need to more carefully examine the teacher pool for the study. Additional sampling techniques could be used; for example, homogeneous teacher subgroups could be formed and then classrooms could be randomly assigned to treatments.

School-wide events and state/local testing were other factors that could have differentially taken away time from instruction. Some teachers in the ten-hour group

taught more intensive courses such as foreign languages, adding even more burden and discomfort to the teachers and students. Another threat to the study was the fact that the five-hour group performed higher than the ten-hour group on the pretest, despite the random assignment of classrooms. The differences in teachers described above may have resulted in pre-existing differences in student SLO achievements. Since the five-hour group also scored higher on the posttest and the gain scores, the doubling of PD time from five hours to ten hours gave no advantage to the students in the ten-hour group.

Connection to Previous Studies

Few studies have been conducted which found support for a direct connection between professional development and student achievement. According to Huffman, Thomas, and Lawrenz (2003), research on the impact of professional development on student achievement is limited because it is expensive and difficult to conduct. In a review of research on professional development conducted in the areas of science and mathematics, Loucks-Horsey and Matsumoto (1999) suggested a model of professional development that used high quality professional development which led to an improvement in teachers' learning that, in turn, led to improved student achievement. The results of the current study did not support the claims made by previous studies, but that was partly due to the structure of the school environment. Ultimately, there are three principles to consider that are related to professional learning; first quality teaching can enhance student learning; second, a key factor in quality teaching is professional learning of teachers and principals; and third, the structure and culture of the school environment are critical to enhancing the impact of professional learning (Sparks & Hirsch as cited in Moore et al., 2011).

Implications for Future Research

Findings from this study suggest the need for additional research that has stricter parameters for the conditions in which the teachers are grouped. Teachers who teach the same or similar content should be grouped together and provided with professional development that would be more appropriate to their content area. This type of research design would eliminate the additional effort and time to customize practices obtained through professional development to fit the content. Professional development that is more specific to the content may prove to offer greater support for teachers' comfort with implementing instructional strategies.

Future research on the impact of professional development provided to experienced teachers versus inexperienced teachers may also be valuable in determining whether professional development has an impact on student achievement. It may be of instrumental value to determine whether prior teaching experience influences teachers' ability to implement professional learning in a way to increase student achievement. One last idea that may be worth researching further is whether the number of professional development hours provided to teachers has a direct correlation to improving student achievement. This study would need to be specific and conducted in a way that would assess students after teachers received a specified number of hours. Again, this could be a complex study to conduct because of all the factors that could influence the results. However, it is worth consideration when taking into count all the money that is spent in school systems on professional development.

Conclusion

The results of the study indicate that students of teachers who received five hours of professional development had higher gains from the pretest to the posttest on the Student Learning Outcome assessment. The five-hour group had significantly greater average gains in addition to significantly greater pre- and post-scores. Teachers in the ten-hour group reported feeling overwhelmed by trying to effectively implement the strategies introduced during the professional development session before receiving a new strategy or recommendation to consider. On the other hand, the five-hour group reported having sufficient time to implement the strategies and recommendations received during the professional development sessions. While there were gains made from students instructed by teachers in both groups, the teachers in the five-hour group were able to implement the strategies and recommendations with comfort and less pressure and were therefore more successful.

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