

Copyright

by

Elizabeth Goodrich

December, 2010

CHANGE IN TIME UTILIZATION BY OCCUPATIONAL THERAPY AND
PHYSICAL THERAPY SERVICE PROVIDERS IN SCHOOLS

A Dissertation Proposal Presented to the
Faculty of the College of Education
University of Houston

In Partial Fulfillment
Of the Requirements for the Degree

Doctor of Philosophy

by

Elizabeth Goodrich

December, 2010

ACKNOWLEDGEMENT

I have been afforded many opportunities in life, but the opportunity to develop skills to complete research in an applied setting is a summit that I hope to remain at for many years to afford children with special needs the benefit of an evidence based education. This achievement could not have been obtained without the support of an excellent university program, and a highly talented and supportive committee. To the University of Houston, I thank you for this opportunity. To Dr. Hawkins, Dr. Burrridge, Dr. Johnson, Dr. White, and Dr. Yu, thank you for your ongoing support and guidance. To Dr. Wolters and Dr. Frankiewicz thank you for the challenges that pushed me beyond my own expectations. I also could not have been successful without a great team of occupational therapy and physical therapy service providers and a great administrative team who always face the challenges of meeting the needs of children with special needs in a large urban school district with grace, compassion and excellence. And, most importantly, thank you to my husband, children, and parents who have each stood by me with love, encouragement, and fortitude. I am very richly blessed.

CHANGE IN TIME UTILIZATION BY OCCUPATIONAL THERAPY AND
PHYSICAL THERAPY SERVICE PROVIDERS IN SCHOOLS

An Abstract
of a Dissertation Presented to the
Faculty of the College of Education
University of Houston

In partial Fulfillment
of the Requirement for the Degree

Doctor of Philosophy

by

Elizabeth Goodrich

December, 2010

Goodrich, Elizabeth A. "Change in Time Utilization by Occupational Therapy and Physical Therapy Service Providers In Schools" Unpublished Doctor of Philosophy Dissertation, University of Houston, December, 2010.

Abstract

Occupational therapy (OT) and physical therapy (PT) are related services that are provided under the Individuals with Disabilities Education Improvement Act of 2004 (IDEA, 20 U.S.C. 1400 et seq.). Related services are provided under the IDEA to assist children with disabilities to benefit from special education. Nationally, there is a critical shortage of qualified personnel to provide related services in schools. Due to budget constraints, public school systems also experience challenges in competing with medical facilities to hire these personnel. Due to this combination of the critical shortage of qualified personnel and budgetary constraints, public school systems often times operate with staffing shortages. Therefore, it is important to develop evidence based practices that facilitate the efficient utilization of both personnel time and talent to provide these services in schools.

To contribute to this evidence, the researcher investigated change in how OT and PT service providers utilized time in a large urban school district across four school years. These years are consistent with the years investigated by Goodrich, Hawkins, Burrige, and White (2009), who reported an increase across these years in the number of appropriate as opposed to inappropriate referrals generated for OT and PT services in this school district. In the later three years, three interventions designed to facilitate appropriate referrals were implemented. The interventions included training on using an education based decision making process when generating a referral, a modified referral form to guide campus personnel through using an education based decision making process, and the addition of a classroom based support service to the continuum of services provided by OT and PT services. In the current study, a

RELATED SERVICE TIME UTILIZATION

longitudinal analysis was conducted to measure if a significant change occurred in the proportion of time OT and PT service providers spent in various activities performed as a part of their work responsibilities when the increase in the proportion of appropriate referrals was reported. Therapy personnel increased the time spent in providing campus or classroom based support services and in travel. Time spent in providing screening and evaluation services remained stable across the years.

The interventions implemented in this school district across these four years were supported as effective practices to improve the efficient utilization of OT and PT services provided in schools. These personnel were able to increase the proportion of time they were able to spend in providing the campus or classroom based support services, offering a proactive model of support in addition to the reactionary, referral driven, model. The referral process improved because less, more appropriate referrals were generated by campus teams (Goodrich, et al. 2009) the time spent in responding to these referrals remained relatively consistent across these years. This time was spent in responding to more appropriate referrals as opposed to being unnecessarily expended to respond to inappropriate referrals. In addition to these two changes in how these service personnel spent time across these years, the number of children recommended to receive OT and/or PT services as a part of the child's IEP increased.

Table of Contents

Abstract	i
Table of Contents	iii
List of Tables	v
Table of Figures	ix
Chapter I. Introduction.....	1
The Problem.....	1
Background Information.....	6
Hypotheses.....	16
Chapter II. Review of Related Literature.....	17
Providing OT and PT Services Under the IDEA	17
Key Points:.....	20
Determining a Child’s Educational Need as Opposed to Medical Need for OT or PT Services.....	21
OT and PT Activities Defined by State Licensure Requirements	26
OT and PT Activities Defined by Best Practices.....	27
Key Points:.....	31
OT and PT Activities Defined by the Continuum of Services Provided in the School District.....	31
Measuring Change	38
Chapter III. Methodology	44
Data Set:.....	45
Chapter IV. Results.....	57

RELATED SERVICE TIME UTILIZATION

Predictors of Change.....	81
Chapter V. Discussion	94
Findings.....	96
Finding #1	96
Finding #2	97
Finding #3	100
Finding #4	101
Limitations	101
Conclusion	103
References.....	106

List of Tables

Table 1: Number of Referrals Received in the First Thirty Days of the 2005-2006 School Year Rated Appropriate or Inappropriate by at Least 50% of the Therapy Personnel (<i>N</i> = 141).....	7
Table 2: Number of Ratings in Each Sub-Category of Inappropriate for the Referrals Received in the First Thirty Days of the 2005-2006 School Year (<i>N</i> = 141)	8
Table 3: Parameter Estimates of Year as a Predictor of an Appropriate Referral Rating	11
Table 4: Summary of # of Child Specific Services Provided Across the Years.....	13
Table 5: Number of Filled Service Provider Full Time Equivalents (FTE) by Year and Profession.....	15
Table 6: Common Related Service Delivery Models and Definitions	28
Table 7: The Number of OT and PT Service Providers and the Number of Students Meeting the Effgen, et al. (2007) Criteria	40
Table 8: Number of Service Providers by Year and Profession	46
Table 9: Activity Codes and Definitions Used by OT and PT Personnel in the 2005-2006 School Year.....	47
Table 10: Changes in the 2005-2006 Activity Codes and Definitions Used by OT and PT Personnel in the 2006-2007 School Year (Changes Italicized)	49
Table 11: Changes in the 2006-2007 Activity Codes and Definitions Used by OT and PT Personnel in the 2007-2008 School Year (Changes Italicized)	50
Table 12: Changes in the 2007-2008 Activity Codes and Definitions Used by OT and PT Personnel in the 2008-2009 School Year (Changes Italicized)	52

RELATED SERVICE TIME UTILIZATION

Table 13: Activity Categories and Definitions Conceptually Grouped Into Ten Common Categories.	54
Table 14: Mean Percentage of Unreported Service Provider Time (Missing Data) for all Service Providers by Year	59
Table 15: Mean Percentage of Unreported Service Time (Missing Data) Within the Subgroup of Service Providers with Missing Data by Year.....	60
Table 16: Mean Percentage of Unreported Therapist Time (Assistants Excluded) by Year..	61
Table 17: Mean Percentage of Unreported Therapists Time (Excluding Assistants) Within the Subgroup of Therapists with Missing Data by Year.....	61
Table 18: Mean Percentage of Time Service Providers Reported in the Lunch Category by Year.....	62
Table 19: Mean Percentage of Time Service Providers Reported in the Absent Category by Year.....	62
Table 20: Mean Percentage of Time Service Providers Reported Providing Campus or Classroom Based Support Services by Year.....	63
Table 21: Mean Percentage of Time Service Providers With and Without Missing Data Reported Providing Campus or Classroom Based Support Services by Year.....	64
Table 22: Mean Percentage of Time Service Providers Reported Participating in Professional Development by Year	65
Table 23: Mean Percentage of Service Provider Time Reported Providing Assistive Technology Services by Year	66
Table 24: Number of Service Provider Days Per Week Set Aside to Provide Assistive Technology Services by Year	67

RELATED SERVICE TIME UTILIZATION

Table 25: Mean Percentage of Time Service Providers Reported in Performing Other Job

Related Duties by Year	69
------------------------------	----

Table 26: Mean Percentage of Time Service Providers Reported in Providing Child Specific

Services by Year	69
------------------------	----

Table 27: Mean Percentage of Time Service Providers Reported in Travel by Year..... 73

Table 28: Mean Percentage of Time Service Providers With and Without Missing Data

Reported in Travel by Year.....	74
---------------------------------	----

Table 29: Mean Percentage of Service Provider Time Reported Providing Evaluation

Services by Profession	75
------------------------------	----

Table 30: Mean Percentage of Therapist Time Reported Providing Evaluation Services by

Year.....	76
-----------	----

Table 31: Mean Percentage of Time Therapists With and Without Missing Data Reported

Providing Evaluation Services by Year	77
---	----

Table 32: Mean Percentage of Service Provider Time Reported Providing Screening Services

by Profession.....	78
--------------------	----

Table 33: Mean Percentage of Therapist Time Reported Providing Screening Services by

Year.....	78
-----------	----

Table 34: Mean Percentage of Time Therapists With and Without Missing Data Reported

Providing Screening Services by Year.	79
--	----

Table 35: Parameter Estimates of Year and Profession as Predictors of the Variance for

Therapists Time Reported in Providing Screening Services.	83
--	----

Table 36: Parameter Estimates of Year and Profession as a Predictor of the Variance for

Therapists Time Reported in Providing Evaluation Services.	86
---	----

RELATED SERVICE TIME UTILIZATION

Table 37: Parameter Estimates of Year and Profession as a Predictor of the Variance for

Time Reported in Providing Campus or Classroom Based Support Services 89

Table 38: Parameter Estimates of Year and Profession as a Predictor of the Variance for

Time Reported in Travel 91

Table of Figures

Figure 1. Percentage of change in special education student enrollment from 2005-2006.	2
Figure 2. Percentage of change in special education expenditures from 2005-2006.....	3
Figure 3. Percentage of change in total student enrollment from 2005-2006.....	3
Figure 4. Percentage of change in total education expenditures from 2005-2006.....	4
Figure 5. Percentage of change in the number of children meeting the Effgen, et al. (2007) criteria from 2005-2006.	5
Figure 6. Five categories of services available to a child who has met his or her state's criteria for eligibility and qualification for services provided under the IDEA.....	19
Figure 7. Definition of physical therapy practice as stated in the Texas Physical Therapy Practice Act and the Texas Physical Therapy Rule.	21
Figure 8. Definition of occupational therapy practice as stated in the Texas Occupational Therapy Rules.	22
Figure 9. Factors that influence the decisions physical therapists make regarding service model and intensity of services (Effgen and McEwen, 2007).	30
Figure 10. Continuum of OT and PT services provided in the school district.	32
Figure 11. Activity codes included in nine of the ten common activity categories by year...	56
Figure 12. Mean percentage of total service provider time reported in each common activity category.....	58
Figure 13: Mean percentage of service provider time reported in providing child specific services (intervention, ARD, and student documentation) compared to time reported in performing job related duties.	71

Figure 14: Percentage of change from year one in the number of children receiving IEP recommended services compared to the percentage of change in the mean percentage of time reported in providing child specific services and performing other job related duties combined.....	72
Figure 15. Mean percentage of time reported by service providers for each of the remaining categories or interest within year by year.	81
Figure 16. Mean percentage of time therapists reported providing screening services by professions by year.	84
Figure 17: Percentage of change in the number of requests received for screening/consultation services from year one compared to the percentage of change in time therapists reported in providing screening services from year one.	85
Figure 18. Mean percentage of time reported providing evaluation services by professions and year.	87
Figure 19. Mean percentage of time reported providing campus or classroom based support services by professions and year.	90
Figure 20: Mean number of campus visits made by OT and PT personnel during the data collection month by year.....	92
Figure 21. Mean percentage of time reported in travel by professions by year.....	92

CHANGE IN TIME UTILIZATION BY OCCUPATIONAL THERAPY AND PHYSICAL THERAPY SERVICE PROVIDERS IN SCHOOLS

Chapter I. Introduction

Occupational therapy (OT) and physical therapy (PT) services are related services provided in public schools under the Individuals with Disabilities Education Improvement Act of 2004 (IDEA, 20 USC 1400) to assist children with disabilities to benefit from special education. Budgetary constraints and a shortage of qualified personnel to provide these services require public school systems to utilize OT and PT resources (personnel time and talent) with increasing efficiency. Therefore, it is important to develop evidenced based practices that facilitate the efficient utilization of resources used to provide OT and PT services in schools.

The Problem

The United States Department of Education, Institute of Education Sciences (nd), the Texas Education Agency, Division of Performance Reporting Academic Excellence Indicator System (2005-2006, 2006-2007, 2007-2008, 2008-2009), and the Houston Independent School District (2006, 2007, 2008) report across the 2005-2006, 2006-2007, 2007-2008, and 2008-2009 school years, student enrollment in special education programs declined on national, state, and local levels (-1.6%, -4.5%, -7.2% respectively, see Figure 1 but expenditures for special education programs increased (+12.2%, +19.2%, +7.6% respectively, see Figure 2. Concurrently these agencies report, overall student enrollment slightly increased (+0.3%, +1.6%, +0.4%, see Figure 3), federal education expenditures declined (-2.7%), and state and local education expenditures increased (+26.2%, +10.5%

respectively, see Figure 4) These changes in student enrollment numbers and expenditures are important changes to recognize because the dollars legislative bodies approve for education are generally tied to student enrollment numbers. When enrollment numbers decline, legislators and school administrators begin to question the need to decrease funding for special education and related services such as speech therapy and OT and PT (Houston Independent School District, 2010; Walsh, 2010).

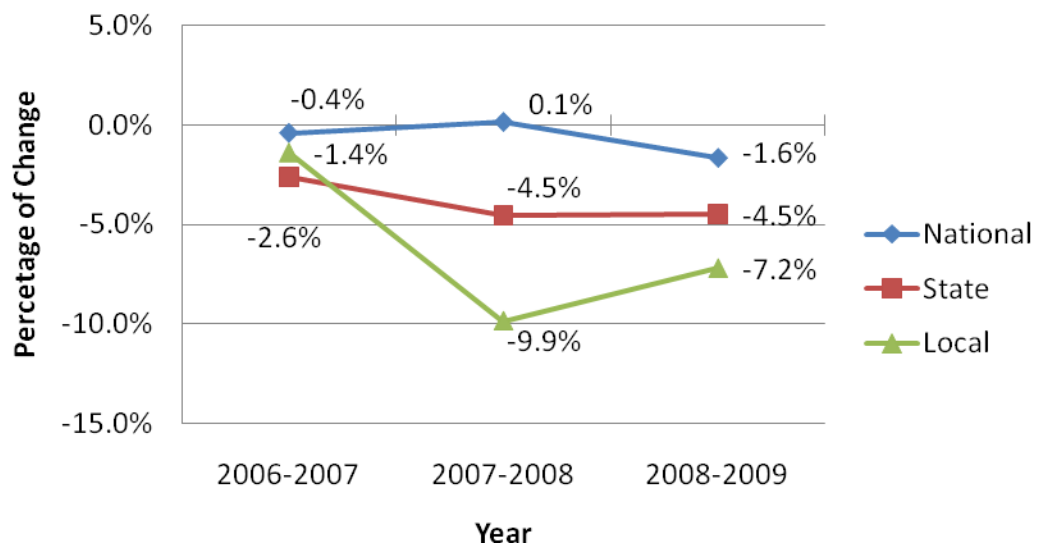


Figure 1. Percentage of change in special education student enrollment from ¹2005-2006.

¹ Data reported by the United States Department of Education, Institute of Education Sciences (nd), the Texas Education Agency, Division of Performance Reporting Academic Excellence Indicator System, 2005-2006, 2006-2007, 2007-2008, 2008-2009), and the Houston Independent School District, 2006, 2007, 2008

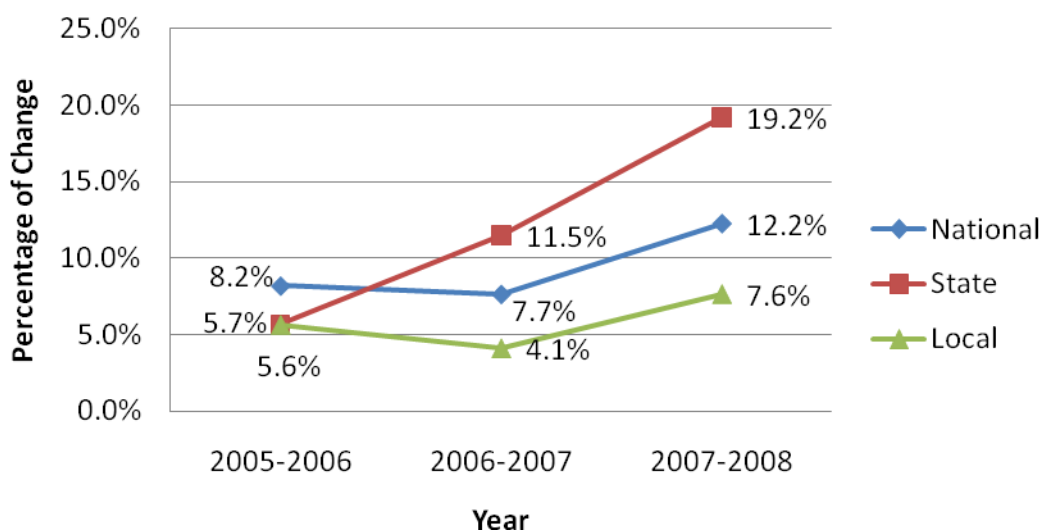


Figure 2. Percentage of change in special education expenditures from ²2005-2006.

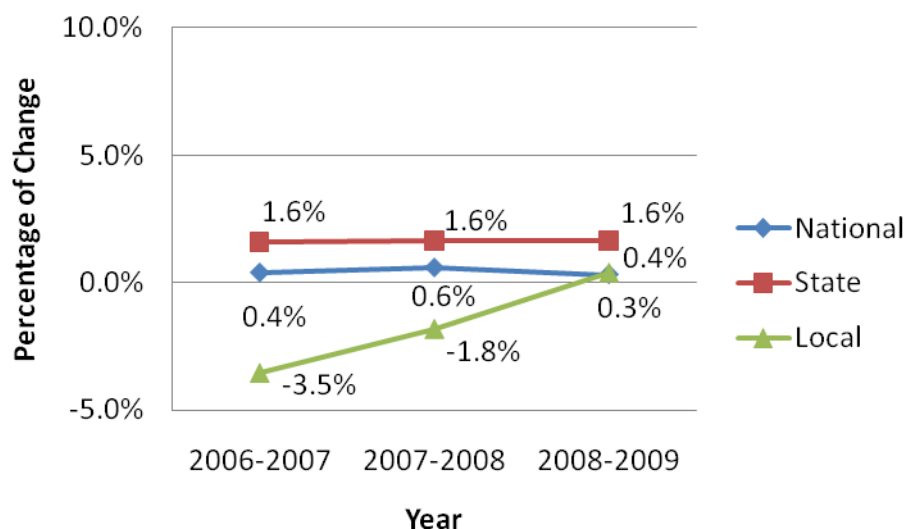


Figure 3. Percentage of change in total student enrollment from ³2005-2006.

² Data reported by the United States Department of Education, Institute of Education Sciences (nd), the Texas Education Agency, Division of Performance Reporting Academic Excellence Indicator System, 2005-2006, 2006-2007, 2007-2008, 2008-2009), and the Houston Independent School District, 2006, 2007, 2008

³ Data reported by the United States Department of Education, Institute of Education Sciences (nd), the Texas Education Agency, Division of Performance Reporting Academic Excellence Indicator

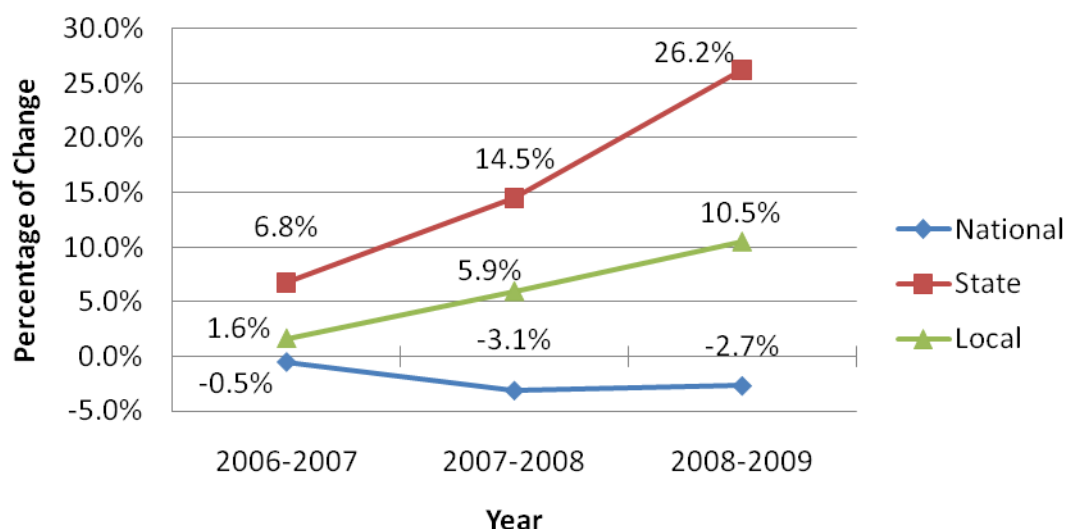


Figure 4. Percentage of change in total education expenditures from ⁴2005-2006

To respond to this question it is important to understand the population of students that are most commonly supported by OT and PT services. Effgen, Myers, and Myers (2007) assert that the children who most commonly receive OT or PT services in schools are children identified with one of the following disabilities: multiple disabilities, orthopedic impairment, mental retardation, developmental delay, traumatic brain injury, or autism. In the school district of the current study, the percentage of children identified with these disabilities increased over the four years included in this study even though, overall, the number of children enrolled in special education programs declined (see Figure 5). The

System, 2005-2006, 2006-2007, 2007-2008, 2008-2009), and the Houston Independent School District, 2006, 2007, 2008

⁴ Data reported by the United States Department of Education, Institute of Education Sciences (nd), the Texas Education Agency, Division of Performance Reporting Academic Excellence Indicator System, 2005-2006, 2006-2007, 2007-2008, 2008-2009), and the Houston Independent School District, 2006, 2007, 2008

funding needs of school districts to provide OT and PT services then cannot be based solely on the number of students enrolled in special education programs.

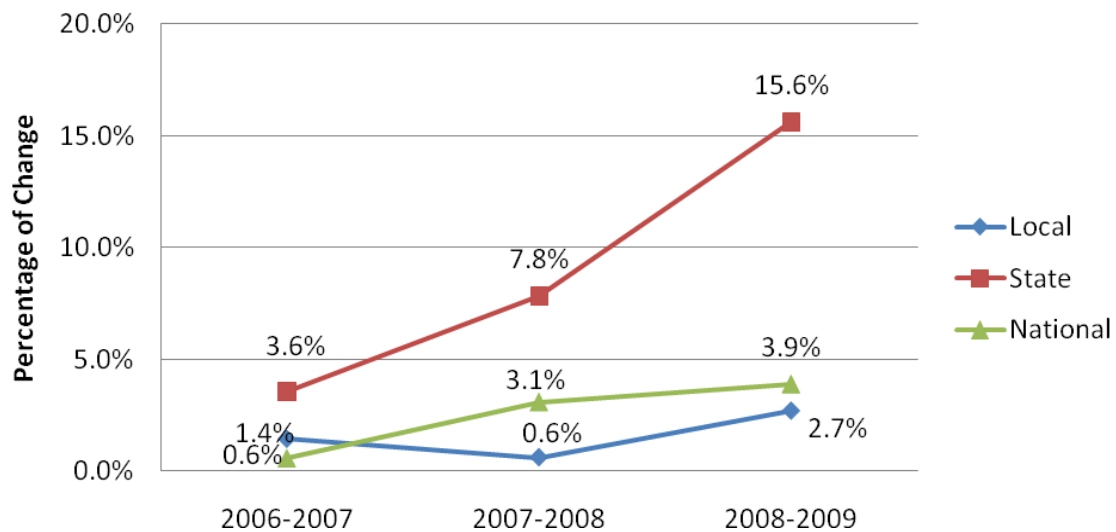


Figure 5. Percentage of change in the number of children meeting the Effgen, et al. (2007) criteria from 2005-2006.

Regardless of the strategy used for calculating staffing needs and the resources expended to provide OT and PT services, school districts across the country are facing the challenges of a shortage of available personnel to provide these services (Texas Education Agency, Office of Special Education Programs, 2001; The Center on Personnel Studies in Special Education, 2004). In a series of public meetings held by the Texas Education Agency in 2001, several of the public comments made by parents, teachers, and special education administrators included concerns regarding the limited availability of OT and PT personnel to provide the recommended services for children (Texas Education Agency, Office of Special Education Programs, 2001). Since that time the provision of related services has been included in the state's continuous improvement plan monitoring the delivery of related services in school districts across the state. In the school district of this study during the first

year of the study, the shortage of qualified OT and PT service providers was exemplified in that the district had approved 30 OT and PT positions, but was only able to fill 21.1 of these positions due to a shortage of available personnel to hire.

Therefore, with the number of children who potentially require OT and PT services increasing in schools, the potential decline in available funds, and the shortage of available personnel to provide these services, it is important to use these personnel resources efficiently and effectively. It is also important to recognize that public school districts, being funded through federal, state, and local tax dollars, are accountable to the taxpayers to demonstrate fiscal responsibility with the tax dollars provided to meet the public education needs of children.

Background Information

In the 2005-2006 school year, a systems review of the OT and PT services provided in a large urban school district in Texas identified an excess amount of OT and PT service time expended to respond to inappropriate referrals generated by campus personnel. To further investigate the referral activity, an exploratory analysis of referrals received in the 2005-2006 school year requesting OT and/or PT services in the school district was performed. Of the 141 referrals received in the first 30 days of the 2005-2006 school year, 83 (59%) were submitted without providing a reason for the referral. These referrals are included in Table 1 to provide the overall distribution of the referrals received, but due to the incompleteness of these referrals they could not be rated and so are identified in an “Unrated” category. Providing a reason for referral is an important part of the process of generating a referral because it clarifies the specific need to be addressed both for the individuals generating the referral and for those who are to coordinate a response to the

referral. The remaining referrals were reviewed by 20 of the OT and PT service providers working in the school district to determine if the reason for referral indicated by the referring campus personnel reflected an appropriate referral. In this preliminary review, a referral was considered appropriate if at least 50% of these service providers agreed it was appropriate. Of these referrals, 32 (23%) were identified as appropriate and 26 (18%) were identified as inappropriate (see Table 1).

Table 1: Number of Referrals Received in the First Thirty Days of the 2005-2006 School Year Rated Appropriate or Inappropriate by at Least 50% of the Therapy Personnel (*N* = 141)

Ratings	# of Referrals	Percentage
Clearly Appropriate	32	23%
Inappropriate	26	18%
Unrated (incomplete referral - no reason for referral provided)	83	59%

Based on a review of referrals categorized as inappropriate, the OT and PT service providers determined that in general, the campus personnel generating referrals did not understand the role of OT and PT services as a related service in schools. The group identified categories of inappropriateness that were common across these referrals. Table 2 provides the distribution of the referrals across the categories of inappropriateness.

Table 2: Number of Ratings in Each Sub-Category of Inappropriate for the Referrals Received in the First Thirty Days of the 2005-2006 School Year (*N* = 141)

Sub-Categories of Inappropriate	^a # of Ratings	Percentage
Medical or Clinical Focus	112	10%
Campus Level Intervention Needed	193	17%
Not Aligned with Eligibility	74	6%
Not Screened Before Referral for Evaluation	144	12%

^aA referral could be given more than one rating

In some of the referrals (10%), it appeared that the campus personnel interpreted the services similarly to medical services provided in clinical therapy settings. OT or PT services are provided in clinical settings to improve a child's functional performance by remediating or rehabilitating the degree of impairment the child experiences as a result of disability. In school settings these services are provided when "required to assist a child with a disability to benefit from special education" (20 USC 1401§602.26 [A]). Further clarification of this difference will be provided in the chapter 2, the literature review.

In some referrals (17%), it appeared that campus personnel interpreted the services similarly to an instructional service because the reason for referral indicated a campus level intervention should have been provided prior to generating the referral. In Texas, OT and PT services are only provided as a related service, "which are developmental, corrective, supportive, or evaluative services, not instructional in nature, that may be required for the student to benefit from special education instruction and for implementation of a student's individualized education program" (TEC§29.002[2]). Further distinctions between an instructional service and a related service will also be presented in chapter 2.

As a result of this preliminary analysis, in spring 2006 and through fall 2006, training was provided for the district level special education coordinators and campus level special education department chairpersons on utilizing an education based decision making process when considering the need to refer a child for OT or PT services at school (intervention one). This decision making process was based on the “Determination of Educational Need: Question Sequence” proposed by Polichino (2001, p. 2). Additionally, to reinforce the use of this decision making process, the referral form used by campus personnel to generate a referral was modified to replace the “Reason for Referral” section of the form with three response areas. Using this modified form, campus personnel were to indicate the:

- Curriculum area or educational goal to be addressed by the referral,
- Barrier(s) that exist(s) preventing the child from achieving the goal, and
- Strategies or campus level interventions that had been previously tried to support the child's achievement on that goal.

This form was introduced in spring 2006 and fully implemented in fall 2006 (intervention two).

A review of progress completed at the end of the 2006-2007 school year, supported the interventions as effective practices based on anecdotal reports, but the problem of inappropriate referrals persisted. In the first 30 school days of this school year, 101 referrals were generated by campus personnel for OT and/or PT services. Of these referrals 13 were submitted without indicating a reason for referral and 8 provided a very scant reason (e.g., handwriting, consent for consult). The impact of the first two interventions appeared to only reach a portion of the campus personnel who generated referrals. A need was identified to more directly support classroom teachers with a proactive response to address the concerns

the teachers experienced in the classroom at the time the concerns occurred as opposed to reacting to receipt of a referral. The team of OT and PT service providers working in the school district proposed that time spent on responding to inappropriate referrals could be better spent providing this proactive classroom based support service.

In the 2007-2008 school year, the classroom based support service delivery model was implemented in the preschool program for children with disabilities (PPCD) classrooms (intervention three). This model was expanded to support all self-contained special education classrooms (life skills classrooms, classrooms for children with multiple impairment, and structured learning classrooms) in the 2008-2009 school year. In this model, an OT or PT service provider would provide support to the classroom as a whole one time per month regardless of whether a child had been identified in that classroom as requiring OT or PT as a related service. This service differed from a child specific service as it was not designed to target the goals and objectives of an individual student, but to assist the classroom personnel to incorporate sensory and motor skills in instructional routines as an instructional strategy to achieve curricular objectives. The classroom based support service delivery model was designed to capitalize on the benefits of school based therapy consultation services reported in the literature. These benefits will be expounded upon in the literature review.

The prior study investigated the change in the proportion of appropriate and inappropriate referrals for OT and PT services after the implementation of the above described interventions. This analysis supported each of these interventions as effective strategies to improve the appropriateness of referrals generated by campus personnel for OT or PT services. The proportion of appropriate referrals received across the four years increased ($\chi^2[3, N = 4896] = 241.11, p < .01$). Using logistic regression analysis

incorporating generalized estimating equations, the researchers identified that the likelihood for a referral to be rated appropriate increased by six and a half times in the 2008-2009 school year compared to the 2005-2006 school year. The likelihood a referral would be rated appropriate increased by two times for referrals received in the 2006-2007 or the 2007-2008 school years (see Table 3).

Table 3: Parameter Estimates of Year as a Predictor of an Appropriate Referral Rating

^a Year	Odds Ratio		95% Wald Confidence Interval for Exp(B)	
	<i>B</i>	Exp(B)	Lower	Upper
2008-2009	1.89	6.62**	5.14	8.54
2007-2008	1.10	3.02**	2.36	3.86
2006-2007	1.28	3.60**	2.86	4.54

^aCompared to the 2005-2006 school year

** Significance $p < .01$

(Goodrich, Hawkins, Burrige, & White, 2009)

The prior study supported the continued use of the three interventions to facilitate more appropriate referrals. The prior study did not address if in the years of increase in appropriate referrals, a change also occurred in how OT and PT service providers utilized their time. The researcher asserted that the high number of inappropriate referrals received for OT and PT services unnecessarily expended OT and PT service time that could have been spent providing other services that would be more beneficial to children.

The current study is designed to measure change in the proportion of time OT and PT service providers spent in various activities that are a part of their work responsibilities. The data for this study are historical data that were submitted by the OT and PT service providers

across the years, where the service providers coded each 15 minutes of their workdays for the month of February as spending time in one of the several category options provided for that year. A complete description of each of these categories is provided in chapter 3, the methodology section. A target outcome of this study is to investigate if a change occurred in the proportion of time OT and PT personnel spent in performing various job functions across the years. Any change identified was anticipated to inform the researcher of shifts in time utilization across the OT and PT workforce for this school district across the same years when the increase in appropriate referrals was reported. An increase in time spent in providing screening, evaluation, or a service recommended as a part of a child's individualized educational program (IEP) would indicate an increase in the utilization of these services to support specific children to improve their functional participation in the classrooms and progress in the IEP (more information on the IEP development process is provided in the literature review). An increase in service provider time spent addressing the needs of specific children would indicate a positive shift in time utilization as more time was spent in providing individualized services for children.

The number of children who received an individualized service across the years varied (see Table 4).

Table 4: Summary of # of Child Specific Services Provided Across the Years

Category of Child Specific Service	2005-2006	2006-2007	2007-2008	2008-2009
IEP Recommended Service				
OT	283	406	418	473
PT	199	251	346	334
Total	482	657	764	807
New Referrals				
OT Screening	50	405	374	245
PT Screening	40	232	222	141
OT Consultation	374	NA	NA	NA
PT Consultation	198	NA	NA	NA
Total Children Referred for				
Screening/Consultation	662	637	596	386
OT Evaluation	116	71	184	52
PT Evaluation	35	27	93	25
Total New Children Referred	813	735	873	463
Total Children Served	1295	1392	1637	1270

Note. NA = not applicable because of the change in the referral process from a consultation and evaluation model to a screening and evaluation model.

Table 4 also reflects the transition from a referral system ending in the 2005-2006 school year that provided an avenue for campus teams to refer a child for a consultation or an evaluation for OT or PT services to a system initiated in the spring of 2006. This new system provided only an avenue for campus teams to refer a child for a screening by OT or PT

services. We already have evidence that after this change occurred, the referrals generated by campus teams increased in appropriateness. But with this transition or change, it is unknown whether OT and PT personnel experienced a change in the proportion of time they spent in responding to these referrals. The anticipated benefit of channeling the referrals through a screening process was not only to increase the appropriateness of referrals but also to decrease the amount of time therapists spent in completing unnecessary evaluations, thereby allowing them to spend their time in more productive areas. These data do not accurately reflect the total number of evaluations that were performed by the OT and PT staff because these numbers only represent the referrals. When a screening process progressed into an evaluation it was not represented in these data. Therefore, it is the time utilization data that will inform the researcher of the difference in the variation of time that therapists spent in the evaluation process.

These data also indicate that more children received IEP recommended services across the years. But is this a reflection of the school district's ability to fill more of the available staff positions (see Table 5) or did the average proportion of time personnel spent in providing services for children actually increase?

Table 5: Number of Filled Service Provider Full Time Equivalents (FTE) by Year and Profession

Profession	2005-2006	2006-2007	2007-2008	2008-2009
Occupational Therapists	11.4	9.8	13.7	14.7
Occupational Therapy Assistants	4.0	4.6	4.0	6.1
Physical Therapists	4.7	5.5	4.8	7.0
Physical Therapy Assistants	2.0	2.0	2.0	5.0
Total FTE	22.1	21.9	24.5	32.8

An increase in time spent in providing campus or classroom based support services would indicate an increase in the utilization of these services to support the classrooms that serve the children requiring the largest amount of special education support in this school district. The benefit of this service delivery model is reported in the literature and is further described in the literature review.

Differences across the years in time utilization by the OT and PT personnel in the categories that do not directly relate to serving children is also of interest. Categories such as the amount of time personnel spent in travel throughout this large school district and the amount of time personnel spent in completing district required paperwork are of interest. Therefore, the following research questions are posed:

1. Did the proportion of time spent in various work related activities as reported by OT and PT service providers in a large urban school district change over time when the appropriateness of referrals were reported to increase?

2. If a significant difference is found, what variables can be identified as predictors of the change? (year, profession)

Hypotheses

H_1 = A significant difference occurred in the amount of time spent in various work related activities as reported by the OT and PT service providers.

H_0 = No significant difference occurred in the amount of time spent in various work related activities as reported by the OT and PT service providers.

Chapter II. Review of Related Literature

The provision of OT and PT services to support children with special needs in schools is required by federal and state legislation. The services provided in public schools are different from the services that parents, teachers, and administrators may be familiar with in medical settings. To provide these services, OT and PT practitioners spend time engaged in activities directly and indirectly supporting children. These activities are defined by the boundaries of state licensing requirements, the best practices reported in the literature, and the continuum of services defined by the school district. The proportion of time service providers spend in each activity across a month provides a portrait of how the personnel resources (i.e., time and talent) are expended to provide these services. This portrait provides a means by which to conceptualize and measure change in how these resources were utilized across the years when the number of appropriate as opposed to inappropriate referrals received for these services increased.

Providing OT and PT Services Under the IDEA

The federal legislation requiring states and local education agencies to provide OT and PT services for the children who need them to assist them to benefit from special education is the IDEA, which was last reauthorized in 2004. Under the IDEA, a child may receive any of four general categories of services: special education instructional services, related services, supplementary aides and services, and modifications and accommodations. Under the IDEA, OT and PT services are in the category of related services.

In order to be eligible for these services, a child must first be evaluated by a qualified professional (e.g., licensed school psychologist, educational diagnostician) and be identified as a child with a disability as defined in the IDEA (20 USC 1401§602.3). This means that

through educational evaluation, the child is identified to meet the eligibility criteria for at least one of the disability categories provided in the IDEA and qualifies for services with an educational need for services. This two-step process (i.e., eligibility and qualification) means that a child could have a disability identified through a medical model but not have a disability in an educational model. It also means that a child could have a disability but not require special education and related services to progress in the educational program. For example, a child could have a medical diagnosis of muscular dystrophy but fully and independently participate in the general education program without the need for special education supports. In this scenario, the child meets the eligibility criteria as a child with orthopedic impairment under the IDEA, but because no educational need for special education services is identified, the child does not qualify for special education and related services under the IDEA. In order to receive an OT or PT service at school, a child must first meet eligibility for and qualify for special education and related services.

Once a child has completed this evaluation process and he or she has met eligibility criteria and qualified for special education and related services, he or she is eligible for all special education and related services that are necessary for the child to receive educational benefit. The question becomes one of determining what services are necessary. Five categories of educational supports or services are available to a child with a disability in IDEA funded educational programs: special education instructional services, related services, supplemental aides and services, modifications, and accommodations (see Figure 6).



Figure 6. Five categories of services available to a child who has met his or her state’s criteria for eligibility and qualification for services provided under the IDEA

The supports and services included in each of these five categories can vary from state to state. For example, most states identify speech therapy services as a related service. In Texas, speech therapy services can be provided as a related service or an instructional service (19 TAC §89.1131 and 2 TEC §42.151). Additionally, some states identify OT services as a designated instructional service or a related service, but in Texas OT services are only provided as a related service. Additionally, in Texas a related service is clearly to be provided to supplement instruction and is not instructional in nature (TEC§29.002 and TEC§29.003).

When a child requires special education and related services, the individualized educational program (IEP) is developed that reflects the services and supports the child needs to advance appropriately toward attaining the annual goals, be involved in and make progress in the general education curriculum and to participate in extracurricular and other nonacademic activities, and to be educated and participate with other children with disabilities and nondisabled children (20 USC 1414§614(d)). After meeting eligibility requirements and qualifying for special education and related services, the next step in the process of accessing OT or PT services at school is to determine that the child requires the service in order to benefit from special education.

Key Points:

- Special education is not a place or an instructional setting, but is a set of services.
- While all services are available to support a child with a disability to receive educational benefit, only those services that are required for the child to receive a free and appropriate public education are incorporated into the child's specific IEP.

- While states differ in the services included under each service category, there is a distinction between instructional services and related services.
- In Texas, OT and PT services are only provided as related services. Related services are provided to supplement instruction and are not instructional in nature (TEC§29.002 and TEC§29.003).

Determining a Child's Educational Need as Opposed to Medical Need for OT or PT Services

To determine if a child requires OT or PT services at school to benefit from special education one must first understand how the services are defined under state practice acts or licensing boards and then understand how the educational as opposed to a medical need of the child is determined. OT and PT services include a broad range of services across multiple settings, including private clinics, hospitals, long-term care facilities, rehabilitation centers, and schools. Figures 7 and 8 provide the definitions of OT and PT services as stated in the Texas practice acts for these professions.

The practice of **Physical Therapy** is “a form of health care that prevents, identifies, corrects, or alleviates acute or prolonged movement dysfunction or pain of anatomic or physiologic origin.” (The Texas Physical Therapy Practice Act Adopted under the authority of Title 3, Subtitle H, Chapters 453, Occupations Code)

“In the educational setting, the physical therapist conducts appropriate screenings, evaluations, and assessments to determine needed services to fulfill educational goals.” (The Texas Physical Therapy Rules Adopted under the authority of Title 3, Subtitle H, Chapters 453, Occupations Code)

Figure 7. Definition of physical therapy practice as stated in the Texas Physical Therapy Practice Act and the Texas Physical Therapy Rule.

The general practice of **Occupational Therapy** includes:

- Methods or strategies selected to direct the process of interventions such as:
 - Establishment, remediation, or restoration of a skill or ability that has not yet developed or is impaired.
 - Compensation, modification, or adaptation of activity or environment to enhance performance.
 - Maintenance and enhancement of capabilities without which performance in everyday life activities would decline.
 - Health promotion and wellness to enable or enhance performance in everyday life activities.
 - Prevention of barriers to performance, including disability prevention.
- Evaluation of factors affecting activities of daily living (ADL) instrumental activities of daily living (IADL), education, work, play, leisure, and social participation, including:
 - Client factors, including body functions (such as neuromuscular, sensory, visual, perceptual, cognitive) and body structures (such as cardiovascular, digestive, integumentary, genitourinary systems).
 - Habits, routines, roles and behavior patterns.
 - Cultural, physical, environmental, social, and spiritual contexts and activity demands that affect performance.
 - Performance skills, including motor, process, and communication/interaction skills.
- Interventions and procedures to promote or enhance safety and performance in activities of daily living (ADL), instrumental activities of daily living (IADL), education, work, play, leisure, and social participation, including.
 - Assessment, design, fabrication, application, fitting and training in assistive technology, adaptive devices, and orthotic devices, and training in the use of prosthetic devices.
 - Assessment, recommendation, and training in techniques to enhance functional mobility including wheelchair management.
 - Driver rehabilitation and community mobility.
 - Management of feeding, eating, and swallowing to enable eating and feeding performance.
 - Application of physical agent modalities, and use of a range of specific therapeutic procedures (such as wound care management; techniques to enhance sensory, perceptual, and cognitive processing; manual therapy techniques) to enhance performance skills.

(The Texas Occupational Therapy Rules Adopted under the authority of Title 3, Subtitle H, Chapters 452 and 454, Occupations Code)

Figure 8. Definition of occupational therapy practice as stated in the Texas Occupational Therapy Rules.

Whether practicing in a medical setting or in a school setting, OT and PT service providers practice under the same definitions provided in the state practice acts and rules. This may lead to confusion for parents, school administrators and teachers in what to expect from an OT or PT service provided in a school setting. This potential for confusion is furthered by the differences in how states define the OT and PT services provided in schools. The Code of Federal Regulations (C.F.R.) allows states the flexibility to define a related service as special education (34 *C.F.R.* 300.39(b)(2)(ii)) which would then be provided to meet the unique needs of a child with a disability. When a child with a disability moves from one state that defines the services as special education to another state that defines the service as a related service, the recommendations for services provided in the public school may change. The difference is in the role of the service in the educational program. Special education is defined as specially designed instruction provided to meet the unique needs of a child with a disability (20 USC 1401§602.29). A related service is provided to assist the child to benefit from special education (20 USC 1401§602.26). Therefore, in some states, there may be overlap between services provided in public schools and services provided in medical settings, because both are addressing the unique needs of the child with a disability. In other states the distinction between services provided in schools and in medical settings is found in the whether the service is focusing on a unique need of a child or on assisting the child to benefit from special education. In Texas, OT and PT services are provided only as related services (TEC§29.002). These services focus on identifying strategies and designing interventions that can assist the child to overcome barriers that may be limiting the child's participation in (and thus benefit from) the instructional program provided by the classroom teacher.

Therefore, the educational need for a child to receive an OT or PT service in a public school in Texas is based on an evaluation process which begins with identifying if the child is benefitting from special education. If no, then the evaluator will consider if the additional support of an OT or PT service is required to assist the child to benefit from special education. This evaluation process is different from the process used in medical or clinical settings because clinically based services may seek to rehabilitate the level of impairment a child experiences as a result of disability. In the medical or clinical evaluation process, the therapist is seeking to identify if the child would benefit from an OT or PT service. In a medical or clinically based evaluation process, the evaluator may ask the following sequence of questions to determine the child's medical need for OT or PT services:

- What is the nature of disability for this child?
- How is disability impacting functional participation in life activities?
- Can the level of impairment be remediated or rehabilitated (based in evidence) to achieve improved functional participation in life activities?
- If yes, what intervention / therapeutic approach (based in evidence) will best address the identified need?
- Is OT or PT service required (based in evidence) to achieve the targeted outcome?

(Adapted from Goodrich, et al. 2009)

In a school based OT or PT evaluation, the evaluator is identifying if the child requires the additional support of an OT or PT to benefit from special education. A

school based OT or PT evaluator might use the following sequence of questions to determine if the child has an educational need for the service:

- Is the child currently “benefiting from special education”?
- What is the educational program and curriculum (e.g., the demands on the student)?
- What special education supports are in place (e.g., co-teaching, modifications)?
- Are the supports meeting the student’s educational needs (e.g., level and type appropriate)?
 - If not, what is the barrier that is limiting the child’s current or potential benefit from the program and is it a barrier that would be best addressed by OT or PT as a least restrictive support?
 - If yes, what strategies and solutions (based in evidence) can OT or PT offer the student, the teachers, and others?
- Is OT or PT expertise required (based in evidence) to provide the necessary support?
 - If yes, what intensity of services is needed from OT or PT (e.g., time, frequency, duration, location)?

(Adapted from Polichino, 2001)

Because the question asked in the school based evaluation process differs from the medical or clinical evaluation process, the outcome may differ. For example, a child with an orthopedic impairment requiring the use of a wheelchair for mobility throughout the school setting may require physical therapy services in the medical setting to rehabilitate or

remediate the degree of disability the child experiences as a result of the orthopedic impairment. But, in the public school setting, the same child may have independent mobility with the wheelchair and so access and participate in the school environment and instruction independently. In this scenario, the student would have a medical necessity for physical therapy services but not an educational need for physical therapy services at school.

In collaboration with classroom teachers, OT and PT service providers working in schools identify barriers that limit a child's participation in classroom and school related activities and provide teachers and other school personnel with strategies to adapt the activities to address identified barriers and support the implementation of the child's IEP. OT and PT service providers may also support classroom personnel in implementing assistive technology to support student success, and support campus teams in designing alternative assessments, relevant instructional programs, and transition plans. In providing these services, OT and PT practitioners spend time engaged in activities that are defined within the boundaries of state licensing requirements, by best practices reported in the literature, and by the continuum of services defined by the school district. These activities are used in this study to provide the structure for documenting and measuring change in how OT and PT service providers spent time during their workdays across the four years of this study.

OT and PT Activities Defined by State Licensure Requirements

In Texas these personnel are licensed by the Executive Council of Physical Therapy and Occupational Therapy Examiners (ECPTOTE). Personnel may be licensed as a therapist or a therapy assistant based on educational degree status. Under these licensing requirements, an OT service may be provided by an occupational therapist or an occupational therapy assistant (OTA) under the supervision of an occupational therapist. PT services may be

provided by a physical therapist or by a physical therapy assistant (PTA) under the supervision of a physical therapist. There is clear role delineation between a therapist and an assistant. While an assistant may assist in the data collection process for an evaluation, an OT or PT evaluation can only be performed by a licensed therapist. Similarly, an OT or PT plan of care can only be developed by a licensed therapist based on formal evaluation, but the licensed assistant may participate in the data collection process measuring the child's progress in the plan of care (Texas Board of Occupational Therapy Examiners, Occupational Therapy Rules §372.1(d)4; Texas Board of Physical Therapy Examiners, Physical Therapy Rules §322.1(b)3 & (c)4). In schools this plan of care is incorporated into the child's IEP when services are needed for the child to participate in the educational program. These role delineations will be referred back to in the data analysis section as some of the activities analyzed in the data pertain only to therapists (e.g., screenings and evaluations).

OT and PT Activities Defined by Best Practices

Once the IEP is developed and the educationally necessary services are identified, services may be provided using various service delivery models which contribute to the differences in the activities OT and PT personnel engage in during their workday. Service delivery models may vary in definition between states and local educational agencies. Table 6 provides common definitions of typical service delivery models across states for related services in schools. A distinctive factor in these service delivery models is whether the services are provided directly with the child or on behalf of the child. The IDEA specifies that services can be provided in either model but must be specified in the child's IEP (20 USC 1414§614(d)).

Table 6: Common Related Service Delivery Models and Definitions

Service Model	Definition
Consultative	Services provided on behalf of a child whereby the service provider consults with other school or community based personnel or family members.
Direct	Services provided directly with the child targeting the child's progression on specified goals and/or objectives.
Indirect	Services provided on behalf of the child. The child is not present when the services are provided.

The literature identifies consultative practices and services provided in naturalistic settings as preferred practices for related services (Barnes & Turner, 2001; Dole, 2004; Sayers, 2008). Citing the increasing attention paid to supporting children in the least restrictive environment and the importance of minimizing the amount of time children are removed from the instructional setting, Gutkin (1996) noted an increase in consultative services provided across several related services. To allow for frequent repetition and reinforcement of new skills, McWilliams (1995, 1996) reported the importance providing related services in naturalistic settings. In a critical appraisal of the evidence regarding consultative services provided by occupational therapists in schools, Sayer (2008) reported, "Both direct 1:1 intervention and consultative services provide effective methods for facilitating students' functional performance and goal achievement; Consultation with classroom teachers is essential for ensuring carryover of interventions in the child's natural setting; Teachers report positive perception and increased understanding of OT's role when

classroom based models are employed; And, the use of blended models including direct 1:1 services, group intervention, and consultative methods allow therapists to tailor intervention to match the individual needs of each student” (p. 178). These benefits of consultative practices for related services provided the foundation for the development of the classroom based support services that were initiated in the school district in this study in the 2007-2008 school year and expanded in the 2008-2009 school year.

To determine the service delivery model and the intensity of services required, Effgen and McEwen (2007) state, “therapists make judgments regarding intervention based on evidence and the timely monitoring of the child’s responses and progress in achieving the anticipated goals” (p. 5). They (2007) cite the *Guide to Physical Therapist Practice* (APTA, 2001) to provide several factors that influence the decisions physical therapists make regarding service model and intensity of services (See Figure 9).

Factors that Influence the Complexity, Frequency, and Duration of Physical Therapy Intervention and the Decision-Making Process

- accessibility and availability of resources
- adherence to the intervention program
- anatomical and physiological changes related to growth and development
- caregiver consistency or expertise
- chronicity or severity of the current condition
- cognitive status
- comorbidities, complications, or secondary impairments
- concurrent medical, surgical, and therapeutic interventions
- decline in functional independence'
- level of physical function
- living environment
- multisite or multisystem involvement
- nutritional status
- overall health status
- premorbid conditions
- probability of prolonged impairment, functional limitations, or disability
- psychosocial and socioeconomic factors
- psychomotor abilities
- social support
- stability of condition

APTA (2001), p.47

Figure 9. Factors that influence the decisions physical therapists make regarding service model and intensity of services (Effgen and McEwen, 2007).

This list of factors includes child specific abilities and needs (e.g., anatomical and physiological changes related to growth and development, nutritional status, overall health status, etc.), environmental supports and barriers, (e.g., living environment, social support, etc.) and available resources (e.g., accessibility and availability of resources, caregiver

consistency and expertise, etc.). To discern the related services that will assist the child to benefit from special education requires the consideration of all of these factors.

Key Points:

- Related services may be provided directly with the child or on behalf of the child.
- The type of service delivery model and the intensity of services provided by a related service must be specified in the child's IEP.
- Factors related to the child, the environment, and the available resources are all considered in discerning the type and intensity of related services a child requires to benefit from special education.
- Related services incorporating consultation practices, collaboration with classroom personnel and classroom based models increase generalization of skills of both the child and classroom personnel across classroom and school settings.

OT and PT Activities Defined by the Continuum of Services Provided in the School District

In addition to the boundaries established by the state licensing requirements, and the best practices reported in the literature, the activities OT and PT service providers engage in are defined by the continuum of OT and PT services provided in the school district. The school district of this study currently provides a continuum of OT and PT services, including classroom based support services provided for all children receiving instruction in a self contained special education setting, screenings for instructional purposes for all children meeting eligibility and qualification criteria for special education and related services, evaluations for children with disability where an educational concern has been identified that may require the expertise of an OT or PT practitioner to address, and child specific services

which are based on evaluation and recommended through the ARD/IEP process. Figure 10 provides a description of each of these services. These descriptions of the various services provided by OT and PT service providers in this school district also provide an overarching delineation between the various activity categories the service providers used to report how their time was spent during the workdays reported in this study.

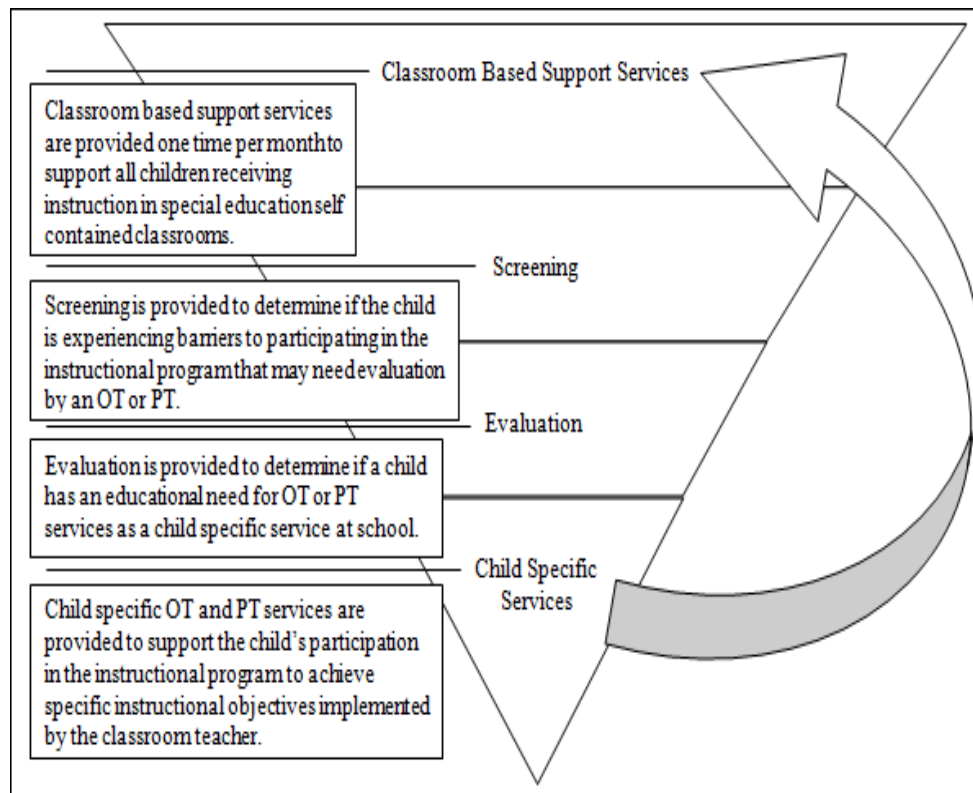


Figure 10. Continuum of OT and PT services provided in the school district.

Classroom based support services are designed, initiated, and implemented in collaboration with classroom personnel. These services are never intended to focus on one specific child but are provided to support the general integration of sensory and motor skills as a foundation to each student's full participation in the instructional program. These services are offered as a support to the classroom personnel and are provided at the discretion

of the classroom teacher. Different from a child specific service, classroom based support services are provided to address the sensory and motor skills development of all children in the classroom. These services are an integrated component of the program and not an individualized service included in a child's IEP.

Screening for instructional purposes is defined in the IDEA as, "the screening of a student by a teacher or specialist to determine appropriate instructional strategies for curriculum implementation (and) shall not be considered to be an evaluation for eligibility for special education and related services." (20 USC 1414§614(a)) A screening by OT or PT services is requested for a specific child when a member of the child's IEP team identifies a potential need for the child to receive the additional support of an OT or PT at school. To identify this potential need, a teacher, parent, or school administrator is requested to review the child's progress in the identified IEP goals and objectives, use measurable data to determine if there are barriers limiting the child's progress in the identified goals and objectives, and to consider campus based supports that may address the identified barriers.

To complete a screening, the OT or PT practitioner reviews the educational program to understand the strategies currently being implemented to support the child's progress. As a result of this screening process, the OT or PT practitioner may provide suggestions for the campus team to consider to adapt the current program; provide training for campus personnel to support implementation of the IEP; determine that the current program is appropriately implementing the current IEP such that no additional support is needed from OT or PT; or, recommend an OT or PT evaluation. If in the process of providing a screening, the OT or PT practitioner identifies barriers that limit the child's participation and benefit from the educational program, and identifies that these barriers may need to be addressed by OT or PT

services, the OT or PT practitioner will recommend the child be referred for an OT or PT evaluation.

Evaluation by OT or PT services is only provided upon receipt of written consent by a child's parent or legal guardian. Evaluation must occur before the initial provision of the related service. Evaluation is used "to determine whether a child is a child with a disability ...and to determine the educational needs of such child" (20 USC 1414§614(a)). The OT or PT evaluation process begins with the therapist observing the student in the classroom environment, consulting with the classroom personnel and the child's parents, and consulting with others (e.g., private therapy providers) with the parent's consent. In gathering this information, the therapist will determine the child's current level of functional participation in the school setting and if more information is needed, additional testing may be administered. In the process of evaluating a child's need for services at school, the OT or PT evaluator will take into account the child's current educational program and special education supports in place, how the current supports are meeting the child's educational needs and if additional support is needed. If additional support is needed, the OT or PT will determine if an OT or PT service is required to provide the support or if there is a less restrictive means of supporting the child. These less restrictive supports may include strategies and solutions that the child, classroom personnel, or the child's parents can implement to support the child's full participation at school.

In the school setting, if, as a result of evaluation, a level of ongoing support from an OT or PT practitioner is determined as the least restrictive approach to address the child's needs, the evaluating therapist will recommend to the IEP committee the child specific services including time, frequency and duration of services necessary to address the

instructional objectives requiring support. Child specific OT and PT services are provided when, in the development of a child's IEP and as a result of evaluation, the services are determined necessary for the child to benefit from special education. Child specific services are provided using an array of service delivery models all of which are provided within the context of the instructional setting.

The integrated service delivery model provides services directly with the child, or on behalf of the child. In this service delivery model, service providers frequently transition between working directly with the child and working on behalf of the child. A service provider will commonly work directly with a child to ascertain an appropriate strategy to facilitate the child's progression toward the identified instructional objectives. A service provider will commonly work on behalf of the child to train classroom personnel, speech language pathologists, and others who support the child at school to implement a successful strategy, or to consult with medical personnel, parent(s), and/or community supports. This service delivery model occurs within the context of the naturally occurring instructional program and therefore does not alter the child's receipt of instructional services.

The collaborative service delivery model is used when services are indicated to be provided in collaboration with other supports and services. In providing these services the service provider may work directly with the child, or on behalf of the child. When working directly with the child in a collaborative model, the service provider is commonly working alongside another member of the child's IEP team to develop strategies in concert with the strategies that are implemented through other supports and services. For example, many times children receiving instruction in structured learning classrooms (SLC) benefit from highly structured routines that may be designed by the classroom teacher, an autism

specialist, or a behavior support professional (Schopler E., Mesibov G. B. & Hearsey K., 1995). In collaborating with these professionals, the service provider develops strategies that compliment the highly structured routine.

Child specific services provided by OT service providers in the school district of this study most commonly include developing sensory motor routines that support a child to functionally participate in the instructional activities presented in the classroom. These services may include training for campus teams to implement developmentally appropriate fine motor activities as an integrated component of the instructional program. Training for campus teams may be provided to facilitate the development of computer skills as a written production strategy for a child or to foster the development of computer access skills for children who may not use traditional methods to utilize the classroom computer. OT service providers may be asked to design feeding management plans for the child who presents a safety concern while eating at school.

Child specific services provided by PT service providers in the school district of this study most commonly include collaboration with classroom personnel to identify and set up alternative positioning programs for a child. These programs are designed to assist the child to functionally participate in the instructional activities presented in the classroom. PT practitioners may develop mobility routines that can be implemented by classroom personnel as an integrated component of a child's daily instructional routine to facilitate the child's increasing independence in mobility in the classroom and at school. Training for campus teams may be provided to implement physical transfer techniques that are safe for both a child and the campus team. PT practitioners may also train campus teams to facilitate the

development of computer access techniques for a child who does not use traditional methods to access the classroom computer.

These integrated and collaborative services are considered best practice in assisting a child to address barriers limiting his or her participation in and benefit from the educational program (Barnes & Turner, 2001; Dole, 2004; Sayers, 2008). In providing these services, OT and PT practitioners will consult with the child, the child's parent(s), and the campus support team to monitor the child's progress. The instructional objectives the OT or PT service support are updated by the classroom teacher in collaboration with the therapist. Prior to the annual IEP committee review, for each child who receives OT or PT services, the OT or PT will update the child's present level of functional performance in the school setting from which recommendations are developed for the upcoming school year. This update is completed focusing on the child's participation in and benefit from the instructional program. A summary of this update is reviewed with the IEP committee.

When barriers that were identified in the OT or PT evaluation process are addressed, the student no longer requires the OT or PT services at school. The recommendation to dismiss a student from OT or PT services comes from the therapist based on the child's present level of academic achievement and functional performance, IEP goals and objectives, and special education supports provided on the campus. When the child is dismissed from the child specific services, he or she will continue to receive the classroom based support services if the child receives instruction in one of the self-contained special education programs offered by the school district. If the needs of the child or supports provided the child change after a child is dismissed from OT or PT services, and the campus team experiences difficulty in addressing the child's needs, a screening can be requested again to

review the educational program and consider the need for evaluation and potential need for reinstating the services. Figure 10 provides a diagram of the continuum of OT and PT services provided in the school district of this study and portrays the flexibility and flow of supports the services are designed to provide.

Measuring Change

With an understanding of how OT and PT services are provided in school settings and a conceptualization of the activities OT and PT service providers engage in throughout the work day, we now transition to considering how to measure if the services became more efficient across the years. Approaches described in the literature for measuring efficiency from a systems perspective in public systems have been broad. There is an expanding interest in public systems benefitting from private industry innovations through performance based contracting (Chapin & Fetter, 2002) and debates over privatizing public education and publicizing health care (Gollust & Jacobson, 2006). The most common approaches have focused on investigating the effectiveness of resources expended for specific interventions on targeted outcomes. These studies have generally focused on the material cost to provide an intervention and the impact of the intervention on a disease process or a measure of standardized achievement.

For example, Nichol, et al. (2003) investigated the cost effectiveness of placing defibrillators in public settings, measuring the costs of placing and maintaining the devices against the increase in survival rate after cardiac arrest and costs of health care expenses post cardiac arrest. To use this model in the current study we would measure change in the school district's expenditures for OT and PT personnel to provide the services (material cost to provide the intervention) for each school year across the years of the study compared to

change in the appropriateness of referrals identified in the prior study, or change in the disability process experienced by the children addressed in the referrals, or change in the academic achievement for the children addressed in the referrals (impact of the interventions).

To complete a cost/benefit analysis of the district's expenditures compared to the proportion of change in appropriateness of referrals is not appropriate because not all available positions for OT and PT service providers could be filled in the first and second years of the study (due to the national shortage of qualified personnel available to hire). Measuring the change in cost compared to the change in appropriateness of referrals would only represent the ability of the district to fill these positions which increased the district's expenditures across the years, but did not represent an appropriate number of available work hours used in effective practices. The school district in this study started the years of this study with a higher ratio of staff to student population than what had been identified as an average for the state.

Effgen, et al. (2007) report a strategy for measuring the OT and PT services staffing in a school district by identifying a ratio of the number of service providers to the number of students in the school district identified with one of six different disability categories: multiple disabilities, orthopedic impairment, mental retardation, developmental delay, traumatic brain injury, or autism. Using these criteria, they identify a large variance across the nation in the staffing ratios for school based OT and PT service providers. For Texas, they identify a ratio of 1 OT service provider for every 122 students and a ratio of 1 PT service provider for every 240 students. Table 7 provides the staffing ratio for the school district in this study across the years of the study using these criteria. This staffing ratio did

improve across the years of the study, but this is not interpreted as a result of any of the interventions related to this study.

Table 7: The Number of OT and PT Service Providers and the Number of Students Meeting the Effgen, et al. (2007) Criteria

	2005-	2006-	2007-	2008-
Descriptive Category	2006	2007	2008	2009
<hr/>				
Occupational Therapists and Occupational Therapy				
Assistants	15.4	14.4	17.7	20.8
Physical Therapists and Physical Therapy Assistants	6.7	7.5	6.8	12.0
⁵ Estimated Total # of Students Meeting the Effgen, et				
al. (2007) Criteria	2,931	2,973	2,949	3,010
Number of Students per OT Service Provider Using				
the Effgen, et al. (2007) Criteria	190.3	206.8	166.6	144.7
Number of Students per PT Service Provider Using				
the Effgen, et al. (2007) Criteria	437.5	437.2	230.4	250.8

It is also not appropriate to complete a cost/benefit analysis comparing the district's expenditures to a measurable change in the disease process experienced by the children addressed in the referrals. This is because, different from providing a clinically based OT or PT service, there is no defined disease process to be addressed when providing a school

⁵ The number of students meeting these criteria is estimated because this school district's data does not separate the number of students in the multiple disabilities category from the students in the other categories. It is assumed that these students would be included in one of the other categories. At most this portrays an underestimation of students which further accentuates the point that the staffing ratio in the school district was significantly less than the ratio reported as the state average.

based service and there is not a specific set of disability related criteria that is considered more appropriately addressed by an OT or PT in a school setting (Goodrich, et al. 2009). In a special education program general categories of disability take on unique characteristics with each individual and with each educational program. In fact, it is because of the individualized nature of disability in education that federal legislation mandates each educational team to develop an IEP for each child with a disability (20 USC 1414§614[d]). Additionally, the role of the related service of OT or PT in a school setting is not necessarily to remediate or rehabilitate the degree of disability a child experiences at school, but to improve the child's ability to participate in the instructional program and thus benefit from the instructional activities that have been designed by a certified teacher.

Similarly, it would be inappropriate to complete a cost/benefit analysis comparing the district's expenditures for OT and PT services to a change in the academic achievement of the children represented in the referrals. The direct link between a referral for OT or PT services and a child's academic achievement cannot be isolated. OT and PT services are provided to address the child's participation in special education with the assumption that the instructional program is designed for academic achievement.

Therefore, the researcher proposed that the changeable commonalities to measure the efficient utilization of these related services are found in how time is spent by these service providers during the work day. How time is spent, the time it takes to cycle from request to response, the actions on which time is focused are all key process measures to drive improvements in work systems (Baldrige National Quality Program at the National Institute of Standards and Technology in Gaithersburg, MD). The data used in this investigation reports the actions on which time was focused. The researcher specifically investigated

change in the proportion of time OT and PT practitioners spent in providing screening and evaluation services, providing campus or classroom based support services, and in travel. It was anticipated that time spent in providing screening services would increase and that time spent in providing evaluation services would decrease due to the implementation of the screening procedure and the decrease in the inappropriate referrals generated across the years. This could be interpreted as an increase in efficiency because to complete a screening process in general requires less than two hours, whereas an evaluation process requires a minimum of eight hours to complete. It was also anticipated that time spent in providing campus or classroom based support services would increase because this service model was formalized in the third year of the study and expanded in the fourth year of the study. This could also be interpreted as an increase in efficiency because of the general benefits reported in the literature when OT and PT services are provided using a consultative model in naturalistic settings (Barnes & Turner, 2001; Dole, 2004; Sayers, 2008).

The use of time as a measure of efficiency or effectiveness of school practices has been reported in the literature from two perspectives: the effectiveness of time management practices used by school administrators (Bridges, 1982; Patterson, 1985, Robertson, 1999), and the effectiveness of interventions designed to change how time is utilized (Scott and Barrett, 2004). In the current study, the researcher considered time from each of these perspectives as the change in how time was spent across the years by the OT and PT practitioners was investigated. Changes in the proportion of time spent engaged in various activities across the years was of particular interest as some services were provided to directly support children whereas other services (e.g., travel) were necessary services but did not directly impact children. From a systems perspective, change in the proportion of time

spent in various activities across the same years when there was an increase in the appropriateness of referrals generated by campus personnel for these services was anticipated to further inform the researcher of the effectiveness of interventions implemented to improve the referral process used in this school district. Therefore, change in the proportion of time OT and PT service providers reported spending in each activity category across the years of the study was used to portray how district resources (personnel time and talent) were used to provide these services.

Chapter III. Methodology

This study was approved through the University of Houston's institutional review process and the school district's research department. The researcher conducted a longitudinal analysis using historical data submitted in the 2005-2006, 2006-2007, 2007-2008, and 2008-2009 school years by the OT and PT service providers in a large urban school district in Texas. This study is an extension of a prior study conducted by Goodrich, et al. (2009) which investigated the change in the number of appropriate referrals versus inappropriate referrals received across four school years when three interventions (training on an education based decision making process, a new referral form, and the addition of a classroom based service delivery model) were implemented. It is important that the referrals generated for OT and PT evaluation services in schools are appropriate because an OT or PT will expend a minimum of 8 hours of service time responding to this referral. Due to a shortage of qualified personnel to provide these services, available OT and PT service time is a limited resource for a school district. Inappropriate referrals require an unnecessary expenditure of this limited resource.

Goodrich, Hawkins, Burrige and White (2009) found that across the four years when the interventions were implemented the proportion of appropriate referrals received for OT and PT services increased ($\chi^2[3, N = 4896] = 241.107, p < .001$). The study found that the likelihood a referral would be rated appropriate increased six and a half times in the referrals received in the first 30 days of the 2008-2009 school year compared to the referrals received in the 2005-2006 school year. This likelihood increased by two times for referrals received in the 2006-2007 or the 2007-2008 school years (Refer back to Table 3). This prior study supported the continued use of the interventions to facilitate appropriate referrals. The study

also identified an additional need for research to address whether or not the increase in the proportion of appropriate referrals allowed the service providers to improve their productivity. To address this research question, data collected as a normal part of the OT and PT service providers' job duties across the four years were analyzed. These data were originally collected for the purposes of monitoring the balance of the caseload across the practitioners and to determine staffing needs.

Data Set:

The data set contained time utilization data submitted by 56 OT and PT service providers working in the school district during February for each of the four school years. The data collected in the month of February is used in this analysis because in the first year of the data collection, the service providers kept these data only for the months of January, February and March. In the second year of the data collection, the service providers kept these data every month from August through February. In the third and fourth years of the data collection the service providers were only required to keep these data in the months of October and February. Therefore, February is the only consistent month these data were maintained across the years.

Many of the service providers worked in the school district across multiple years of the study. Therefore, there were a possible total of 120 service provider entries to be included in these data. Seven of the data files submitted by the service providers were blank. These files were deleted from the data set leaving a total of 113 service provider entries. Of these service providers, 28 worked in the school district for one year of the years included in the study, 5 for two years, 9 for three years, and 12 for four years. Table 8 provides the breakdown of the service providers by profession.

Table 8: Number of Service Providers by Year and Profession

Year	Occupational		Physical		Deleted Cases	Total Cases
	Occupational	Therapy	Physical	Therapy		
	Therapist	Assistant	Therapist	Assistant		
2005-2006	14	4	6	2	3	23
2006-2007	15	4	8	2	4	25
2007-2008	15	3	6	2	0	26
2008-2009	18	7	9	5	0	39

Using an electronic scheduling database, the service providers reported time by coding each 15 minute increment of each work day during the month with one of the activity code categories for that year. There were variations in the activity codes used by the service providers across years but common categories across years were identified for this study based on the definitions service providers used across the years.

Table 9 provides the categories and definitions used by the services providers in the 2005-2006 school year.

Table 9: Activity Codes and Definitions Used by OT and PT Personnel in the 2005-2006

School Year

Activity Code	Definition
Screening	Includes any activity provided in response to a request for screening processed through the Office of Special Education Services as documented on the "Request for Screening for Special Education and Related Services" form (e.g., reviewing the student's state folder, observing the classroom environment, reviewing work samples collected by the teacher, responding to the request either verbally or in writing)
Evaluation / Re-Evaluation	Includes any activity associated with an OT or PT evaluation or re-evaluation process for a student including, reviewing the state folder, observations, consulting with teachers, paraprofessionals, administrators and parents, testing, analyzing test data, writing up the evaluation report, and presenting the report in ARD/IEP meeting.
Intervention (ARD/IEP Recommended Service)	Includes any activity provided on behalf of a student, recommended for service by the ARD/IEP committee, that is serving the student's IEP goals and/or objectives (e.g., working with the student, consulting with others regarding the student's goals and/or objectives, working with adaptations or equipment to support the student, attending an ARD/IEP meeting or staffing to address the student's needs, writing progress notes, updating goals and/or objectives, and completing student attendance logs)
Documentation / Planning / Communication / Staff Meetings	Includes any activity required by the school district to document services (e.g., electronic schedule (eschedule), updating student tracking information, processing Student Health And Rehabilitation Service [SHARS] tickets, attending staff meetings, participating in assistant supervision activities)
Travel	Includes travel to all locations required for the workday except travel to the initial job site of the workday and travel from the last job site of the workday.
Value Added Service	Includes any activity that is in service to the school district that is not directly related to a student recommended for services by the ARD/IEP committee. This includes supporting classroom teachers to address general classroom management needs, providing program oriented services (e.g., motor lab for a PPCD classroom).
Therapist Absent	Enter "Ab" in the spaces that correspond to your normal workday (e.g., 8:00am to 4:00pm)

Activity Code	Definition
Therapist Attended Professional Development	This code is only used for professional development activities required by the school district. Attending a professional development offering on your own time is logged on this schedule as "Ab"
Lunch	All staff are encouraged to take a 30 minute lunch break in the midday. Any staff member having difficulty fitting a lunch break into his or her workday should seek assistance from his or her immediate supervisor.
AT – Evaluation AT – Screening AT – Documentation / Planning / Communication / Staff Meeting AT - Travel AT – Value Added Service AT - Therapist Absent AT - Therapist Attended Professional Development	All of the assistive technology codes are the same as above except have "AT" in front of the code to separate it as a service provided to support a student's success at school through an assistive technology device or service.
AT - Intervention (ARD/IEP recommended service)	While students are not generally recommended for specific time increments of assistive technology service through the ARD/IEP process, if a device has been provided for a student by recommendation of the ARD/IEP committee, then any activity in support of the student's success with that device is in support of an ARD/IEP recommended service.

In the 2006-2007, 2007-2008, and 2008-2009 school years some of the categories and definitions were changed as provided in Tables 10, 11, and 12. Changes are highlighted with an italicized font.

Table 10: Changes in the 2005-2006 Activity Codes and Definitions Used by OT and PT

Personnel in the 2006-2007 School Year (Changes Italicized)

Activity Code	Definition
Screening	Same as the 2005-2006 school year definition
<i>Evaluation</i>	Same as the 2005-2006 school year definition for “Evaluation/Re-Evaluation”. Category name changed.
Intervention (ARD/IEP Recommended Service)	Same as the 2005-2006 school year definition
<i>ARD</i>	<i>Any time spent attending an ARD/IEP meeting.</i>
<i>Planning</i>	Same as the 2005-2006 school year definition for “Documentation / Planning / Communication / Staff Meetings”. Category name changed.
Travel	Same as the 2005-2006 school year definition
Value Added Service	Same as the 2005-2006 school year definition
Therapist Absent	Same as the 2005-2006 school year definition
Professional Development	Same as the 2005-2006 school year definition
Lunch	Same as the 2005-2006 school year definition
<i>Assistive Technology</i>	<i>Any time spent providing AT services as requested by the AT department including AT team training.</i>

Table 11: Changes in the 2006-2007 Activity Codes and Definitions Used by OT and PT

Personnel in the 2007-2008 School Year (Changes Italicized)

Activity Code	Definition
Screening	<i>Any activity engaged in to complete the process, documentation and reporting of a screening</i>
Evaluation	<i>Any activity engaged in to complete the process, documentation and reporting of an evaluation</i>
<i>Intervention</i>	<i>Any activity engaged in to provide an ARD/IEP recommended OT or PT service for a student. This would include services provided directly to the student or on behalf of the student (e.g., collaborating with or training parents or school personnel, collaborating with other medical providers, researching interventions, strategies, and equipment) to support the student.</i>
ARD	Same as the 2006-2007 school year definition
<i>Student documentation</i>	<i>Any time spent documenting services provided for students including completing attendance logs, progress notes, report cards and updating tracking.</i>
<i>Eschedule</i>	<i>Any time spent completing the electronic schedule.</i>
Travel	<i>The time it takes to get from one campus to the next, park, and enter the building.</i>
<i>SHARS billing</i>	<i>Any time spent completing the requirements to submit SHARS billing, including any necessary training activities.</i>
<i>Supervision</i>	<i>Any time spent completing supervision requirements for licensure.</i>
<i>Staff Meeting</i>	<i>Any time spent attending staff meetings with supervisors.</i>
<i>Special Projects</i>	<i>Any time spent on special projects as assigned by the supervisors (e.g., equipment inventory, generating ESY student lists, updating the filing system, developing the resource manual)</i>

Activity Code	Definition
Value Added Service	<i>Any time spent serving as a campus resource not related to students who are receiving ARD/IEP recommended services for, evaluating, or screening (e.g., attending an intervention assistance team meeting, providing a campus training, supporting a classroom)</i>
<i>PPCD Program Support</i>	<i>Any time spent supporting the PPCD programs on campuses.</i>
<i>Absent</i>	<i>Days absent will show 7.5 hours as absent.</i>
Professional Development	<i>Any time spent in professional development activities approved by the supervisors or presented by district personnel.</i>
Lunch	<i>In every 8 hour day each staff member should take a 30 minute lunch break and log 7.5 hours of other activities unless absent.</i>
<i>AT Service</i>	<i>Same as the 2005-2006 school year definition. Category name changed.</i>

Table 12: Changes in the 2007-2008 Activity Codes and Definitions Used by OT and PT

Personnel in the 2008-2009 School Year (Changes Italicized)

Activity Code	Definition
Screening	Same as the 2007-2008 school year definition
Evaluation	Same as the 2007-2008 school year definition
Intervention	Same as the 2007-2008 school year definition
ARD	Same as the 2007-2008 school year definition
Student documentation	<i>Any time spent documenting services provided for students including completing attendance logs, progress notes, and report cards.</i>
Eschedule	Same as the 2007-2008 school year definition
Travel	Same as the 2007-2008 school year definition
SHARS billing	Same as the 2007-2008 school year definition
Supervision	Same as the 2007-2008 school year definition
Staff Meeting	<i>Any time spent attending OT and PT services team meetings, new therapists support meetings, equipment meetings, or regional team meetings.</i>
Special Projects	Same as the 2007-2008 school year definition
<i>Contract Agency Documentation</i>	<i>Any time spent completing documentation required by the contract agency directly employing the service provider.</i>
Value Added Service	<i>Any time you spend supporting a campus that is not associated with a student on caseload or a PPCD, Life Skills, MI, or SLC classroom (e.g., consulting with a resource teacher, providing a training for a campus, attending an intervention assistance team meeting)</i>
PPCD Program Support	Same as the 2007-2008 school year definition

Activity Code	Definition
<i>Lifeskills Program Support</i>	<i>Any time spent supporting the Lifeskills programs on campuses.</i>
<i>MI Program Support</i>	<i>Any time spent supporting the classrooms/programs for children with multiple impairments on campuses</i>
<i>SLC Program Support</i>	<i>Any time you spend supporting the structured learning classroom programs on campuses.</i>
Absent	Same as the 2007-2008 school year definition
Professional Development	Same as the 2007-2008 school year definition
Lunch	Same as the 2007-2008 school year definition
AT Service	<i>Any time spent providing AT services including screening/consultation, evaluation, follow up services, attending trainings, and completing AT reports or other AT related documentation.</i>

Given the variations in the categories and definitions across the years, the activity codes were conceptually grouped into ten common categories as defined in Table 13.

Table 13: Activity Categories and Definitions Conceptually Grouped Into Ten Common Categories.

Activity Category	Definition
Screening	Any activity performed to complete the process, documentation and reporting of a screening
Evaluation	Any activity performed to complete the process, documentation and reporting of an evaluation. This category is primarily for therapists and only used by therapy assistants when gathering data to specifically be used in an evaluation.
Assistive Technology	Activities performed to provide assistive technology (AT) services for children or on behalf of children.
Child Specific Services	Any activity performed to provide an IEP recommended service for a child. This would include direct, integrated, consultation, or collaborative interactions on behalf of the child, researching interventions specifically to support a student, identifying strategies or equipment to support a child, documenting services as required by federal and state regulations, state licensing requirements, and district practices, developing the IEP, and attending the ARD/IEP meeting.
Job Related Duties	Any activity performed to complete the daily electronic schedule (eschedule) that collects the activity codes for the month, scheduling services, attending staff meetings, completing therapist/assistant supervision requirements.
Travel	Any activity performed to move from one service location (e.g., campus, meeting facility, etc.) to the next including parking and enter the building.
Professional Development	Activities performed to attend professional development activities approved by the district.
Campus or Classroom Based Support Service	Services provided to support school personnel, classrooms, or campuses that is not directly associated with child specific services. This category includes classroom based support services.
Miscellaneous Categories	Lunch and Absent categories were combined.

Activity Category	Definition
Missing Data	Time increments that were worked by the service provider but were not coded with an activity code.

Figure 11 provides an overview of the specific activity codes from each year that were included in nine of the ten common categories and how each of these nine categories was used in the analyses. The tenth category is the missing data category. The decision making process regarding use of each category in analysis are provided in the forthcoming data analysis section.

Category Use in Data Analyses / Data Analysis Performed	Common Activity Category	2005-2006 Activity Codes	2006-2007 Activity Codes	2007-2008 Activity Codes	2008-2009 Activity Codes
Categories Maintained Throughout Analyses / Descriptive Analysis and Logistic Regression Incorporating Generalized Estimating Equations	Screening	• Screening	• Screening	• Screening	• Screening
	Evaluation	• Evaluation/ Re-Evaluation	• Evaluation	• Evaluation	• Evaluation
	Travel	• Travel	• Travel	• Travel	• Travel
	Campus or Classroom Based Support Service	• Value Added Service	• Value Added Service	• Value Added Service • PPCD Program Support	• Value Added Service • PPCD Program Support • Lifeskills Program Support • MI Program Support • SLC Program Support
Categories Not Interpreted Due to Change in Data Collection Process / Descriptive Analysis	Child Specific Services	• Intervention (ARD/IEP Recommended Service)	• Intervention (ARD/IEP Recommended Service) • ARD	• Intervention • ARD • Student Documentation	• Intervention • ARD • Student Documentation
	Job Related Duties	• Documentation/ Planning/ Communication / Staff Meeting	• Planning	• Eschedule • SHARS Billing • Supervision • Staff Meeting • Special Projects	• Eschedule • SHARS Billing • Supervision • Staff Meeting • Special Projects • Contract Agency Documentation
Categories Not Carried Throughout Analysis - Not Meaningful to Research Question / Descriptive Analysis	Professional Development	• Professional Development	• Professional Development	• Professional Development	• Professional Development
	Miscellaneous Categories	• Lunch • Therapist Absent	• Lunch • Therapist Absent	• Lunch • Absent	• Lunch • Absent
	Assistive Technology	• AT-Evaluation • AT-Screening • AT-Documentation/ Planning/ Communication / Staff Meeting • AT-Travel • AT-Value Added Service • AT-Therapist Absent • AT-Therapist Attended Professional Development • AT-Intervention (ARD/IEP recommended service)	• Assistive Technology	• Assistive Technology	• Assistive Technology

Figure 11. Activity codes included in nine of the ten common activity categories by year.

Chapter IV. Results

Data analysis began with review of the descriptive measures. Additionally, each of the ten common activity categories was considered for connectedness to the research questions. The decisions regarding how each of the ten activity categories were used in the analysis process are summarized in Figure 11. Figure 12 provides the mean percentage of time service providers reported in each category across the years.

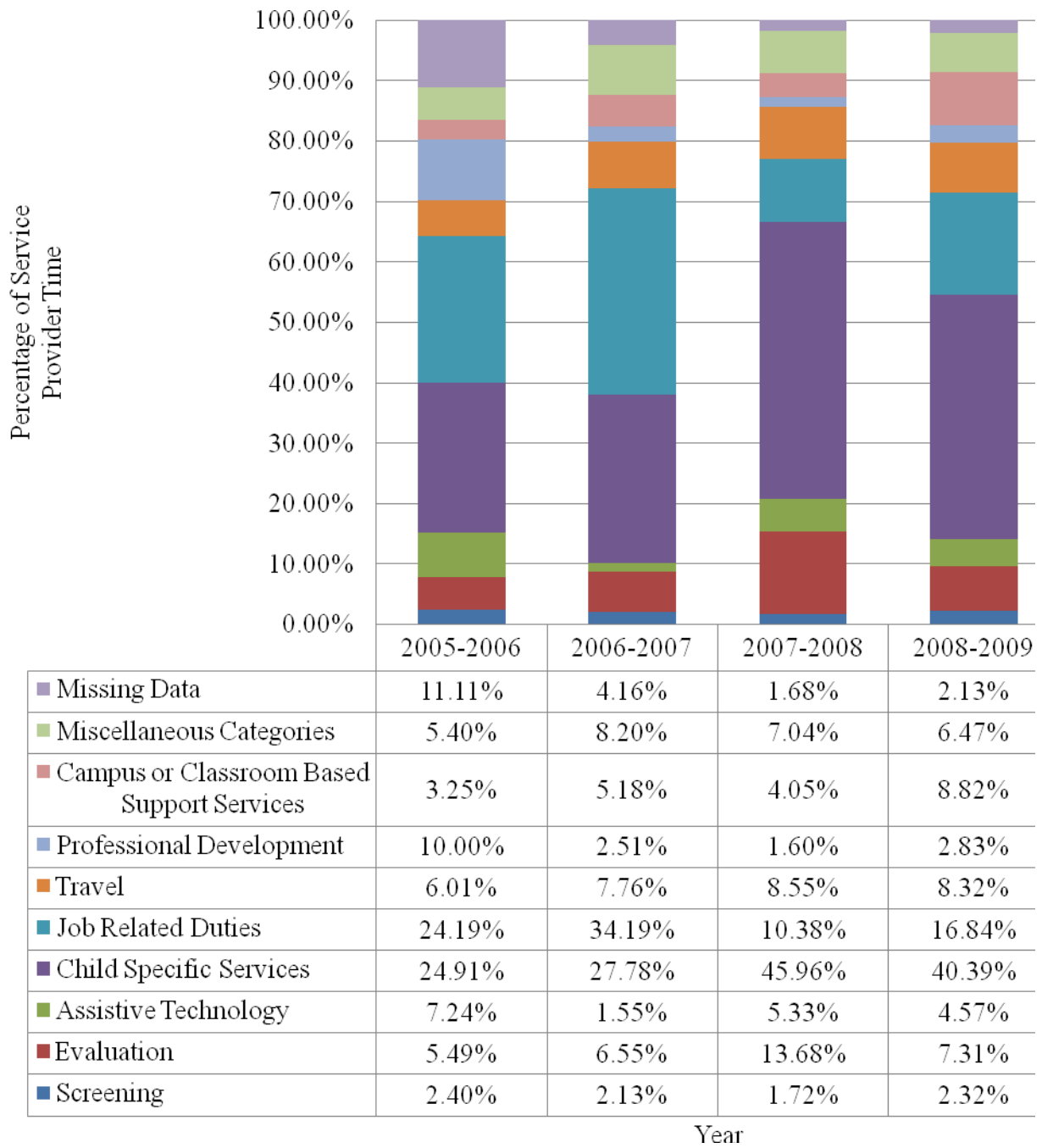


Figure 12. Mean percentage of total service provider time reported in each common activity category.

To further organize the data, each category was reviewed for meaningfulness to the study with descriptive analysis.

Data analysis began with consideration for the presence of missing data. In general, the proportion of missing data declined across the years with the predominance of missing data occurring in the first year (see Table 14).

Table 14: Mean Percentage of Unreported Service Provider Time (Missing Data) for all Service Providers by Year

Year	<i>N</i>	<i>M</i>	Minimum	Maximum	S.D.
2005-2006	23	11.11%	0.00%	75.00%	19.51%
2006-2007	25	4.16%	0.00%	30.00%	8.94%
2007-2008	26	1.68%	0.00%	25.00%	5.36%
2008-2009	39	2.13%	0.00%	16.67%	4.88%

Because the 2005-2006 school year was the first year for the OT and PT service providers to keep this data in an electronic format, missing data was expected as the personnel developed proficiency with the new procedure. Of the four years, the 2005-2006 school year is the only year where the incidence of missing data is of potential concern. In this year a large percentage (43%) of total service providers had missing data. In later years, the number of service providers with missing data markedly declined as did the mean percentage of missing data within these service providers (see Table 15).

Table 15: Mean Percentage of Unreported Service Time (Missing Data) Within the Subgroup of Service Providers with Missing Data by Year

Year	<i>n</i> (^a %)	^b <i>M</i>	Minimum	Maximum	S.D.
2005-2006	10 (43%)	26.29%	5%	75%	22.86%
2006-2007	8 (32%)	13%	.78%	30%	11.95%
2007-2008	4 (15%)	11.05%	2.38%	25%	10.1%
2008-2009	11 (28%)	7.92%	0.63%	16.67%	6.97%

^aPercentage of total service providers for the year

^bMean percentage of the subgroup of service providers with missing data for the year

The researcher assumed that the missing data occurred randomly and could not be attributed to an underreporting of time for any one specific category. In the later years, this assumption is not challenged, but the potential of underreporting due to missing data in the first year is considered with additional analysis in categories that are considered meaningful to the study.

Additionally there are some categories (i.e., screening, evaluation) that are analyzed using only data submitted by therapists due to the role delineations for these service providers under state licensure requirements. Therefore, the potential influence of the missing data is also considered for this subgroup.

Table 16: Mean Percentage of Unreported Therapist Time (Assistants Excluded) by Year

Year	^a <i>n</i>	<i>M</i>	Minimum	Maximum	S.D.
2005-2006	17	13.55%	0.00%	75.00%	21.59%
2006-2007	19	3.94%	0.00%	30.00%	9.39%
2007-2008	20	2.19%	0.00%	25.00%	6.06%
2008-2009	27	1.75%	0.00%	16.67%	4.52%

^aSubgroup of Therapists only (excluding assistants)

Again, the 2005-2006 school year is the only year where the incidence of missing data is of potential concern. This year had the largest percentage (53%) of the subgroup of service providers with missing data. These numbers declined across the latter years as did the mean percentage of missing data within these service providers (see Table 17).

Table 17: Mean Percentage of Unreported Therapists Time (Excluding Assistants) Within the Subgroup of Therapists with Missing Data by Year

Year	<i>n</i> (^a %)	^b <i>M</i>	Minimum	Maximum	S.D.
2005-2006	9 (53%)	25.59%	5%	75%	24.19%
2006-2007	5 (32%)	26.31%	2.03%	30%	13.78%
2007-2008	4 (20%)	10.94%	1.93%	25%	10.23%
2008-2009	7 (26%)	6.77%	0.63%	16.67%	7%

^aPercentage of therapists (excluding assistants) for the year

^bMean percentage within the subgroup of therapists with missing data

The assumption that the missing data occurred randomly for this subgroup will also be challenged for categories that are identified as meaningful to the study and that pertain only to the therapists.

The percentage of time reported in the miscellaneous categories (lunch and absent) increased between years one and two and then decreased across years two and four. Tables 18 and 19 provide an overview of the descriptive statistics for these data.

Table 18: Mean Percentage of Time Service Providers Reported in the Lunch Category by Year.

Year	<i>N</i>	<i>M</i>	Minimum	Maximum	S.D.
2005-2006	23	4.04%	0.78%	7.50%	1.95%
2006-2007	25	5.01%	0.00%	7.66%	1.49%
2007-2008	26	4.11%	0.00%	7.28%	2.30%
2008-2009	39	5.00%	0.63%	8.28%	1.64%

Table 19: Mean Percentage of Time Service Providers Reported in the Absent Category by Year

Year	<i>N</i>	<i>M</i>	Minimum	Maximum	S.D.
2005-2006	23	1.36%	0.00%	10.00%	2.89%
2006-2007	25	3.19%	0.00%	14.24%	4.09%
2007-2008	26	2.92%	0.00%	21.59%	5.03%
2008-2009	39	1.46%	0.00%	13.89%	2.78%

The average proportion of time reported in the lunch category remained fairly consistent across the years. The variability in the miscellaneous category appears to be primarily within the absent category. Across these years there was no circumstance of unexplained absences,

but absences common to most OT and PT groups such as maternity leaves and military leaves. These data are not included in the later analysis because the data are interpreted as miscellaneous and not of further relevance to the study.

The percentage of time service providers reported in providing campus or classroom based support services increased across the four years. This was expected because the classroom based support service delivery model was formalized in the later two years of the study. See Table 20 for the descriptive statistics for these data.

Table 20: Mean Percentage of Time Service Providers Reported Providing Campus or Classroom Based Support Services by Year.

Year	<i>N</i>	<i>M</i>	Minimum	Maximum	S.D.
2005-2006	23	3.25%	0.00%	17.97%	4.99%
2006-2007	25	5.18%	0.00%	44.79%	9.42%
2007-2008	26	4.05%	0.00%	14.73%	4.14%
2008-2009	39	8.82%	0.00%	29.84%	6.83%

These data are considered meaningful to the research question therefore, the role the missing data was considered by comparing the descriptive statistics for service providers who had missing data and service providers who did not have missing data. This was done to see if the missing data in the first year could have accounted for an underreporting of time in these data (see Table 21).

Table 21: Mean Percentage of Time Service Providers With and Without Missing Data Reported Providing Campus or Classroom Based Support Services by Year.

Year	<i>N (%)</i>		<i>M (S.D.)</i>	
	With Missing	Without Missing	^a With Missing	^a Without Missing
	Data	Data	Data	Data
2005-2006	10 (43%)	13	4.3% (5.91%)	2.45% (4.23%)
2006-2007	8 (32%)	17	3.66% (5.08%)	5.90% (10.97%)
2007-2008	4 (15%)	22	1.93% (2.24%)	4.43% (4.33%)
2008-2009	11 (28%)	28	11.85% (8.26%)	7.62% (5.94%)

^aDenominator equals total possible 15 minute time increments that could have been reported by each service provider.

In the campus or classroom based support activity category, service providers in year one with missing data reported spending more time in providing these services (4.3%) than service providers who did not have missing data (2.45%). Therefore, the incidence of missing data does not appear to be a potential underreporting of time in this category in this year. The incidence of missing data was not considered as a possible underreporting in years two through four because relatively little data was missing in these years (refer back to Table 14).

The mean percentage of time service providers reported participating in professional development activities decreased across the years. Table 22 provides the descriptive statistics for these data.

Table 22: Mean Percentage of Time Service Providers Reported Participating in Professional Development by Year

Year	<i>N</i>	Mean	Min	Max	S.D.
2005-2006	23	10.00%	0.00%	20.00%	6.67%
2006-2007	25	2.51%	0.00%	18.28%	4.27%
2007-2008	26	1.60%	0.00%	13.66%	3.53%
2008-2009	39	2.83%	0.00%	20.41%	4.60%

These data only reflect the professional development service providers participated in for the month of February in each year. OT and PT service providers in Texas are required to accumulate at least 15 hours of continuing education credits each year to retain their professional license. They could complete these professional development hours at any time during a year. Therefore, change across the years in this category is not appropriately represented with one month of data. For example, in the 2005-2006 school year most of the service providers participated in two days of professional development through their employer (a contract agency) in the month of February. In other years, these two days of professional development occurred in other months. Therefore, further analysis of the change that occurred in this category was not interpreted as meaningful to the current study. The large percentage of time reported in the first year in this category could artificially inflate a change between year one and the other years. The overall work responsibilities for these service providers did not change just because they participated in professional development. Therefore, the researcher assumed that the time spent in this category in the first year did not come from one specific other category but was randomly distributed across all categories.

Because this pertains specifically to the year one data, it would be necessary to check this assumption in the second analysis by excluding the year one data if an increase in the proportion of time was identified that could be predicted by year one. It is interesting to note that two days of time for this group of personnel can account for 10% of the total available service time. Recall that in the 2005-2006 school year, this district was only able to fill 22.1 full time equivalent positions of the 30 approved full time equivalent positions (refer back to Table 5). The fact that 2 days could account for a tenth of the total available service time in that year reflects how tightly staffed this school district was and the very little flexibility this staff had in discerning how to spend time.

The proportion of time reported in providing assistive technology services decreased across the years (see Table 23).

Table 23: Mean Percentage of Service Provider Time Reported Providing Assistive Technology Services by Year

Year	<i>N</i>	Mean	Min	Max	S.D.
2005-2006	23	7.24%	0.00%	78.52%	18.35%
2006-2007	25	1.55%	0.00%	13.29%	3.81%
2007-2008	26	5.33%	0.00%	56.07%	12.40%
2008-2009	39	4.57%	0.00%	50.61%	10.37%

To provide assistive technology services, service providers had to have specialized training. Only 5 of the OT personnel in the first two years of these data and 6 OT personnel in the latter two years of these data had the training to be able to provide these services. All but one of these therapists was provided one day per week to provide these services. One therapist

provided assistive technology services for 3.5 days per week except in year two when this therapist provided 4.5 days per week of assistive technology services. Table 24 provides the distribution of days dedicated to providing these services each week by service provider across the years.

Table 24: Number of Service Provider Days Per Week Set Aside to Provide Assistive Technology Services by Year

Coded Provider Identifier	2005-2006	2006-2007	2007-2008	2008-2009
OT/04	1	1	1	1
OT/08	1	1	1	1
OT/10	3.5	^a 4.5	3.5	3.5
OT/11	1	1	1	1
OT/12	1	1	1	1
OT/20	0	0	1	1
Total Days	7.5	8.5	8.5	8.5

^aIn this year's data this therapist submitted a blank eschedule so this time was not accounted for in these data.

In year two, one full time therapist was dedicated to providing assistive technology services and submitted a blank eschedule for that year which accounts for the large decrease (7.24% - 1.55%) in time reported in this category in the second year. Because these data are only relevant to a small subgroup of service providers and the time to provide these services was set aside in each of these therapist's weekly schedules separate from the other categories, the change in time reported in providing these services across the years is not considered meaningful to the current study. The impact of one therapist's time in these data again

reflects how tightly staffed this school district was and the limited flexibility for how time is utilized.

The proportion of time service providers reported in performing other job related duties decreased across the year with the variance also narrowing across the years (see Table 25). Across these years there was a concentrated effort made to transition the documentation systems the personnel used to electronic systems. In the later three years of the study a change in data collection procedure was made that may have also influenced these data. In the first year of the data, time spent completing student documentation and attending IEP development meetings (in Texas these meetings are called ARD [Admission, Review, and Dismissal] meetings) was to be included in the intervention category. In the second year of the data, time spent attending ARD meetings was a separate category. In the latter two years of data, time spent in ARD meetings and in completing student documentation were separate data collection categories. It may have been that service providers reported time more accurately when the categories were separate from the intervention category thus accounting for the decrease in time reported in performing other job related duties. This is recognized as a limitation in the study and will be further addressed.

Table 25: Mean Percentage of Time Service Providers Reported in Performing Other Job Related Duties by Year

Year	<i>N</i>	Mean	Min	Max	S.D.
2005-2006	23	24.19%	4.43%	46.87%	11.64%
2006-2007	25	34.19%	14.06%	60.42%	13.17%
2007-2008	26	10.38%	3.01%	21.35%	5.32%
2008-2009	39	16.84%	5.89%	47.40%	8.51%

Conversely, there was an increase in the proportion of time service providers reported in providing child specific services (see Table 26). This may also be due to the above stated change in data collection procedure. Time spent in attending ARD meetings that should have been reported in the intervention category in year one and time spent in ARD meetings and completing student documentation that should have been reported in the intervention category in year two may not have been accurately recorded until the later years.

Table 26: Mean Percentage of Time Service Providers Reported in Providing Child Specific Services by Year

Year	<i>N</i>	Mean	Min	Max	S.D.
2005-2006	23	24.91%	0.86%	56.94%	15.23%
2006-2007	25	27.78%	7.19%	71.29%	15.00%
2007-2008	26	45.96%	6.62%	83.33%	18.07%
2008-2009	39	40.39%	6.25%	62.02%	14.29%

Figure 13 provides a comparison of the change in these two categories across the years. In the year two data, time reported in performing job related duties increased. Time reported in providing child specific services only increased by the amount of time reported in preparing for and attending ARD meetings. In the previous year this time should have been included in the intervention time, but due to the change in data collection procedure it is not known whether the change in procedure facilitated more accurate time reporting rather than an increase in what would have been intervention time in year one. In years three and four, time spent in providing child specific services increased (see Table 25). Figure 13 shows how this increase in time though actually appears to have replaced time that was previously reported in the job related duties category. This is when the data collection process changed to separate out the student documentation category along with the ARD category that should have been included in the intervention category in year one.

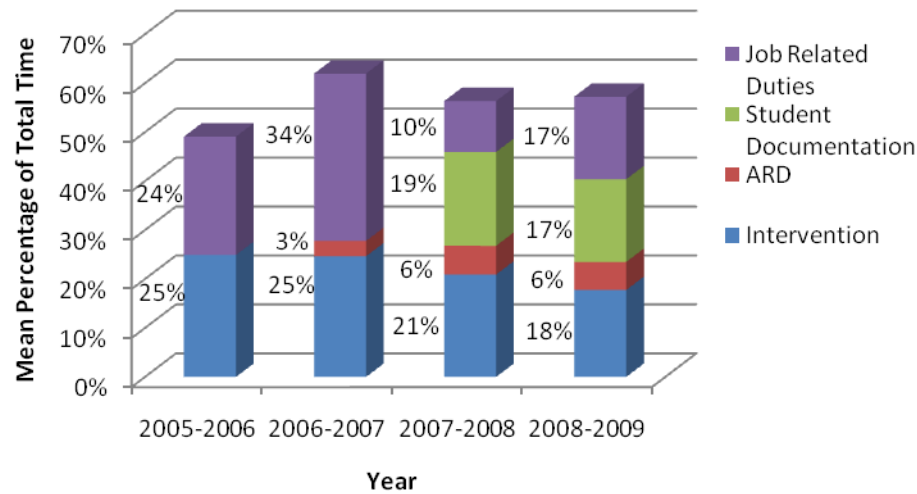


Figure 13: Mean percentage of service provider time reported in providing child specific services (intervention, ⁶ARD, and ⁷student documentation) compared to time reported in performing job related duties.

The overall time reported in the child specific service and job related duties increased but due to the change in data collection procedure, where the increase occurred cannot be determined. The number of children recommended through the IEP process to receive OT and PT services increased across the years (refer back to Table 4). The amount of time the OT and PT service providers spent in completing student documentation and preparing for and attending ARD meetings directly related to the number of children recommended to receive these services through the IEP process. There was also a change in district policy in the 2007-2008 school year that required OT and PT personnel to be present at every ARD

⁶ Time reported in preparing for or attending ARD meetings in the 2005-2006 school year should have been included in the intervention category. The ARD category was not offered as a separate category until the 2006-2007 school year.

⁷ Time reported in student documentation should have been included in the intervention category in the first two years of these data. This category was not offered as a separate category until the 2007-2008 school year.

meeting where the service was to be discussed. When further considering the total increase in time spent in these categories and the increase in the total number of children receiving IEP recommended services increased it is interesting to see how these changes compared to each other (see Figure 14 for percentage of change in these data from year one).

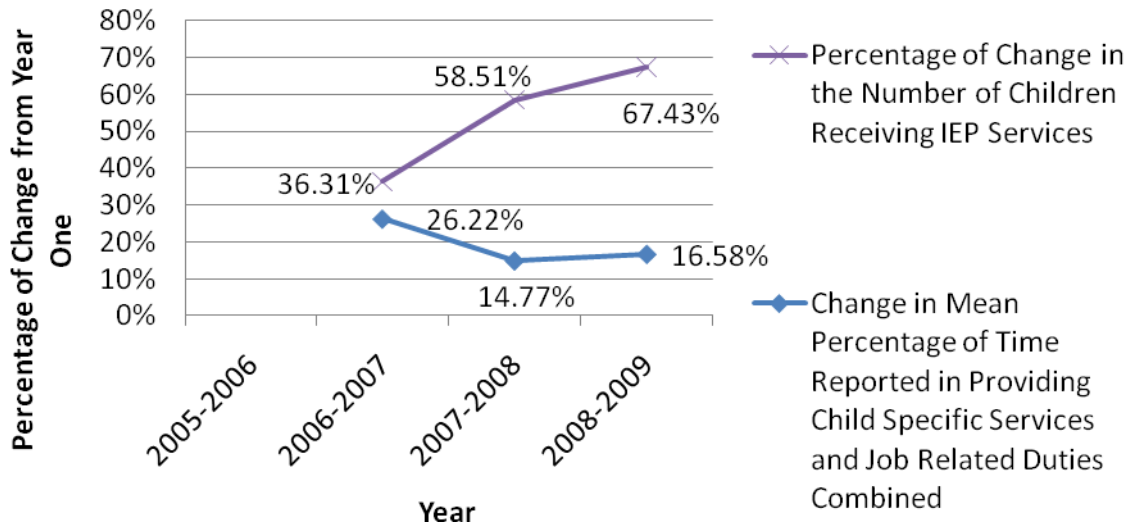


Figure 14: Percentage of change from year one in the number of children receiving IEP recommended services compared to the percentage of change in the mean percentage of time reported in providing child specific services and performing other job related duties combined.

The number of children receiving IEP recommended services increased a total of 67% from year one to year four while the mean percentage of time reported in activities directly related to providing IEP recommended services (child specific services and job related duties) increased by 16.58%. It appears that more children received IEP recommended services in less time. This may have been due to a change in district policy that required all children who were supported with adaptive equipment provided by OT or PT personnel (e.g., pneumatic

transfer lifts, adaptive seating) to be placed on an IEP service to monitor the child's use and continued need for the equipment. Due to the change in data collection procedure we do not know if the overall increase in time across the years (16.58%) in these two categories combined reflects that children received more time or if the personnel spent more time in completing the student documentation related to providing these services.

The proportion of time service providers reported spending in travel minimally increased across the four years. This is interesting because in the 2007-2008 school year, the caseload distribution procedure changed from a seniority based distribution system to a geographically based distribution system. Given this change it was anticipated that the time service providers reported spending in travel would have decreased. It may be that because service providers were traveling to more campuses to provide the classroom based support service, travel increased. See Table 27 for the descriptive statistics for these data.

Table 27: Mean Percentage of Time Service Providers Reported in Travel by Year

Year	<i>N</i>	<i>M</i>	Minimum	Maximum	S.D.
2005-2006	23	6.01%	0.00%	13.75%	3.51%
2006-2007	25	7.76%	0.00%	15.60%	3.35%
2007-2008	26	8.55%	1.56%	14.29%	3.21%
2008-2009	39	8.32%	2.97%	24.66%	3.90%

This change is identified as potentially meaningful to the study. Therefore, the researcher's assumption that the incidence of missing data in year one was challenged for these data by

comparing service providers with missing data and service providers without missing data as related to the travel category (see Table 28)

Table 28: Mean Percentage of Time Service Providers With and Without Missing Data Reported in Travel by Year.

Year	<i>N (%)</i>		<i>M (S.D.)</i>	
	With Missing Data	Without Missing Data	^a With Missing Data	^a Without Missing Data
2005-2006	10 (43%)	13	2.27% (2.59%)	2.51% (4.46%)
2006-2007	8 (32%)	17	7.75% (2.65%)	7.76% (3.71%)
2007-2008	4 (15%)	22	8.54% (4.55%)	8.56% (3.05%)
2008-2009	11 (28%)	28	7.4% (3.17%)	8.69% (4.14%)

^aDenominator equals total possible 15 minute time increments that could have been reported by each service provider.

These data reflect minor differences between service providers with missing data and service providers without missing data in the average amount of time reported by in travel.

Therefore, it does not appear that missing data was a potential incidence of underreporting in this category.

Due to the role delineations between therapists and assistants under Texas OT and PT licensure regulations, assistants reported minimal time in providing evaluation services (see Table 29). Therefore, these data for evaluation services will be isolated to the OT and PT personnel

Table 29: Mean Percentage of Service Provider Time Reported Providing Evaluation

Services by Profession

Profession	<i>N</i>	<i>M</i>	Minimum	Maximum	S.D.
OT	55	12.54%	0.00%	43.44%	10.95%
OTA	19	0.10%	0.00%	1.37%	0.32%
PT	28	8.54%	0.00%	29.30%	8.77%
PTA	11	0.00%	0.00%	0.00%	0.00%

Time spent in providing evaluation services increased across the years with a sharp increase in the 2007-2008 school year and then sharp decline in the 2008-2009 school year (see Table 30). The sharp increase in the evaluations in the 2007-2008 school year is attributed to a change in district procedures requiring all OT and PT evaluations for students receiving OT or PT services to be current within 3 years. This meant that in this school year there were many re-evaluations completed in addition to the evaluations completed due to new referrals.

Table 30: Mean Percentage of Therapist Time Reported Providing Evaluation Services by Year

Year	^a <i>n</i>	^b <i>M</i>	Minimum	Maximum	S.D.
2005-2006	17	7.43%	0.00%	26.13%	8.45%
2006-2007	19	8.61%	0.00%	29.3%	10.38%
2007-2008	20	17.77%	0.00%	43.44%	11.95%
2008-2009	27	10.5%	0.00%	28.94%	8.33%

^aSubgroup of therapists (excluding assistants) for the year

^bDenominator equals total possible 15 minute time increments that could have been reported by each service provider within the subgroup of therapists (excluding assistants).

The increase in time reported in providing evaluation services is potentially meaningful to the study. Therefore, the researcher's assumption that the incidence of missing data in year one was challenged for these data by comparing service providers with missing data and service providers without missing data as related to the evaluation category (see Table 31)

Table 31: Mean Percentage of Time Therapists With and Without Missing Data Reported Providing Evaluation Services by Year

Year	<i>n</i> (^a %)		<i>M</i> (S.D.)	
	With Missing Data	Without Missing Data	^b With Missing Data	^b Without Missing Data
2005-2006	9 (53%)	8	5.99% (7.61%)	9.05% (9.56%)
2006-2007	5 (26%)	14	6.13% (8.02%)	9.49% (11.24%)
2007-2008	4 (20%)	16	11.14% (5.11%)	19.43% (12.69%)
2008-2009	7 (26%)	20	8.7% (9/12%)	11.13% (8.19%)

^aPercentage of therapists (excluding assistants) for the year

^bDenominator equals total possible 15 minute time increments that could have been reported by each service provider within the subgroup of therapists (excluding assistants).

Therapists in year one with missing data reported on average less time in providing these services (5.99%) than service providers who did not have missing data (9.05%). Therefore, the incidence of missing data could be an underreporting of time in this category for the first data year. To address this, later analyses for these categories will only include years two, three, and four.

Similar to evaluation services, screening services are provided predominantly by therapists due to the role delineations between therapists and assistants previously discussed (see Table 32). Therefore, these data for screening were also isolated to the OT and PT personnel.

Table 32: Mean Percentage of Service Provider Time Reported Providing Screening Services by Profession

Profession	<i>n</i>	<i>M</i>	Minimum	Maximum	S.D.
OT	55	3.14%	0.00%	10.97%	2.78%
OTA	19	0.23%	0.00%	3.13%	0.75%
PT	28	2.38%	0.00%	12.19%	2.83%
PTA	11	0.04%	0.00%	0.47%	0.14%

Time spent in providing screening services remained fairly consistent across the years (see Table 33). This is interesting because the number of requests for screening/consultation services decreased across the years (refer back to Table 4).

Table 33: Mean Percentage of Therapist Time Reported Providing Screening Services by Year

Year	^a <i>n</i>	^b <i>M</i>	Minimum	Maximum	S.D.
2005-2006	17	3.25%	0.00%	12.19%	3.96%
2006-2007	19	2.8%	0.00%	8.54%	2.23%
2007-2008	20	2.08%	0.00%	6.48%	2.01%
2008-2009	27	3.29%	0.00%	10.97%	2.81%

^aSubgroup of therapists (excluding assistants)

^bDenominator equals total possible 15 minute time increments that could have been reported by each service provider within the subgroup of therapists (excluding assistants).

The researcher's assumption that the missing data occurred randomly and could not be associated with any one specific category was challenged for year one (see Table 34).

Table 34: Mean Percentage of Time Therapists With and Without Missing Data Reported Providing Screening Services by Year.

	<i>n</i> (%)		<i>M</i> (<i>S.D.</i>)	
	With Missing Data	Without Missing Data	^b With Missing Data	^b Without Missing Data
Year				
2005-2006	9 (53%)	8	2.52% (2.61%)	4.07% (5.17%)
2006-2007	5 (26%)	14	3.04% (1.76%)	2.71% (2.43%)
2007-2008	4 (20%)	16	1.15% (1.33%)	2.32% (2.12%)
2008-2009	7 (26%)	20	2.44% (2.91%)	3.59% (2.79%)

^aPercentage with the subgroup of therapists (excluding assistants)

^bDenominator equals total possible 15 minute time increments that could have been reported by each service provider within the subgroup of therapists (excluding assistants).

Therapists in year one with missing data reported on average less time in providing these services (2.52%) than service providers who did not have missing data (4.07%). Therefore, the incidence of missing data could be an underreporting of time in this category for the first data year. To address this, later analyses for these categories will only include years two, three, and four.

In summary, the predominance of missing data occurred in the 2005-2006 school year. It was assumed that the missing data occurred randomly and was not a result of an under-reporting in any one specific category. This assumption was challenged for categories that

were identified as meaningful to the study (campus or classroom based support services, travel, evaluation, and screening) by comparing data for service providers with missing data to data for service providers without missing data. The assumption was validated for campus or classroom based support services and travel activity categories. The assumption was not validated for the screening and evaluation categories. Therefore, the analysis proceeded into identifying potential predictors (i.e., year and profession) of the difference identified in these categories across the years. For the screening and evaluation categories though, this later analysis will only include the year two, three and four data due to the potential impact of the missing data.

The change in the proportion of time reported in professional development and providing assistive technology services is not further assessed because the changes in these categories were not representative of the whole group but can be attribute to isolated circumstances (e.g., two days of professional development in year one within the data collection month that did not occur in the same month in subsequent years; the absence of data for one therapist who's full workload was dedicated to the provision of assistive technology services in year two). It is interesting to note the percentage of overall time that could be impacted by these circumstances. This reflects the tightness of the staffing of these service providers in this school district for these years.

The change in the proportion of time reported in performing other job related duties and providing child specific services is not included in later analyses because of the change in data collection procedures that are most likely to have impacted the accuracy of these data. These changes in data collection procedure are recognized as a limitation of the study, and are a common experience when utilizing historical data. The increase in the overall number

of students receiving IEP recommended services (67%) compared to the overall increase in time reported in these two categories combined reflects that more children were provided services in less time. Due to the limitation we are not able to discern if the children received more time or if more time was spent in performing other job related duties.

Predictors of Change

For the four categories identified for further analysis (screening, campus or classroom based support, travel and evaluation), Chi Square analysis was employed to test the null hypothesis ($\alpha = 0.05$). With the total count of 15 minute time increments reported by the service providers in each of these four categories as the independent variable and year as the dependent variable, Chi Square test for independence identified significant differences in the amount of time reported in these four categories across the years ($X^2[9, n = 15643] = 970.451, p < .001$, see Figure 16)

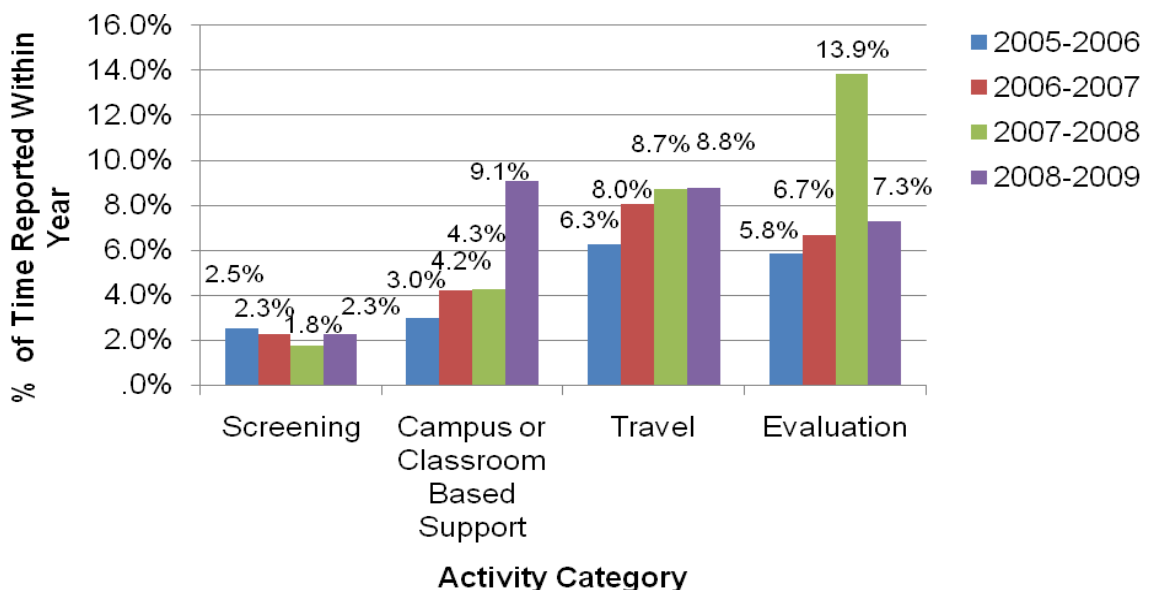


Figure 15. Mean percentage of time reported by service providers for each of the remaining categories or interest within year by year.

Logistic regression analysis incorporating generalized estimating equations was employed to identify the predictors of the changes that occurred across the years. This analysis technique was used because a correlation existed within the categorical data (Liang and Zeger, 1986; Zeger and Liang, 1986). The same service providers reported time across multiple categories. With the coded service providers as the subjects, year as the within variable, the count of 15 minute time increments reported in each category as the dependent variable, and the possible count of 15 minute time increments as the scale weight variable, year and profession were analyzed as factors predicting the variance of time reported in each of the four remaining activity categories of interest. The negative binomial model was selected because the variance was larger than the mean in these count data.

To investigate the predictors of time spent in providing screening services, only time reported by the therapists in years two, three and four were used due to the role delineations previously discussed and the concern for the potential impact of the missing data in the first data year of these data. The interaction between year and profession was not significant ($X^2[2, n = 66] = 3.355, p > .10$). Year was a significant predictor of the variance ($X^2[2, n = 66] = 6.777, p < .05$). Profession was a significant predictor of the variance ($X^2[1, n = 66] = 7.240, p < .01$). Individual years were not significant when compared to the 2006-2007 school year, but when compared to the 2008-2009 school year, the therapists were almost 28% less likely to report time in this category in year three than in year four. PT was not significant when compared to OT and OT was not significant when compared to PT.

Table 35: Parameter Estimates of Year and Profession as Predictors of the Variance for Therapists Time Reported in Providing Screening Services.

Predictor	<i>B</i>	Odds Ratio Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper
^a 2006-2007	-.082	.922	.341	2.490
^a 2007-2008	-1.283	.277*	.099	.776
^b OT	.321	1.379	.652	2.916
^c 2006-2007 * OT	.033	1.034	.328	3.255
^d 2007-2008 *OT	1.047	2.849	.850	9.548

^aCompared to the 2008-2009 school year

^bCompared to PT

^cCompared to 2008-2009 *PT; 2008-2009*OT; 2007-2008 *PT; 2006-2007*PT

^dCompared to 2008-2009 * PT; 2008-2009*OT; 2007-2008 * PT

*Significant $p < .05$

The variation in time therapists spent in providing screening services appears to occur in year three with PT services (see Figure 17).

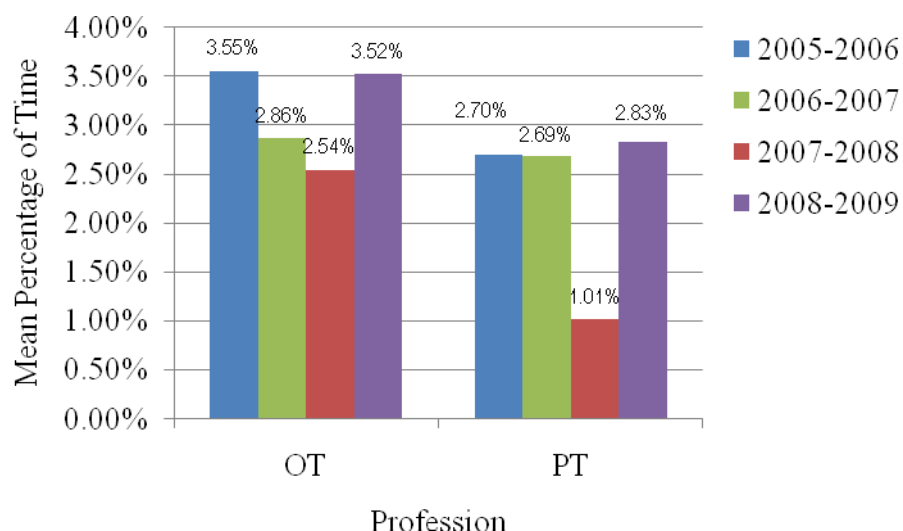


Figure 16. Mean percentage of time therapists reported providing screening services by professions by year.

Additional descriptive statistics were reviewed to consider the variance within professions across the years. From a practice perspective, it was expected that OT personnel would spend more time than PT personnel in providing screenings because OT personnel received at least 50% more requests for screenings than PT personnel in the later three years of these data (refer back to Table 4). Because there are more OT service providers than PT service providers, the proportion of time reported in this category by these subgroups did not significantly vary. Furthermore, it was expected that the proportion of time therapists spent in providing screening services would decline because the number of requests for screenings for both services declined across the later three years of data (refer back to Table 4). Therapists spent more time addressing less screenings across the years (see Figure 18).

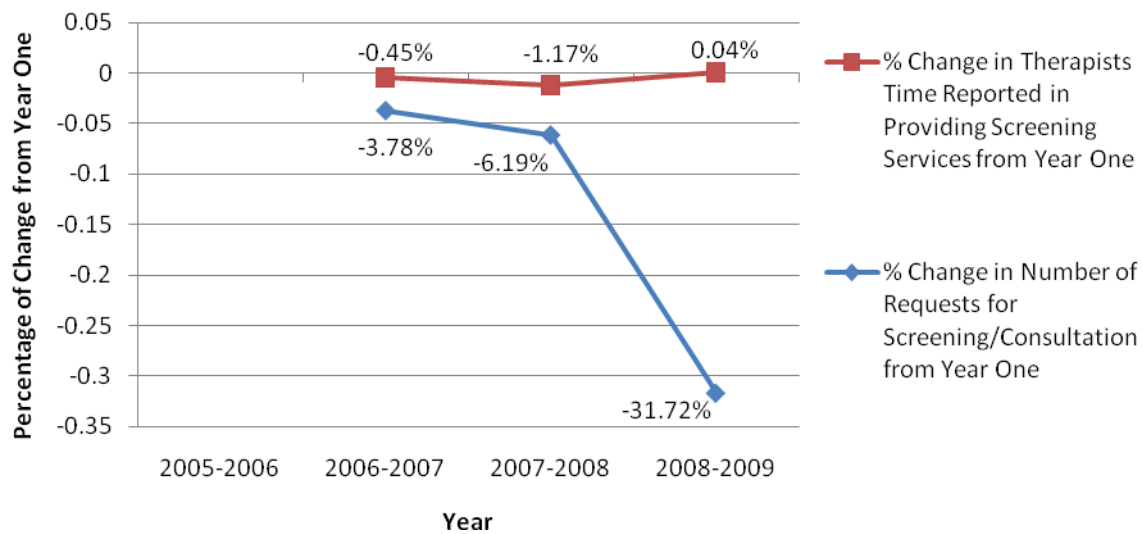


Figure 17: Percentage of change in the number of requests received for screening/consultation services from year one compared to the percentage of change in time therapists reported in providing screening services from year one.

To investigate the predictors of time spent in providing evaluation services, only time reported by the therapists in years two, three, and four were used due to the role delineations previously discussed and the potential impact of the missing data on these data. The interaction between year and profession was significant ($X^2[2, n = 66] = 7.042, p < .05$). Year was a significant predictor of the variance ($X^2[2, n = 66] = 11.987, p < .01$). Profession was also a significant predictor of the variance ($X^2[1, n = 66] = 9.119, p < .01$). Individual years were not significant when compared to year two. PT personnel were less likely to report time in the evaluation category than OT personnel. Table 36 provides the parameter estimates for these variables.

Table 36: Parameter Estimates of Year and Profession as a Predictor of the Variance for Therapists Time Reported in Providing Evaluation Services.

Predictor	<i>B</i>	Odds Ratio Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper
^a 2008-2009	-.134	.874	.450	1.697
^a 2007-2008	.643	1.903	.996	3.634
^b PT	-1.497	.224**	.078	.642
^c 2008-2009 * PT	1.552	4.721*	1.413	15.767
^d 2007-2008 *PT	.840	2.317	.678	7.911

^aCompared to the 2006-2007 school year

^bCompared to OT

^cCompared to 2008-2009 *OT; 2007-2008 *OT; 2006-2007 * OT; 2006-2007 * PT

^dCompared to 2007-2008 * OT; 2006-2007 * OT; 2006-2007 * PT

*Significant $p < .05$

**Significant $p < .01$

Additional descriptive statistics were reviewed to consider the variance within professions across the years (see Figure 19).

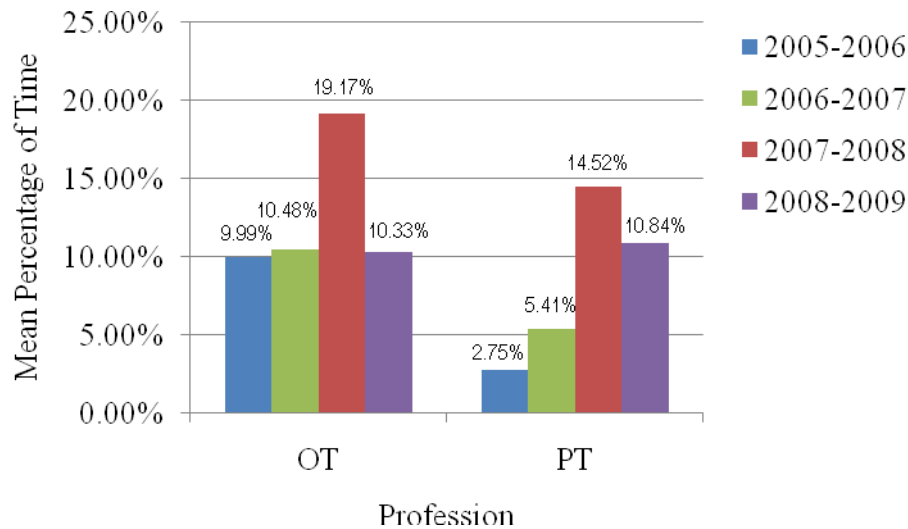


Figure 18. Mean percentage of time reported providing evaluation services by professions and year.

As previously discussed, the rise in time spent in evaluation services in the 2007-2008 school year is attributed to the change in district practice requiring therapists to complete many re-evaluations in this school year in addition to the referrals of students for initial evaluation. Excluding the 2007-2008 school year though, the proportion of time OT personnel reported spending in providing evaluation services remained constant while the proportion of time reported by PT personnel increased across the years. These two circumstances also explain the interaction between year and profession. Within this interaction, the difference across the years and by profession was almost five times more likely to be associated with the difference in time reported by PT personnel in the 2008-2009 school year compared to any other year or any difference in time reported by OT personnel across the years. Overall, the difference in the mean percentage of time reported in the evaluation category between years

one and four was 3.07% and the difference between years two and four was 1.89% (refer back to Table 30). This is a relatively small change given the scale of these data.

To investigate the predictors of time spent in providing campus or classroom based support services all service providers and all years were included. The interaction between year and profession was significant ($X^2[9, N = 113] = 70.471, p < .001$). Within this interaction, the differences across year and by profession were associated with the a sharp decline in time reported in this category by PTA personnel in the 2007-2008 school year and the decline in time reported in this category by PT personnel in the 2006-2007 school year (See Table 35). Year was a significant predictor of the variance ($X^2[3, N = 113] = 40.832, p < .001$). Profession was also a significant predictor of the variance ($X^2[3, N = 113] = 10.561, p < .02$). Table 35 provides the parameter estimates for this variable.

Table 37: Parameter Estimates of Year and Profession as a Predictor of the Variance for Time Reported in Providing Campus or Classroom Based Support Services

Predictor	<i>B</i>	Odds Ratio Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper
^a 2008-2009	2.643	58.172***	2.305	11.604
^a 2007-2008	1.237	3.445**	1.548	7.668
^a 2006-2007	.955	2.600	.883	7.653
^b PTA	1.304	3.684**	1.733	7.832
^b PT	1.506	4.507*	1.337	15.201
^b OTA	.891	2.437	.430	13.814
^c 2008-2009 * PTA	-1.121	.326*	.134	.792
^c 2008-2009 *PT	-1.379	.252	.062	1.027
^c 2008-2009*OTA	.121	1.129	.184	6.927
^c 2007-2008*PTA	-3.470	.031***	.012	.082
^c 2007-2008*PT	-1.435	.238	.046	1.240
^c 2007-2008*OTA	-.316	.729	.104	5.122
^c 2006-2007*PTA	-.886	.412	.127	1.340
^c 2006-2007*PT	-1.995	.136*	.023	.807
^c 2006-2007*OTA	-.196	.822	.090	7.477

^aCompared to the 2005-2006 school year

^bCompared to OT

^cCompared to Same Year*OT; 2005-2006*PTA; 2005-2006*PT; 2005-2006*OTA; 2005-2006*OT

*Significant $p < .05$

**Significant $p < .01$

***Significance $p \leq .001$

The service providers were two and a half times and one and a half times more likely to report time in providing campus or classroom based support services in the 2008-2009 and 2007-2008 school years respectively than in the 2005-2006. This is expected as it was in these years that this service delivery model was formalized in this school district. The significant difference found with professions is not interpretable due to the interaction between year and profession. Additional descriptive statistics were reviewed to consider the variance within professions across the years.

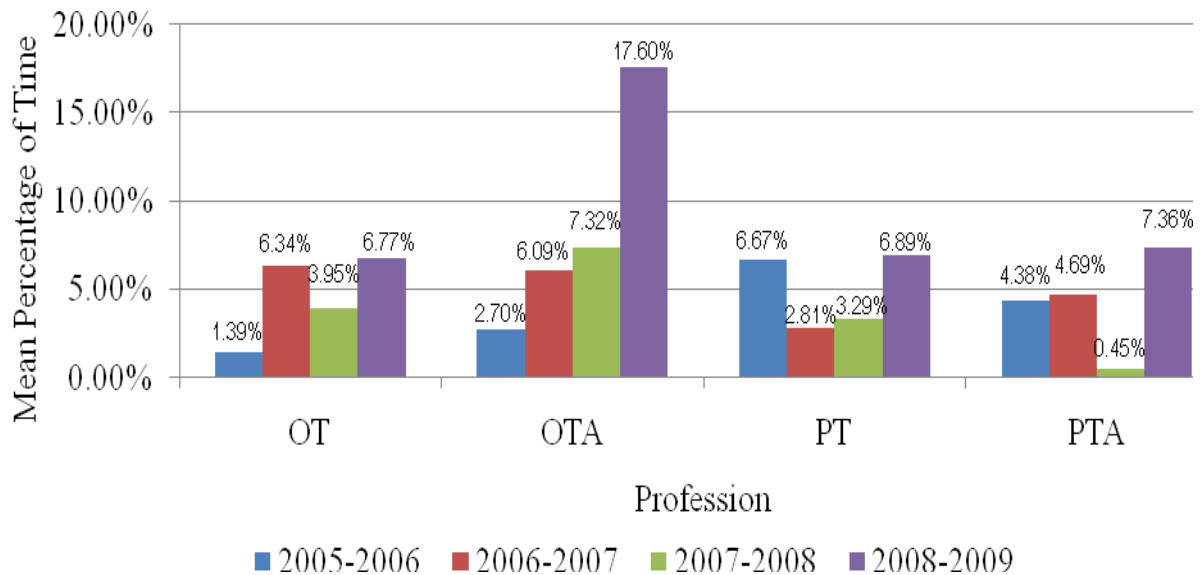


Figure 19. Mean percentage of time reported providing campus or classroom based support services by professions and year.

The largest proportion of overall time reported in this category occurred in the 2008-2009 school year with the OTA personnel reporting the largest proportion of time in this category in this year (see Figure 20). The overall proportion of time reported in the 2005-2006 school year and the 2007-2008 school year were comparable but in the 2005-2006 school year the PT personnel (when compared to the other professionals) reported spending

the largest proportion of time in this category in this year and the OTA personnel (when compared to the other professionals) reported spending the largest proportion of time in this category in the 2007-2008 school year. OT and OTA personnel reported the largest proportion of time in this category in the 2006-2007 school year with both professions reporting proportions comparable to each other.

To investigate the predictors of time spent in travel all service providers and all years were included. The interaction between year and profession was not significant ($\chi^2[9, N = 113] = 5.945, p > .70$). Year was not a significant predictor of the variance ($\chi^2[3, N = 113] = 7.740, p > .05$). Profession was a significant predictor of the variance ($\chi^2[3, N = 113] = 15.783, p = .001$). Table 36 provides the parameter estimates for this variance.

Table 38: Parameter Estimates of Year and Profession as a Predictor of the Variance for Time Reported in Travel

Predictor	<i>B</i>	Odds Ratio Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper
^a PTA	.367	1.443	.986	2.113
^a PT	-.173	.841	.393	1.798
^a OTA	.172	1.187	.816	1.727

^aCompared to OT

PTA, PT, and OTA personnel did not significantly differ from OT personnel in the amount of time reported in travel. The proportion of time that all service providers spent in travel increased across the years. This is expected because there was also an increase in the mean number of campus visits made by OT and PT personnel within the data collection month across the years (see Figure 21).

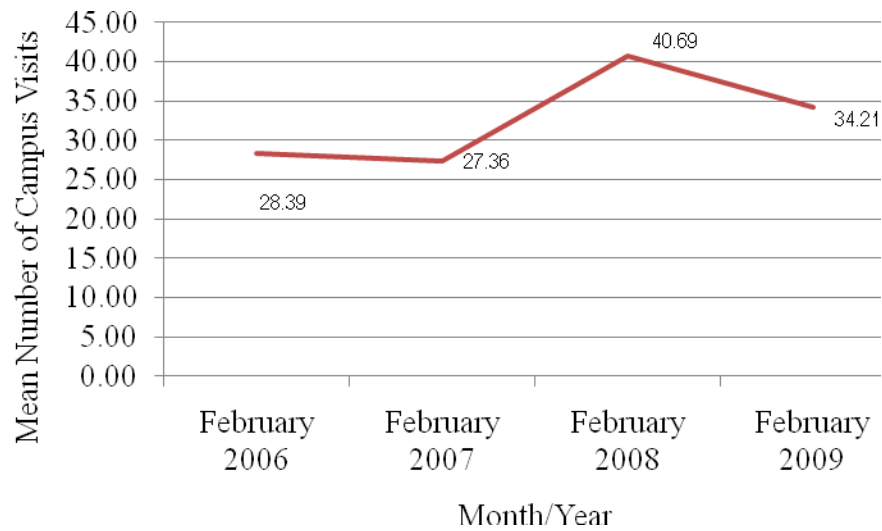


Figure 20: Mean number of campus visits made by OT and PT personnel during the data collection month by year.

PTA personnel reported the most travel time across all school years (see Figure 22).

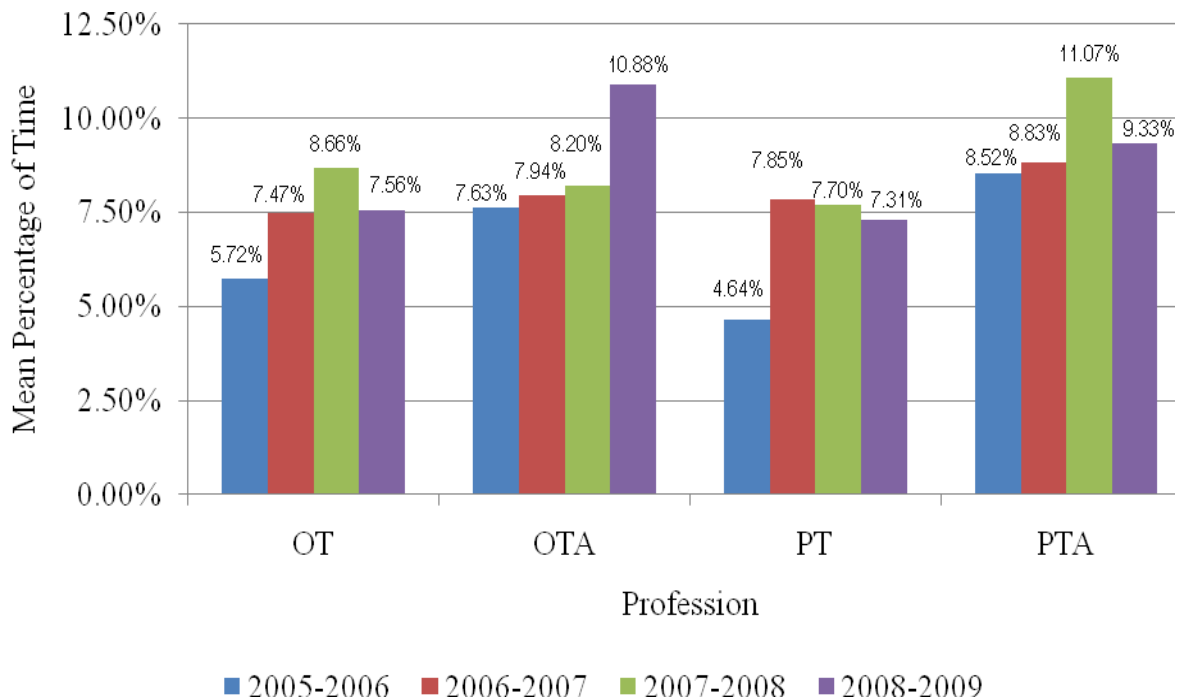


Figure 21. Mean percentage of time reported in travel by professions by year.

This is expected as the children who receive PT services in the district are more dispersed across the school district than children who receive OT services. PTA personnel are the personnel that are most likely to provide the PT services recommended for children through the IEP process.

Chapter V. Discussion

The data analysis indicates that this school district was able to increase the efficient utilization of resources expended to provide OT and PT services across the four years when three interventions were implemented to improve the appropriateness of referrals for these services. The service providers were able to spend more time in providing classroom based support services. Time spent in evaluation and screening services remained relatively stable, and time spent in travel increased. Each of these four findings were interpreted as beneficial to improving the efficient utilization of resources expended to provided OT and PT services in this school district.

The increase in the proportion of time spent in providing campus or classroom based support services was beneficial because this is a service delivery model supported in the literature as a best practice to assist children with disabilities to benefit from special education (Barnes & Turner, 2001; Dole, 2004; Sayers, 2008). The increase in providing these services though is believed to have increased the amount of time the service providers spent in travel. The minimal change in time spent in providing evaluation services between year one and year four and year two and year four is considered an indicator of the efficient utilization of OT and PT services because the referrals addressed when providing these services had increased in appropriateness (Goodrich, et al. 2009). It was not necessary to spend more time on responding to the increasing incidence of inappropriate referrals that had been identified in the first year. The implementation of a screening process is identified as an effective intervention to support teachers, parents, speech-language pathologists, and school administrators in clarifying the educational concern that might lead to evaluation. The current literature does not address the effectiveness of this service delivery model in school settings.

In the medical literature this screening service is reported to benefit the appropriate identification of individuals who would benefit from OT or PT services in a less time intensive practice (Foster, et al. 2004; Woosley, Sands, & Dunlap, 1987; Johnson & Marlow, 2006). The determination of need for services in a school setting is different from a medical setting (Polichino, 2001). When this school district transitioned to providing a screening process to initiate any OT or PT services for a student with a disability, the appropriateness of referrals increased, the number of referrals generated by campus personnel decreased, the time OT and PT personnel spent in providing screening services stabilized, and parents, teachers, speech language pathologists, and school administrators received a direct response from an OT or PT service provider when questioning the need to refer a child. The interventions implemented by this school district across the 2006-2007, 2007-2008, and 2008-2009 school years are supported not only as an effective means to improve the appropriateness of referrals for OT and PT services in schools, but also an effective means to improve the efficient utilization of these services.

This investigation contributes to the evidence pertaining to the efficient delivery of OT and PT services in public schools. This is an important area of research due to the consistent interest of educational administrators and legislators to reduce costs pertaining to special education. This is also an important area of research due to the shortage of qualified personnel to provide OT and PT services in schools and the limited ability of public schools to compete with medical facilities for these personnel (Texas Education Agency, Office of Special Education Programs, 2001; The Center on Personnel Studies in Special Education, 2004).

Findings

After data analyses, four variables were identified as meaningful for interpretation in this study: the proportion of time spent in providing campus or classroom based support services, evaluation and screening services, and in travel. Over time, these OT and PT personnel spent an increased percentage of time in providing campus or classroom based support services, a relatively stable percentage of time in evaluation and screening services, and an increased percentage of time in travel. These findings were all interpreted as beneficial for this school district to increase the efficient utilization of the resources expended to provide OT and PT services for children.

Finding #1

The increase in the proportion of time services providers reported in providing classroom based support services was beneficial because this was a direct intervention implemented in the latter two years of these data to address the concern of inappropriate referrals for OT and PT services (Goodrich, et al. 2009). Service providers were one and a half times more likely to report time in providing campus or classroom based support services when this service model was formalized (in the Fall, 2007) than in year one. They were two and a half times more likely to report time spent providing this service in year four than in year one. The statistical significance of this variable in these data is accentuated by the practical significance of these consultative services provided in the natural environment reported in the literature (Barnes & Turner, 2001; Dole, 2004; Sayers, 2008). Due to the limitations of this investigation, the researcher was not able to identify specific shifts in the distribution of time from one category or group of categories to another. If the distribution of time for these service providers continues to increase in time spent in providing campus or

classroom based support services, future research might investigate what factors are allowing these service personnel to increase time spent in this best practice service model.

Finding #2

The increase in the proportion of time service providers reported in providing evaluation services was isolated to the year three data when district policy changed to require OT and PT evaluations for all students currently recommended for services through the IEP process to be current within 3 years. The difference between time reported in evaluation between years one and four and two and four was minimal. This is important because of the decrease in inappropriate referrals received for OT and PT services across these years (Goodrich, et al. 2009). It was not necessary to increase the time spent in providing evaluation services to continue to address the increasing incidence of inappropriate referrals that was identified in the 2005-2006 school year. This is believed to have benefitted the school district not only in focusing the therapists' time on necessary services for children, but also in increasing job satisfaction for the therapists. Because this school district experienced challenges in the early years of these data in filling OT and PT service provider positions, personnel frequently experienced high workloads. When personnel perceived that an excess amount of time was spent responding to unnecessary referrals there was a sense of frustration with the reduced ability to focus the limited staff on the necessary referrals and services. While it is not reflected in these data, it is believed that this school district was able to improve the therapists' job satisfaction by implementing specific interventions to increase the appropriateness of referrals which then also benefitted the school district in being able to fill more of the open service provider positions. Within the community of OT and PT personnel in the county in which this school district is located, the reputation of the school district

improved for taking proactive measures to improve how the therapists' used time. Given the limited availability of qualified personnel to fill these positions, it is necessary for school districts, which generally cannot compete financially with hospital or clinical settings to attract service providers, to target procedures and practices to accentuate best practices and focus workload requirements on services that are perceived as necessary for children. With this same spirit of increasing job satisfaction by improving how these personnel utilize time, this school district is currently focusing on the large volume of time that these personnel expend in student documentation and supporting ARD/IEP processes that was identified in this same data set.

The minimal change in time spent in evaluation services may also be a reflection of the transition from a consultation and evaluation model to a screening and evaluation model. The definition of a screening for instructional purposes provided in the 2004 reauthorization of the IDEA clarified that screenings of children with special needs in public schools are not evaluation but are provided "to determine appropriate instructional strategies for curriculum implementation" (20 USC 1414§614(a)). When therapists provided a consultation model (prior to and including a portion of the 2005-2006 school year) they could generally address a child specific need in approximately half the time than when providing an evaluation, but it still required more time than a screening process (generally requiring ≤ 2 hours). Additionally, the consultation process required parental consent before the process could be initiated which many times resulted in a parent confusing a consultation process with an evaluation process. A common occurrence at the time was for a therapist to complete an evaluation in addition to the consultation to address the perception that the parent had consented to an evaluation. The clarification of a screening in the IDEA, 2004 allowed these

therapists to offer an informal process to assist classroom personnel in addressing concerns regarding the implementation of the curriculum that may have previously led them to referring a child for the more formal processes of consultation or evaluation.

Because the screening service was a new component of the IDEA, 2004, the benefits of this service have not been previously reported in the literature pertaining to services provided in public schools. Many state regulations addressing the practice of OT and PT within states do allow for a screening to be provided prior to evaluation as it is identified as a more economical approach to identifying the medical or clinical need to proceed into OT or PT evaluation (Foster, et al. 2004; Woosley, Sands, & Dunlap, 1987). Caution is provided in the literature to focus a screening process on the potential need for further assessment or evaluation rather than a determination of the need for intervention (Johnson & Marlow, 2006). The current literature does not address the benefit of a screening process in school settings.

One of the primary reasons for transitioning these services from a consultation model to a screening model was to increase the direct involvement of the therapists in the identification of an educational need to proceed into and evaluation. When the screening service was implemented, the therapist gained a direct understanding of the concerns from both the teacher and the parent prior to proceeding into evaluation. This service was designed to give both the parent and the teacher the opportunity to review the concerns with the therapist prior to initiating an evaluation process. Parents were then afforded a model of fully informed consent when the process proceeded into evaluation.

Finding #3

The relative stabilization of the time therapists spent in providing screening services across the years is also perceived as an indicator of an increase in efficiency. While these services were formalized to improve the systemic process and increase the appropriateness of referrals generated by campuses, the need for these services did not increase. A concern at the time of implementing the screening process was that the easier access and the increase in information provided for campuses regarding these services might generate more referrals. Actually the number of requests for screenings declined across the years (refer back to Table 4). It seems that the easier access and having better trained campus personnel not only benefitted an increase in appropriateness of referrals but also supported campus personnel to refer less often.

Therefore, the minimal change in time spent in providing evaluation services between years one and four and years two and four, and the consistent time spent in screening services are perceived as indicators of improvement in the systemic process of providing OT and PT services in this school district. Through the procedural change, steering all considerations of OT and PT services for a child through an initial screening process, parents, teachers, speech-language pathologist, and school administrators received the direct support of the therapist in identifying the specific needs of the child to be addressed during the evaluation process. While it is not reflected in these data, it is also believed that by reducing the amount of need for therapists to respond to unnecessary referrals, the therapists' overall job satisfaction improved as did the reputation of the school district amongst the community of qualified OT and PT personnel within the county. This then allowed the school district to fill more of the open staff positions.

Finding #4

The increase in travel time is considered a likely outcome of implementing the classroom based support services. The average number of campus visits the OT and PT personnel made across the years increased with the largest increase occurring between the second and third years of data. The third year is when the classroom based support services were implemented in this school district. By design, when providing these services, personnel traveled to more campuses than just the campuses where students receiving IEP recommended services were attending. This is interpreted as a possible cost/benefit trade off to providing the classroom based support services in this school district. It may not be a cost/benefit trade off for smaller school districts that do not cover similar square miles (301) or number of campuses (300) as the school district in this study. The change in the distribution of time that is reported in these data provides a general perspective for school administrators to consider how procedural changes impact the resources expended for these services.

Limitations

Limitations in this investigation were encountered due to the historical nature of these data collected in a natural setting for original purposes other than research. These limitations restricted the researcher from identifying actual movement of time between categories across the years. These limitations also required the researcher to exclude categories from the final analyses due to concerns with the integrity of the data. Time reported in providing child specific services and time reported in performing other job related duties were not analyzed beyond review of the descriptive measures because of the probable confusion that occurred with the service providers in how to record time spent in completing student documentation

and time spent in preparing for or participating in the ARD/IEP process. This confusion appeared to be corrected with the change in data collection procedure separating out the two categories of student documentation and ARD. Future investigations with these data collected over latter years could alleviate this limitation by restricting any additional changes in the data collection process.

The overall quality of these data improved across the four years as the service providers learned the data collection process. Service providers in general maintained personal calendars or kept a daily record as a memory tool to then enter the data into the electronic schedule at the end of each work day or, for some, at the end of the week. The inconsistency across the service providers in the frequency of when these data were entered in the electronic schedule and when the electronic schedules were submitted to administrators is also recognized as a limitation to the study. This could be alleviated in future studies by establishing consistent standards for entering and submitting data and maintaining a tracking system to provide an accountability measure. Different from controlled research settings though, the practicality of this type of accountability for these personnel would potentially distract them from their primary job functions.

Another limitation of this study resulted from the high proportion of missing data that occurred in the first year of these data. The role of these missing data was considered when the change in the proportion of time in each category was identified as potentially meaningful to the research question. The proportion of time reported in these categories was then compared for personnel with missing data and without missing data to consider if the missing data could have accounted for an underreporting of time in this category. Otherwise, the researcher assumed the missing data occurred randomly and could not account for an

underreporting in any one specific category. Missing data is a typical occurrence when a new data collection system is introduced as the users of the data collection system develop proficiency with the system. Better reporting could have benefitted this analysis and possibly allowed the researcher to see movement in the amount of time reported from one category or group of categories to another across the years.

Conclusion

Initially this investigation provides a general perspective of the distribution of OT and PT service time in a large urban school district that has not been previously reported. It is important for school administrators and legislators to recognize that OT and PT service needs and decisions regarding staffing needs cannot be directly tied to the number of children who have been recommended for these services in the development of the IEP. To provide these services in public schools requires that large portions of time are spent in documenting those services to meet state and federal requirements, as well as in accommodating the itinerant nature of these services, particularly in large urban school districts. How this time is distributed and whether this time is distributed in service delivery models that provide the most services for children can be altered with systemic changes.

In the school district of this study, the implementation of a screening process prior to proceeding into an evaluation process alleviated the need for classroom personnel or parents to make an educated, or sometimes, uneducated guess as to whether a child needed to be referred for an OT or PT service. An OT or PT service provider became directly involved in the decision making process. The increase in appropriateness of referrals for evaluations that occurred at the same time of this change in procedure is not perceived as the only benefit of this systemic change. Because OT and PT service providers had the opportunity for direct

partnership with classroom personnel and parents to fully understand the concerns that were leading to evaluation, the therapist proceeded into evaluation with better clarity of the questions to be addressed in the evaluation.

The implementation of a classroom based support service delivery model not only introduced a practice into this school district that was well supported in the literature, but also alleviated therapists spending time in unnecessary evaluation processes. Because many of the concerns presented in the classroom could be addressed in this informal less time consuming service delivery model, or through the screening process, unnecessary referrals were avoided. The increase in time spent in this service delivery model across the years of this study is not only an indication of an increase in best practices for OT and PT services in this school district but is also an indication of improved time utilization as more service time could be spent in providing these services. Due to the limitations of this study, the researcher was not able to discern where the additional time originated, but there was an increase in time afforded to this service delivery model.

In summary, at the same time when systemic changes were made in the provision of OT and PT services in this large urban school district, more children received more direct support from an OT or PT service provider either through an IEP recommended service or campus or classroom based support service delivery model. While the limitations of this investigation do not allow us to pinpoint specific shifts in time utilization from one category to another, the benefits of the systemic changes made in this school district can be related to an improved referral process, more direct responses from OT and PT service providers for classroom teachers, speech-language pathologist, school administrators, and parents, and an increase in the number of children supported across the years. The systemic changes made in

this school district are supported as effective practices to not only improve the appropriateness of referrals generated by campus personnel but also to improve the efficient utilization of district resources to provide OT and PT services in schools.

Improving the efficient utilization of district resources to provide OT and PT services in schools is important due to the increasing concern among school administrators and legislators regarding the rising costs of providing special education services. The number of children meeting eligibility and qualifying for special education and related services is declining, but the number of children who most often require OT and PT services in schools is increasing. This reflects the national trends to require intervention strategies to be implemented in general education settings to reduce the numbers of children requiring special education and related services. In large urban school districts such as the school district in this study with large populations of children in low socioeconomic households, there is a growing population of children with disabilities in the moderate to severe range. Providing services for these children with limited resources requires school districts to enact systems that utilize limited resources with efficient service delivery processes.

References

- Advance (2008). Positive impact: Our salary survey report for 2008 shows strong trends upward for PT. *Advance for Physical Therapy and Rehab Medicine*. 19 (27) p. 10
- American Physical Therapy Association. (2001). Guide to physical therapist practice (2nd Ed.). *Physical Therapy*, 81, 11-746.
- Baldrige National Quality Program at the National Institute of Standards and Technology in Gaithersburg, MD. (n.d.). 2009–2010 Education Criteria for Performance Excellence. Retrieved from http://www.baldrige.nist.gov/PDF_files/2009_2010_Education_Criteria.pdf
- Barnes, K. J., & Turner, K. D. (2001). Team collaborative practices between teachers and occupational therapists. *The American Journal of Occupational Therapy*, 55, 83-89
- Bridges, E. (1982). Research on the school administrator: The state of the art 1867-1980. *Educational Administration Quarterly*, 18, 12-33.
- Chapin, J., & Fetter, B. (2002). Performance-based contracting in Wisconsin public health: Transforming state-local relations. *Milbank Q.* 80, 97-124.
- Data Accountability Center. (2007). Individuals with disabilities education act (IDEA) data center: Part B personnel. United States Department of Education: Office of Special Education Programs. Retrieved February 14, 2010 from <http://www.ideadata.org/PartBPersonnel.asp>
- Data Accountability Center. (2007, 2008). Individuals with disabilities education act (IDEA) data center: Part B child count. United States Department of Education: Office of Special Education Programs. Retrieved February 14, 2010 from <http://www.ideadata.org/PartBChildCount.asp>

- Dole, R. (2004). Collaborating successfully with your school's physical therapist. *Teaching Exceptional Children*, 36 (5), 28-35.
- Dunn, W. (1990). A comparison of service provision models in school-based occupational therapy services: A pilot study. *Occupational Therapy Journal of Research*, 10, 300-320.
- Effgen, S. K., Myers, C. T., & Myers, D. (2007). Distribution of physical and occupational therapists service children with disabilities in educational environments. *Physical Disabilities: Education and Related Services*, 26(1), 47-61
- Effgen, S. K. & McEwen, I. R. (2007). Review of selected physical therapy interventions for school age children with disabilities. (COPSSE Document Number OP-4).
Gainesville, FL: University of Florida, Center on Personnel Studies in Special Education.
- Foster, C. B., Gorga, D., Padial, C., Ferretti, A. M., Berenson, D., Kline, R., BeLue, R., & Charlson, M. E. (2004). The development and validation of a screening instrument to identify hospitalized medical patients in need of early functional rehabilitation assessment. *Quality of Life Research*, 13, 1099-1108.
- Glomstad, J. (2009). Advance's 2009 salary survey. *Advance for Occupational Therapy Practitioners*. 25 (8), p. 10
- Goodrich, B., Hawkins, J., Burrige, A., & White, C. (2009). Facilitating appropriate referrals for related services in schools. Manuscript submitted for publication.
- Gollust, S. E. & Jacobson, P. D. (2006). Privatization of public services: organizational reform efforts in public education and public health. *American Journal of Public Health*. 96, 1733-1739.

Gutkin, T. B. (1996). Core elements of consultation service delivery for special service personnel. *Remedial & Special Education*, 17, 333-341.

Houston Independent School District. (2006). Assessment of student performance in special education: 2005-2006. Houston Independent School District, Department of Research and Accountability. Retrieved February 20, 2010 from https://www.houstonisd.org/ResearchAccountability/Home/Perform_Acount/StudPerf/Special%20Education/Reports/SpEd_Rpt_2006.pdf

Houston Independent School District. (2007). Assessment of student performance in special education: 2006-2007. Houston Independent School District, Department of Research and Accountability. Retrieved February 20, 2010 from https://www.houstonisd.org/ResearchAccountability/Home/Perform_Acount/StudPerf/Special%20Education/Reports/SpEd_Rpt_2007.pdf

Houston Independent School District. (2009). Assessment of student performance in special education: 2008-2009. Houston Independent School District, Department of Research and Accountability. Retrieved February 20, 2010 from https://www.houstonisd.org/ResearchAccountability/Home/SP_SpecialEd/Reports/Intro.pdf

Houston Independent School District. (2010). Budget Update: HISD 2011-2012, Retrieved December 9, 2010 from http://www.houstonisd.org/HISDConnectEnglish/Images/PDF/CommConv_Update1.pdf

Individuals with Disabilities Education Improvement Act, 20 USC 1400 (2004). Public Law 108-446

- Johnson, S., & Marlow, N. (2006). Developmental screen or developmental testing? *Early Human Development*, 82, 173–185.
- Liang, K.-Y., & Zeger, S. L. (1986). Longitudinal data analysis using generalized linear models. *Biometrika*, 73, 13-22.
- McWilliam, R. A. (1995). Integration of therapy and consultative special education: A continuum in early intervention. *Infants and Young Children*, 7(4), 29–38.
- McWilliam, R. A. (1996). Rethinking pull-out services in early intervention: A professional resource. Baltimore: Brookes.
- National Center for Education Statistics. (2009). Children 3 to 21 years old served under Individuals with Disabilities Education Act, Part B, by type of disability: Selected years, 1976-77 through 2007-08 United States Department of Education, Institute of Education Sciences. Retrieved July 30, 2010 from http://nces.ed.gov/programs/digest/d09/tables/dt09_050.asp
- Nichol, G., Valenzuela, T., Roe, D., Clark, L., Huszti, E., & Wells, G.A. (2003). Cost effectiveness of defibrillation by targeted responders in public settings. *Circulation*. 108(6), 697-703.
- Patterson, J. L. (1985). A phenomenological study of the management and utilization of time by first year principals. (Doctoral dissertation, The Florida State University, Tallahassee, FL). Retrieved from ProQuest Dissertations and Theses database. (752953111)
- Polichino, J. (2001, June). An education-based reasoning model to support best practices for school-based OT under IDEA 97. *School System Special Interest Section Quarterly*, 8, 1 - 4.

Sayers, B. R. (2008). Collaboration in School Settings: A Critical Appraisal of the Topic.

Journal of Occupational Therapy, Schools, & Early Intervention, 1, 170 - 179.

Schopler E., Mesibov G. B. & Hearsey K. (1995). Structured teaching in the TEACCH

system. In: *Learning and Cognition in Autism* (eds E. Schopler & G. B. Mesibov), pp. 243-68. Plenum Press, New York, NY.

Scott, T., & Barrett, S. (2004, Winter). Using staff and student time engaged in disciplinary procedures to evaluate the impact of school-wide PBS. *Journal of Positive Behavior Interventions, 6*, 21-27.

SPSS, Inc. (2008). SPSS Statistics GradPack for Windows (Version 17.0) [Computer software]. Chicago, Illinois: SPSS, Inc.

Texas Administrative Code. Title 19. Education. Part 2. Texas Education Agency (nd).

Retrieved from

[http://info.sos.state.tx.us/pls/pub/readtac\\$ext.ViewTAC?tac_view=3&ti=19&pt=2](http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=3&ti=19&pt=2)

Texas Board of Occupational Therapy Examiners. (2010). Occupational Therapy Rules,

Executive Council of Physical Therapy and Occupational Therapy Examiners.

Retrieved December 10, 2010 from

http://www.ecptote.state.tx.us/_private/OT_current_rules.pdf

Texas Board of Physical Therapy Examiners. (2010). Physical Therapy Rules, Executive

Council of Physical Therapy and Occupational Therapy Examiners. Retrieved

December 10, 2010 from http://www.ecptote.state.tx.us/_private/PTrules2010.07.pdf

Texas Education Agency. (nd). 2008-2009 Budgeted financial data: Totals for state (all districts). Retrieved February 13, 2010 from

- http://ritter.tea.state.tx.us/cgi/sas/broker?_service=marykay&_program=sfadhoc.budget_report_2009.sas&_service=appserv&_debug=0&who_box=&who_list=_STATE
- Texas Education Agency, Division of Performance Reporting. (nd). Academic Excellence Indicator System, 2008-2009 District Profile. Retrieved February 27, 2010 from <http://ritter.tea.state.tx.us/cgi/sas/broker>
- Texas Education Agency, Division of Performance Reporting. (nd). Academic Excellence Indicator System, 2005-2006 State Performance Report. Retrieved March 21, 2010 from <http://ritter.tea.state.tx.us/perfreport/aeis/2006/state.pdf>
- Texas Education Agency, Division of Performance Reporting. (nd). Academic Excellence Indicator System, 2006-2007 State Performance Report. Retrieved March 21, 2010 from <http://ritter.tea.state.tx.us/perfreport/aeis/2007/state.pdf>
- Texas Education Agency, Division of Performance Reporting. (nd). Academic Excellence Indicator System, 2007-2008 State Performance Report. Retrieved March 21, 2010 from <http://ritter.tea.state.tx.us/perfreport/aeis/2008/state.pdf>
- Texas Education Agency, Division of Performance Reporting. (nd). Academic Excellence Indicator System, 2008-2009 State Performance Report. Retrieved March 21, 2010 from <http://ritter.tea.state.tx.us/perfreport/aeis/2009/state.pdf>
- Texas Education Agency, Office of Special Education Programs. (2001, July). Continuous improvement monitoring process validation planning public meeting report. Retrieved from <http://www.tea.state.tx.us/special.ed/cimp/pdf/pubcomm5.pdf>
- Texas Education Code, 79th Leg., 3rd C.S., Subtitle F. Curriculum, Programs, and Services, Title 2. Public Education, Subchapter A. Special Education Program, (2006).

The Center on Personnel Studies in Special Education. (2004, February). An insufficient supply and a growing demand for qualified related service personnel (Workforce Watch [Policy Brief]). Retrieved from <http://www.coe.ufl.edu/copsse/library/workforce-watches.php>

United States Department of Education, Institute of Education Sciences. (nd). Federal support and estimated federal tax expenditures for education, by category: Selected fiscal years, 1965 through 2008, *Digest of Education Statistics*. Retrieved March 21, 2010 from http://nces.ed.gov/programs/digest/d08/tables/dt08_373.asp

United States Department of Education, Institute of Education Sciences. (nd). Number and percentage of children served under Individuals with Disabilities Education Act, Part B, by age group and state or jurisdiction: Selected years, 1990–91 through 2006–07. *Digest of Education Statistics*. Retrieved March 21, 2010 from http://nces.ed.gov/programs/digest/d08/tables/dt08_052.asp

United States Department of Education, Institute of Education Sciences. (nd). Federal on-budget funds for education, by level/educational purpose, agency, and program: Selected fiscal years, 1970 through 2009, *Digest of Education Statistics*. Retrieved February 27, 2010 from http://nces.ed.gov/programs/digest/d09/tables/dt09_375.asp

United States Department of Education, Institute of Education Sciences. (nd). U.S. Department of Education appropriations for major programs, by state or jurisdiction: Fiscal year 2008, *Digest of Education Statistics*. Retrieved February 27, 2010 from http://nces.ed.gov/programs/digest/d09/tables/dt09_378.asp

- United States Department of Education, National Center for Education Statistics. (2009). Fast Facts. *Digest of Education Statistics*, 2008 Retrieved February 27, 2010 from <http://nces.ed.gov/fastfacts/display.asp?id=64>
- Walsh, L. (2010). Houston ISD takes step toward transparency with details on school funding sources. Texas Watchdog. Retrieved December 9, 2010 from <http://www.texaswatchdog.org/2010/11/houston-isd-step-toward-transparency-with-details-on-funding-sources/1290110352.column>
- Woosley, T., Sands, D. I., & Dunlap, W. (1987). An instrument to screen sensory impaired persons for referral to physical and occupational therapy. *Journal of Rehabilitation*. 53, 66-69.
- Zeger, S. L., & Liang, K. Y. (1986). Longitudinal data analysis for discrete and continuous outcomes. *Biometrics*, 42, 121-130.