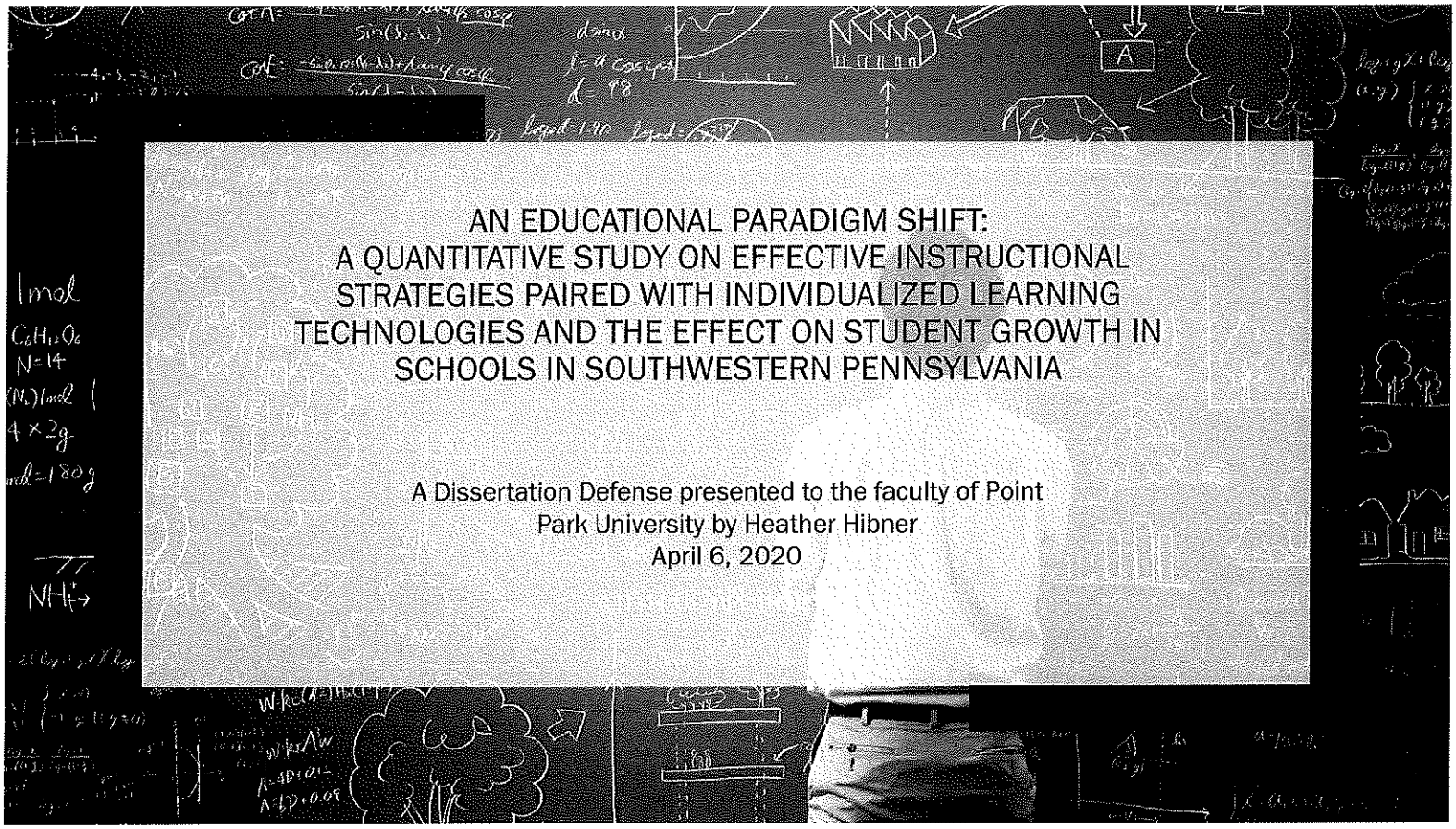


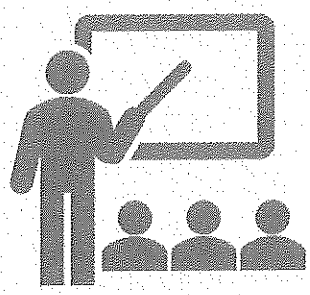
AN EDUCATIONAL PARADIGM SHIFT: A QUANTITATIVE STUDY ON EFFECTIVE INSTRUCTIONAL STRATEGIES PAIRED WITH INDIVIDUALIZED LEARNING TECHNOLOGIES AND THE EFFECT ON STUDENT GROWTH IN SCHOOLS IN SOUTHWESTERN PENNSYLVANIA

A Dissertation Defense presented to the faculty of Point Park University by Heather Hibner

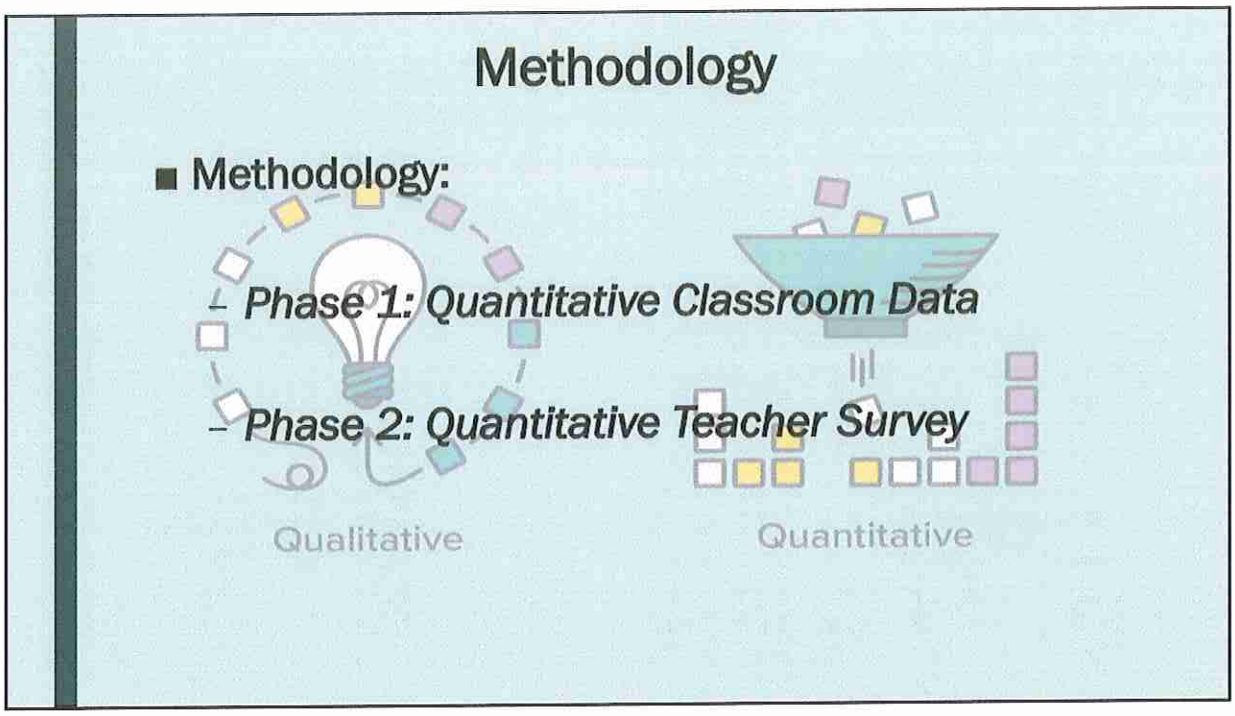
April 6, 2020

Research Questions:

- R1: Does student growth on the Northwestern Evaluation Association's MAP assessment significantly differ between classrooms implementing individualized learning technologies versus classrooms not implementing individualized learning technologies?
- R2: What specific instructional strategies are teachers using in high-growth versus low-growth classrooms that are implementing individualized learning technologies?



The following research questions guided this study:



The methodology of this study was a purely quantitative study which occurred in two phases of data collection. Phase one was a collection of NWEA classroom assessment scores from an initial testing administration and a second testing administration from all schools within this sample. This included 3 schools that do implement the ILT of eSpark, and 3 schools that do not implement the ILT- or any ILT.

The second phase of data collection involved collecting survey results from teachers of ILT/NWEA schools. This survey was on a Likert scale.

NWEA/MAP Assessment

First research question involved collecting two different classroom RiT scores from all NWEA only- and NWEA/eSpark classrooms.

Second research question was answered by the left column of the tool which asks teachers to asses the frequency of usage of different instructional strategies.

This tool was made into a digital tool and disseminated to classroom teachers in ILT schools to complete on a voluntary basis.

Population

Southwestern Pennsylvania K-8 Schools

Sample

- RQ1:
  - *NWEA/ eSpark Schools*
    - School A
    - School B
    - School C
  - *NWEA only Schools*
    - School D
    - School E
    - School F

RQ2:

- Survey was disseminated to NWEA/eSpark classroom teachers (68 teachers)

The population from which the sample for this study was drawn included all southwestern Pennsylvania public elementary schools. Two samples were created from this population.

The first sample included six schools districts that implement the NWEA MAP assessment to track and assess student growth. From this sample, a smaller, sub-sample of schools who also use eSpark as an individualized learning technology was created.

This study excluded any school that does not use the NWEA/MAP assessment for the sake of consistent comparisons. This study also excluded charter, magnet, and cyber schools for the sake of consistent comparison.

Data Collection Procedures

Research Question 1:

- 3 NWEA/ and eSpark Schools
  - *2 NWEA/MAP assessment scores were obtained for each classroom*
  - *Resulted in 200 paired data points*
- 3 NWEA/ Non-eSpark Schools
  - *2 NWEA/MAP assessment scores were obtained for each classroom*
  - *Resulted in 515 paired data points*

PHASE ONE: data collection for this study was the classroom growth data on the NWEA/MAP Assessment (Grades K-8) from classrooms of schools in Southwestern Pennsylvania. The first step of data collection was to identify schools using the NWEA/MAP Assessment. A list of schools using the MAP Assessment was procured from the regional representative of the NWEA. From this list of schools using the MAP Assessment, a smaller sample of schools that were implementing a specific individualized learning tool was deciphered. In order to collect data from all of the school districts, permission was first granted from school district superintendents.

Classroom data was obtained from 347 classrooms from 17 school buildings within 6 school districts in southwestern Pennsylvania. Data was collected from 2017-2018, 2018-2019 school years and was collected from both sample sets of schools..

Data Collection Procedures

Research Question 2:

Sample

- Teachers from all 3 NWEA/ and eSpark Schools were given the survey
- 32/ 68 teachers completed the survey (47% response rate)
  - *7 teachers were identified as Low Growth Classrooms*
  - *25 teachers were identified as High Growth Classrooms*

PHASE TWO: The next phase of this study surveyed instructional strategies teachers are using in high growth versus low growth classrooms that are implementing individualized learning technologies. In order to obtain this data, a teacher survey was administered which was developed by researchers at the University of Delaware. Some slight verbiage modifications were pilot tested for reliability prior to dissemination. Within this survey, the classroom teachers self- reported the instructional strategies they are using paired with ILT. These were assessed for commonalities in classrooms that demonstrate high growth and classrooms that demonstrate low growth.

CHAPTER 4

Results

The purpose of this study was to examine the effect that individualized learning technologies has on student growth on the NWEA/ MAP Assessments.. This study also examined which strategies are used in classrooms with low overall student growth as measured on the NWEA/MAP Assessment. Instructional strategies were measured through a teacher survey on a Likert scale. Growth was measured in two different ways- in overall growth of points, as well as overall percentage of growth. The sample included six school districts in Southwestern Pennsylvania. All six school districts were schools who administered the NWEA/MAP Assessments multiple times throughout the course of a school year. Data was collected from the 2017-2018 and 2018-2019 school years. Three out of the six schools also used the same ILT, which is an individualized learning technology that creates individualized learning pathways based on assessment results from the NWEA/MAP Assessment.

STATISTICAL RESULTS FROM RESEARCH QUESTION 1:

The classroom data that were used in this study consisted of classroom RiT scores from two administrations of the NWEA/ MAP Assessment from 6 school districts in Southwestern Pennsylvania. Three of the school districts did implement eSpark and were identified as ILT Schools. Three of the school districts did not implement eSpark, an individualized learning technology and were identified as Non- ILT Schools. Classroom data was collected from all districts in this study on both the Reading NWEA/MAP Assessment and the Math NWEA/MAP Assessment from an initial administration of the exam as well as a secondary administration of the exam. This resulted in 200 ILT classroom paired data points and 515 Non- ILT classroom paired data points. Growth on the assessment was tested in overall percentage of growth as well as point growth.

Decriptive Statistics from Research Question 1:

Summary of Percentage of Growth

	Mean	Std. Deviation	N
ILT School	11.6%	0.055	200
Non ILT School	6.9%	0.048	515
Total			**715**

Explain descriptive data here- percentage of mean growth for both sets.

Decriptive Statistics from Research Question 1:

Summary of Overall Growth

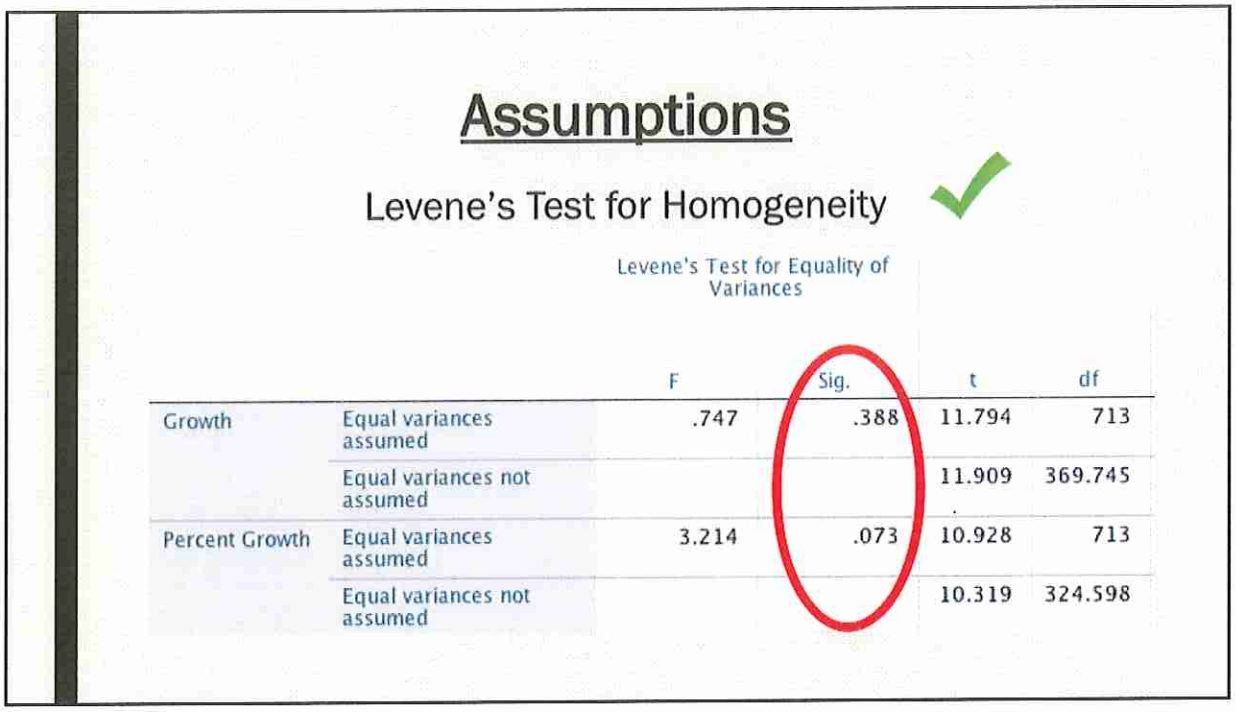
	Mean	Std. Deviation	N
ILT School	19.3 points	0.502	200
Non ILT School	12.3 points	0.317	515
Total			**715**

Explain descriptive data here- overall mean growth for both sets.

Assumptions of Independent Samples T-Test

1. Dependent variable is continuous ✓
2. Independent variable is categorical with two separate groups ✓
3. There is independence of observations with the Independent variables ✓
4. No major outliers ✓
5. Sample has homogeneity of variance ✓
6. Sample is normally distributed ✗

1. The dependent variable is the NWEA/Map Assessment scores. This was an ordinal variable and was the same scale for each testing group.
2. The Independent Variables were the two groups from the sample: schools that are implementing ILTs and schools that are NOT implementing ILTs.
3. Independence of observation means that the groups are indeed separate and no classroom or school could be in both groups. That was the case with this study- there were no shared data points.
4. There were also no major outliers and the sample size overall was large. Outliers tend to be more of a statistical issue when the sample is small.



Prior to running inferential tests, the requisite tests for homogeneity of variance and normality were conducted to determine if the data met the assumptions of the *t*-test. The data was tested with Levene's test for equality of variances and revealed there was homogeneity. (Both numbers are >.05 which indicates that the data has little variance from one data set to the next).

What does levene's test for (layman's) inferential statistic used to assess the equality of variances for a variable calculated for two or more groups. The variance calculates how 'far' apart numbers are from the average value/ mean. If the p value is above .05, then it means that the two random sample groups are approximately the same in variance (GOOD). If the p value is below .05 then it means that more than likely the variance isn't accidental and it is unlikely to have occurred based on random sampling (BAD).

Assumptions

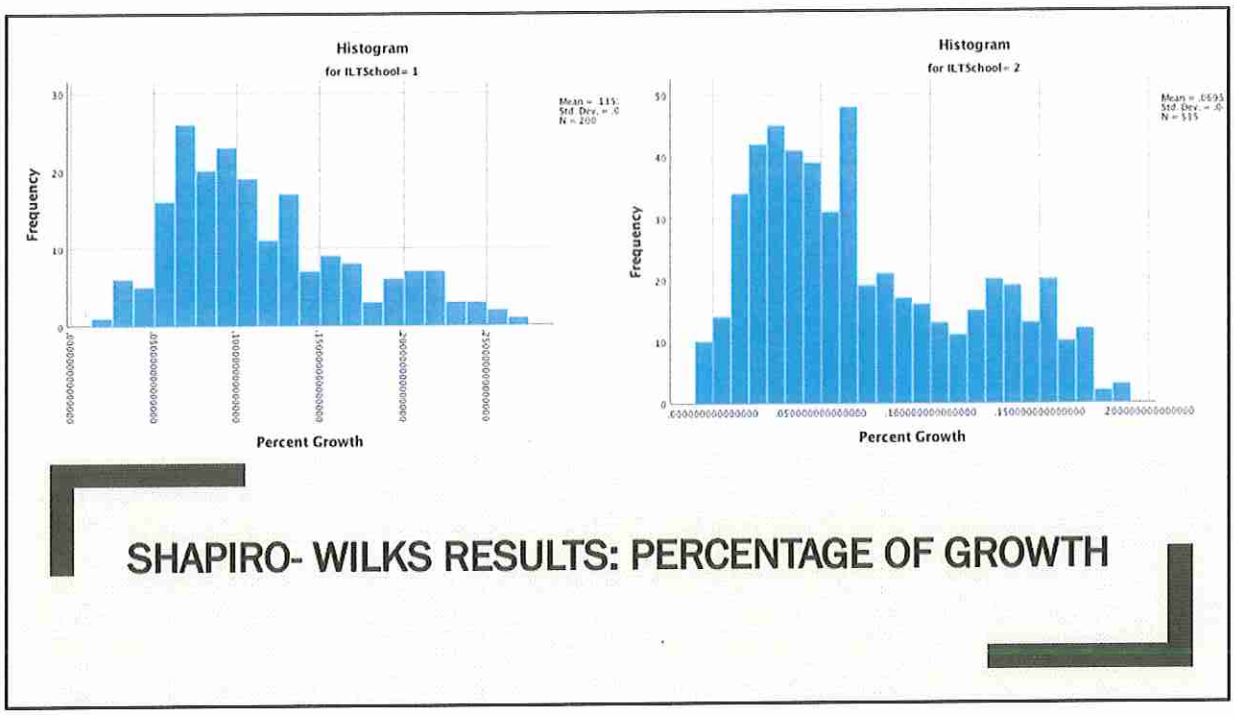
Shapiro Wilks Test for Normal Distribution ✗

Tests of Normality

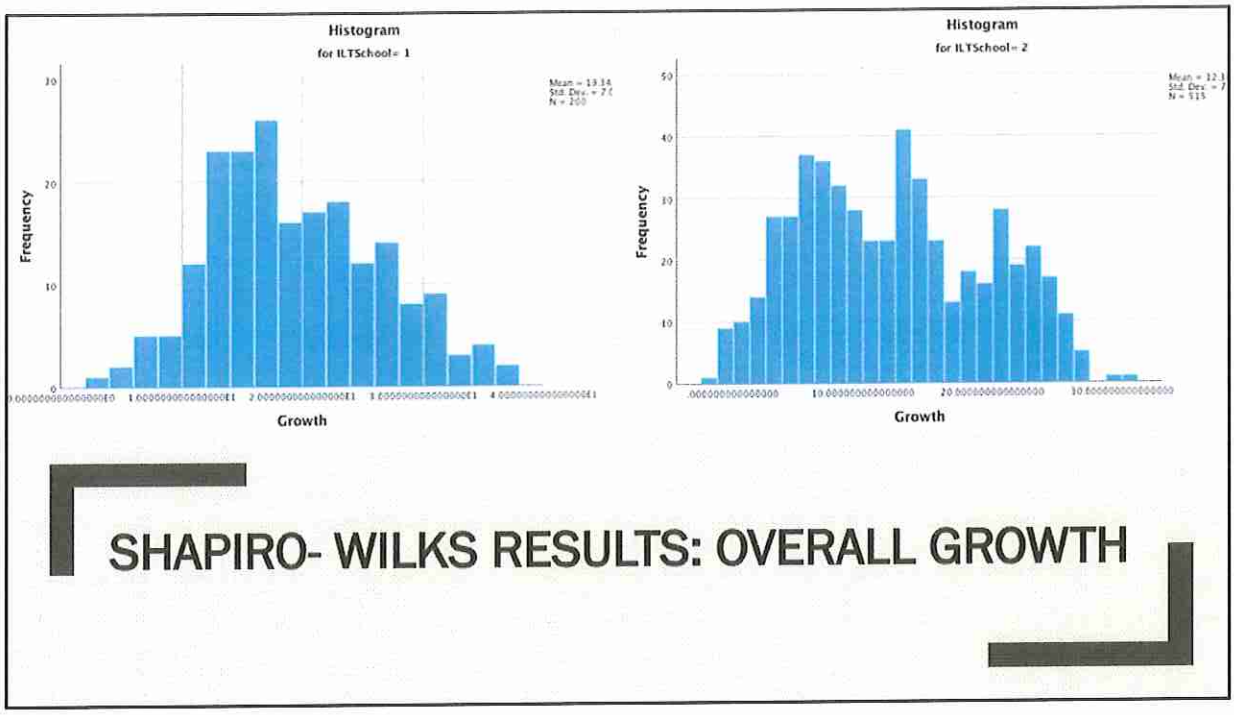
	ILT School?	Kolmogorov-Smirnov[a] Statistic	df	Sig.	Shapiro-Wilk Statistic	df	Sig.
Percent Growth	1	.121	200	.000	.937	200	.000
	2	.115	515	.000	.931	515	.000
Growth	1	.077	200	.006	.983	200	.017
	2	.073	515	.000	.970	515	.000

a. Lilliefors Significance Correction

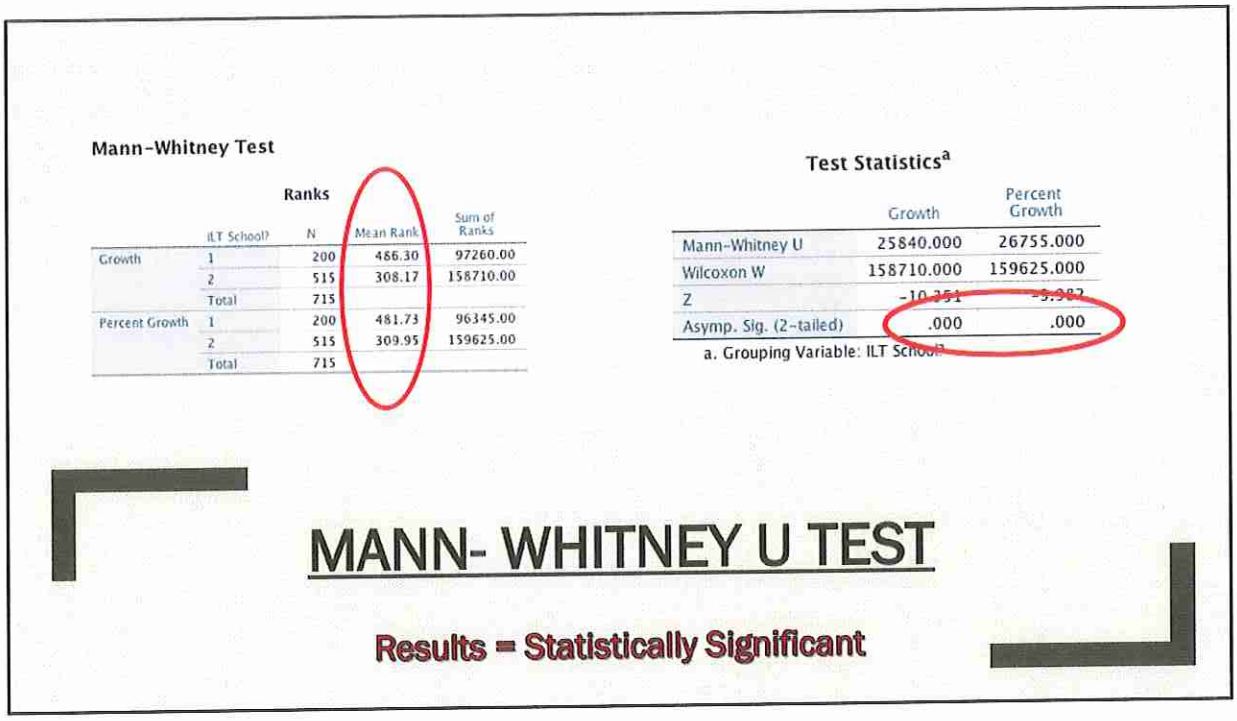
Next, a Shapiro- Wilks test was conducted on the combined math and reading score to test if overall growth and percentage of growth score were normally distributed. The Shapiro Wilks test presented a significant departure from normality ($p < 0.05$).



What does Shapiro Wilks test for: This tests that the data essentially follows a bell curve distribution. If the p value is below 0.05, that means that the data deviates from a normal distribution, and therefore there is a violation of this assumption- as can be seen in these graphical representations of the data. Multiple peaks exist in both indicting a deviation from normal distribution.



Since this assumption was violated as can be seen in this slide and the previous slide, an independent samples t-test could not be completed. Instead, a nonparametric test had to be run- called a Mann- Whitney U test.



The Mann-Whitney U test determined that percentage of growth scores for ILT schools (mean rank = 481.73) was statistically significantly higher than Non- ILT schools (mean rank = 309.95), $U = 26755$, $z = -9.982$, $p = .001$. The Mann-Whitney U test also determined that growth in overall points for ILT schools (mean rank = 486.29) was statistically significantly higher than Non- ILT schools (mean rank = 308.18), $U = 25840$, $z = -10.351$, $p = .001$. Results indicate that when an ILT is used in the classroom, there is statistically significantly higher student growth in overall points and well as percentage of growth on the NWEA/MAP Assessment.

Decriptive Statistics

Summary of Percentage of Growth on the NWEA Math Assessment

	Mean	Std. Deviation	N
ILT School	11.2%	0.05	98
Non ILT School	6.1%	0.05	254
Total			**352**

Summary of Overall Growth on the NWEA Math Assessment

	Mean	Std. Deviation	N
ILT School	18.8	7.01	98
Non ILT School	10.6	7.57	254
Total			**352**

Explain descriptive data here- percentage of mean growth for both sets.

Ranks

	ILT School?	N	Mean Rank	Sum of Ranks
Growth	1	98	246.46	24153.50
	2	254	149.51	37974.50
	Total	352		
Percent Growth	1	98	241.18	23636.00
	2	254	151.54	38492.00
	Total	352		

Test Statistics[a]

	Growth	Percent Growth
Mann-Whitney U	5589.500	6107.000
Wilcoxon W	37974.500	38492.000
Z	-8.013	-7.408
Asymp. Sig. (2-tailed)	.000	.000

a. Grouping Variable: ILT School?

MANN- WHITNEY U TEST: MATH RESULTS

Results = Statistically Significant

Overall Math Results

The Mann-Whitney U test determined that percentage of growth scores for ILT schools (mean rank = 241.2) was statistically significantly higher than Non- ILT schools (mean rank = 151.5), $U = 6107$, $z = -7.40$, $p = .001$. $U = 5589.5$, $z = -8.01$ $p = .001$. The Mann-Whitney U test also determined that growth in overall points for ILT schools (mean rank = 246.5) was statistically significantly higher than Non- ILT schools (mean rank = 149.51), $U = 5589.5$, $z = -8.01$ $p = .001$. Results indicate that when an ILT is used in the classroom, there is statistically significantly higher student growth in overall points and well as percentage of growth on the NWEA/MAP Math Assessment.

Decriptive Statistics

Summary of Percentage of Growth on the NWEA Reading Assessment

	Mean	Std. Deviation	N
ILT School	11.9%	0.06	102
Non ILT School	7.7%	0.05	261
Total			**363**

Summary of Overall Growth on the NWEA Reading Assessment

	Mean	Std. Deviation	N
ILT School	19.8	7.07	98
Non ILT School	13.9	7.57	261
Total			**363**

Explain descriptive data here- percentage of mean growth for both sets.

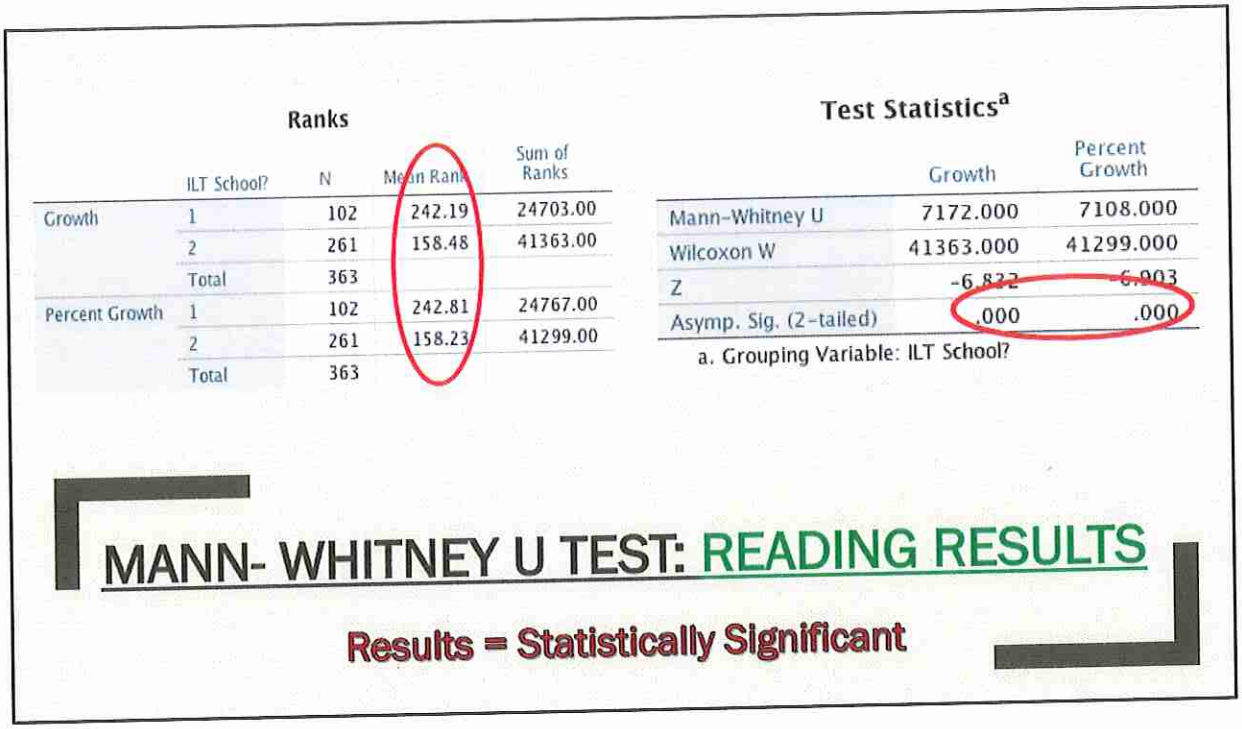
Ranks

	ILT School?	N	Mean Rank	Sum of Ranks
Growth	1	102	242.19	24703.00
	2	261	158.48	41363.00
	Total	363		
Percent Growth	1	102	242.81	24767.00
	2	261	158.23	41299.00
	Total	363		

Test Statistics[a]

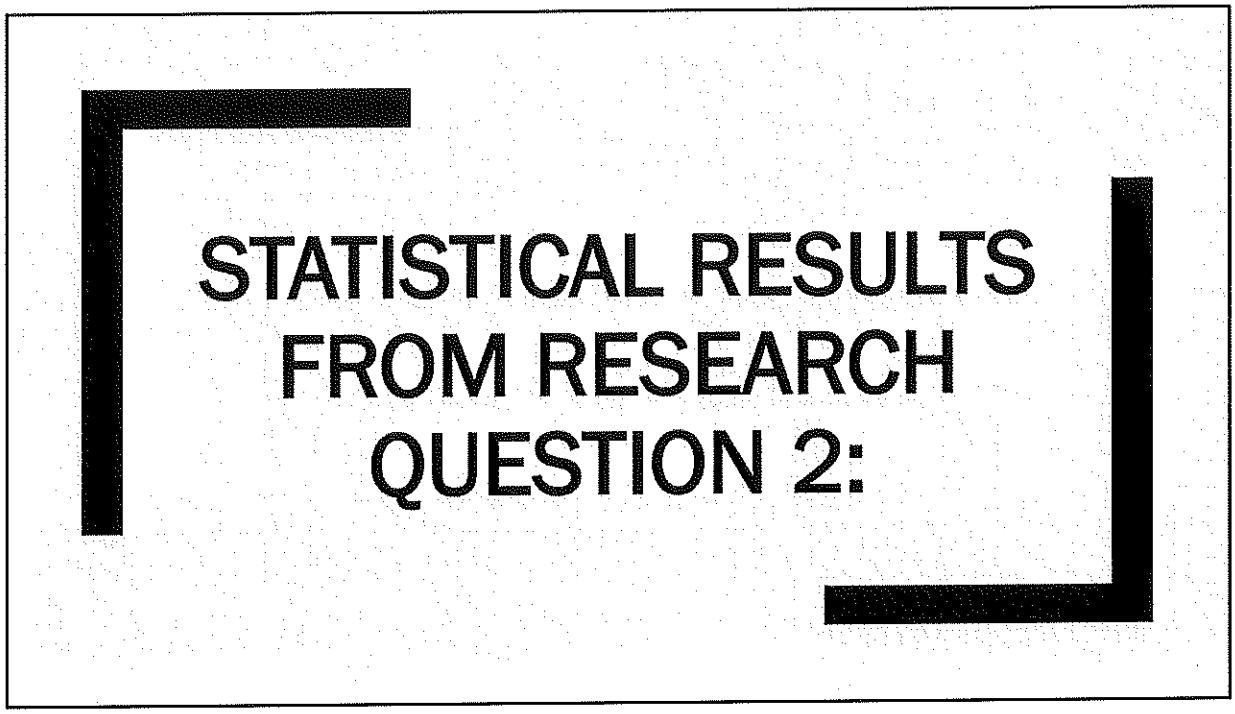
	Growth	Percent Growth
Mann-Whitney U	7172.000	7108.000
Wilcoxon W	41363.000	41299.000
Z	-6.832	-6.903
Asymp. Sig. (2-tailed)	.000	.000

a. Grouping Variable: ILT School?

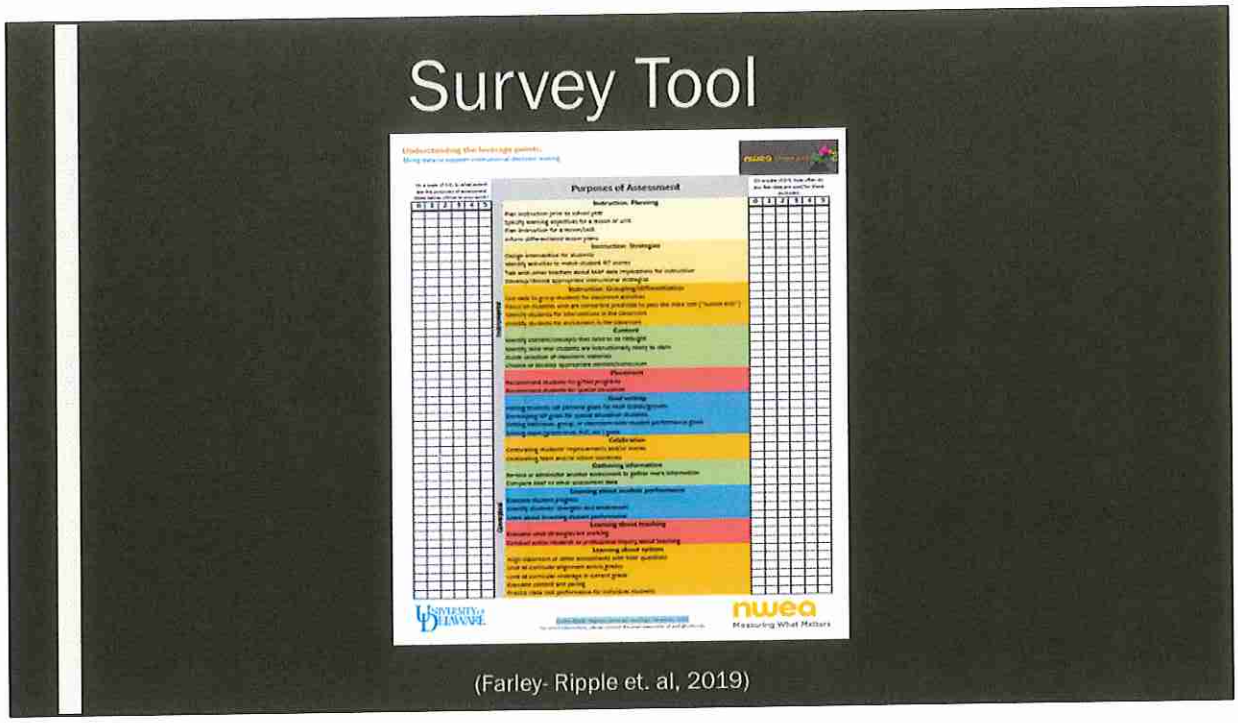


Overall Reading Results

The Mann-Whitney U test determined that percentage of growth scores for ILT schools (mean rank = 242.8) was statistically significantly higher than Non- ILT schools (mean rank = 158.2), $U = 7108.0$, $z = -6.90$ $p = .001$. The Mann-Whitney U test also determined that growth in overall points for ILT schools (mean rank = 242.2) was statistically significantly higher than Non- ILT schools (mean rank = 158.5), $U = 7172.0$, $z = -6.83$, $p = .001$. Results indicate that when an ILT is used in the classroom, there is statistically significantly higher student growth in overall points and well as percentage of growth on the NWEA/MAP Reading Assessment.



The data collected for this phase of the study were survey responses from classroom teachers in schools who are implementing *eSpark*.



The survey was developed by researchers at the University of Delaware (2019) and assesses the frequency of use of specific instructional strategies. This survey was put into electronic form and disseminated to the school leadership to preview and disseminate. The survey was voluntary and was sent to classroom teachers in 3 school districts in Southwestern Pennsylvania who use NWEA/MAP Assessments as well as eSpark. The survey administered was a Likert- scale survey on a 0-5 scale which asked classroom teachers to rate their frequency of usage of 35 different instructional strategies.

Descriptive Statistics: Research Question 2

	Total Teachers	Total Surveys Completed	Percentage
School A	10	9	90%
School B	13	6	46%
School C	45	17	37%
TOTAL	**68**	**32**	**47%**

The survey resulted in 32 responses from classroom teachers from all three of the school districts surveyed.
School A had 9 out of 10 teachers respond
School B had 6 out of 13 teachers respond
School C had 17 out of 45 teachers respond.

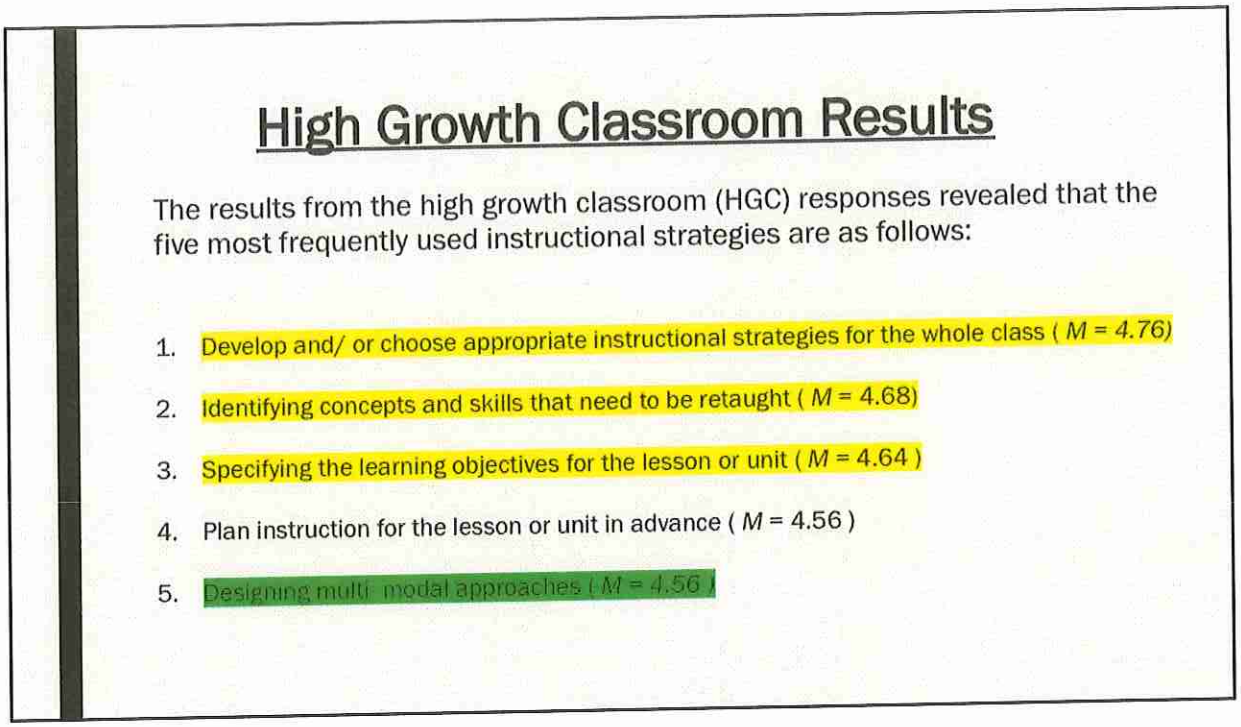
This resulted in 32 out of 68 possible responses, which equates to a 47% response rate.

High Growth Classrooms vs. Low Growth Classrooms

	Number	Percentage
High Growth Classrooms	25	78%
Low Growth Classrooms	7	22%
Total	**32**	**100%**

Based on overall classroom growth on the NWEA/MAP Assessment results which were collected in phase one, these 32 teachers were categorized into two groups: high growth classrooms and low growth classrooms. These categories were determined using RiT Scale Norms that were constructed by NWEA (2015) and provide growth norms for both individual students and for schools.

Of the 32 respondents, 7 of those classroom teachers were identified as generating *low growth* and 25 of the respondents were identified as generating *high growth* by comparing their mean growth to the NWEA Student Growth Norms. There were no respondents who had average growth scores according to the NWEA Classroom Growth Norms; all respondents generated scores that fell above the grade-level norm or below it.



Teachers reported that most often they design instruction for the class as a whole and identify concepts that need to be retaught. This leads to the development of the specific learning objectives for the lesson or unit, which is therefore planned in advance of the instruction and based on professional judgement. Teachers in HGC reported that they design and incorporate multi-modal approaches to instruction.

Take note of the top three instructional strategies. They are highlighted because they are identical on both HGC and LGC. The bottom strategy was reported as the 5th most frequently used by HGC and also appears on the LGC top 5 but in the 4th slot.

Low Growth Classroom Results

The results from the low growth classroom (LGC) responses revealed that the five most frequently used instructional strategies are as follows:

1. Develop and/ or choose appropriate instructional strategies for the whole class (*M* = 5.0)
2. Identifying concepts and skills that need to be retaught (*M* = 4.70)
3. Specifying the learning objectives for the lesson or unit (*M* = 4.50)
4. Designing multi modal approaches (*M* = 4.50)
5. Identify the skills that students are instructionally ready to learn(*M* = 4.50)

Teachers of LGC responded that most frequently, they develop appropriate instructional strategies for the whole class, along with identifying concepts that need retaught. This generates specific learning objectives for the lessons and incorporates multi- modal approaches. Low growth teachers also reported that they more frequently identify the skills that the students are instructionally ready to learn.

Comparative HGC vs. LGC: Specific Strategy Results

Instructional Strategy	Low Growth Mean	High Growth Mean
• Differentiate individual lesson plans	3.71	4.48
• Designing interventions for individual students based on data	3.85	4.32
• Evaluation of student progress using formative and summative assessment data	3.28	4.12
• Incorporating a classroom aide in station teaching activities	1.14	3.12
• Aligning classroom assessments with NWEA/MAP questions	1.85	2.92

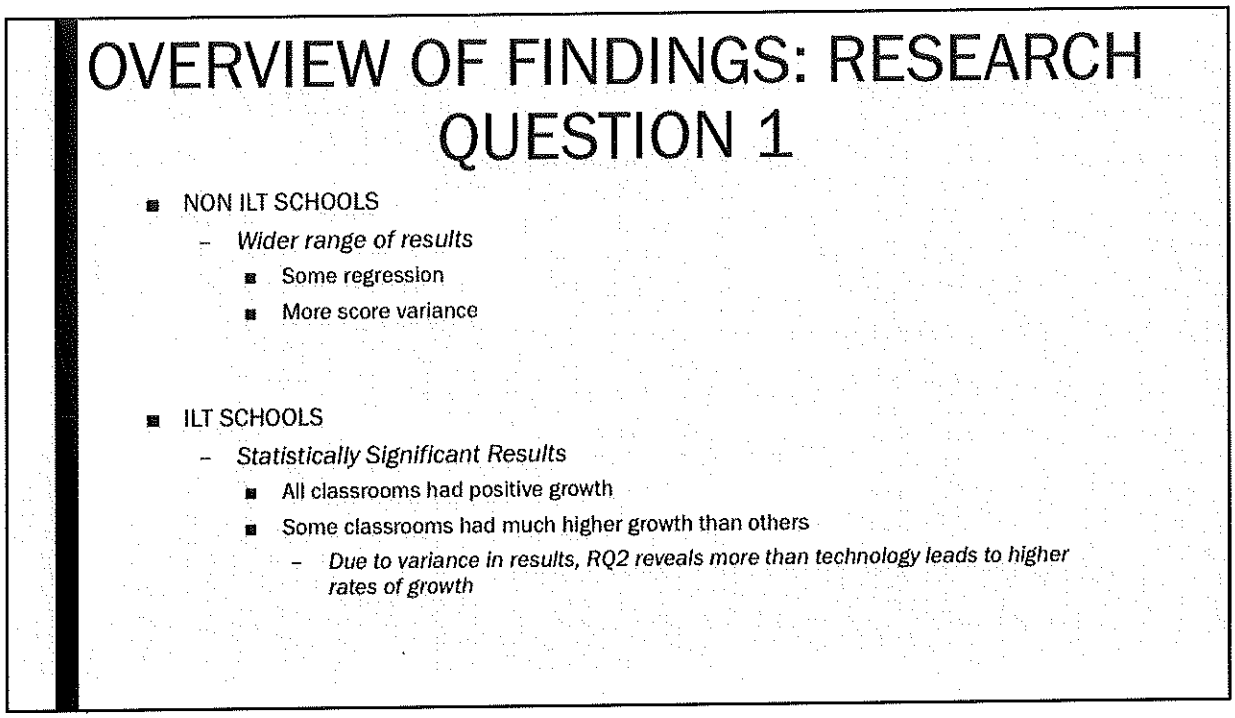
As mentioned, HGC teachers and LGC teachers reported similar strategies being used as their top five strategies. However, beyond the top five strategies, a more diverse response was reported by the HGC teachers as it pertains to strategies that are more individualized for students. High growth teachers reported that they differentiate individual lesson plans ($M = 4.48$) at a rate higher and therefore more frequently than LGC teachers ($M = 3.71$) . High growth teachers also reported higher rates of designing interventions for individual students based on data ($M = 4.32$) than teachers of LGC ($M = 3.85$). HGC teachers reported the evaluation of student progress using formative and summative assessment data at a higher rate of frequency ($M = 4.12$) than their low growth teacher peers ($M = 3.28$). While both groups had comparable rates of frequency of incorporating station teaching into their classrooms daily, high growth classroom teachers ($M = 3.12$) more frequently incorporated a classroom instructional aide to assist in the daily stations than their low growth peers ($M = 1.14$). HGC teachers additionally reported aligning classroom assessments with NWEA/MAP questions ($M = 2.92$) as opposed to LGC teachers ($M = 1.85$).

Comparative HGC vs. LGC: Specific Strategy Results

Instructional Strategy	Low Growth Mean	High Growth Mean
• Identification of students for interventions	4.40	4.20
• Identification of students for enrichment	4.40	4.04

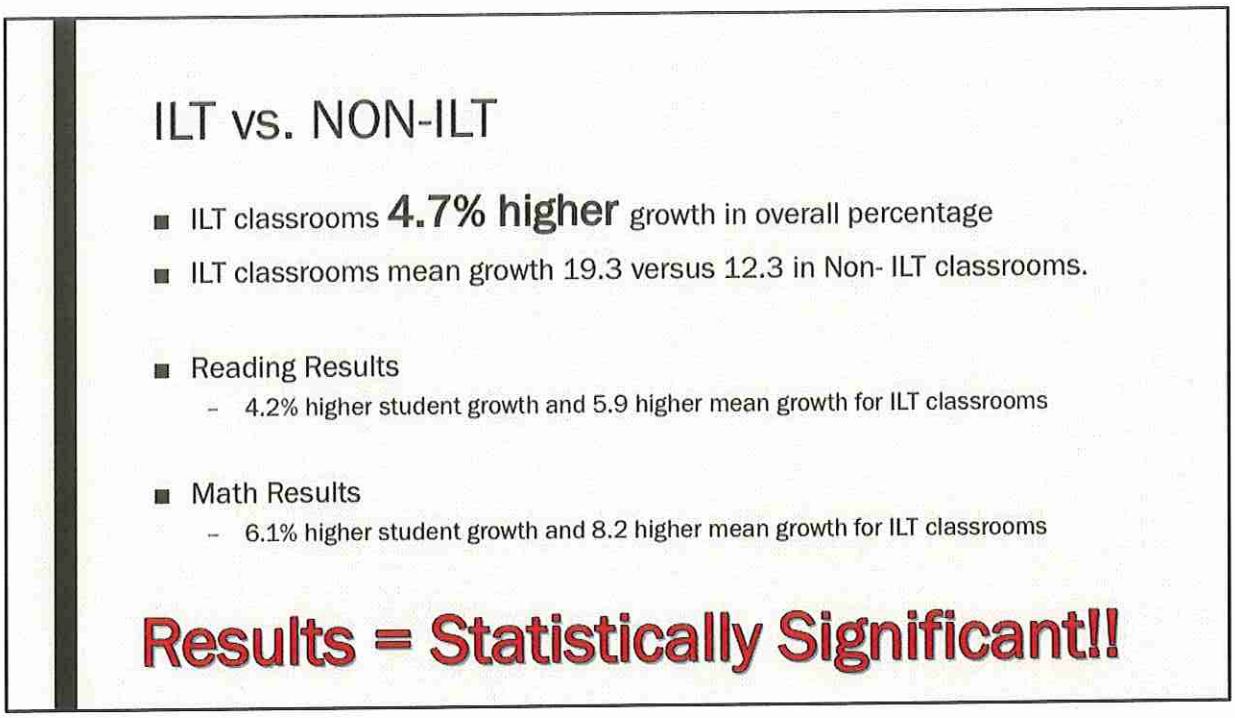
LGC teachers did report higher frequency of identification of students for interventions (*M* = 4.40) as compared to the high growth teachers (*M* = 4.20). However, this can be attributed to the fact that eSpark designs individualized learning pathways for students based on their NWEA/ MAP Assessment data and therefore the interventions are built into the individual learning roadmap. Additionally, similar results were reported for identifying students for enrichment. LCG teachers (*M = 4.40)* reported higher rates of frequency than HGC teachers (*M*= 4.04), however eSpark can also accelerate a student through competency- based progression of skill. Since eSpark has this feature, there would be lower rates of HGC teachers implementing this strategy.

The results from both research questions indicated that the incorporation of an ILT such as *eSpark* resulted in statistically significantly higher overall growth and percentage growth on NWEA/MAP Assessments in both Math and Reading. It was also determined that while some instructional strategies were common in HGC and LGC, there was also an increase in instructional strategies which focused on the individualization of learning for each student in the HGC.



The sample of schools that did not implement ILTs had a wider range of results; some classes experienced score regression where the overall points in the second administration reflected 'negative growth'.

While the ILT schools did experience higher rates of student growth, there were ILT classrooms who had significantly higher growth than other ILT classrooms, which was addressed by RQ2 and supports the TPACK theory; if the results were consistent and uniform across the entire subsample, the growth could have been attributed to the individualized technology, however a variation of scores accompanied by a teacher survey on instructional strategies reveals that higher rates of student growth involves more than just a technological tool.



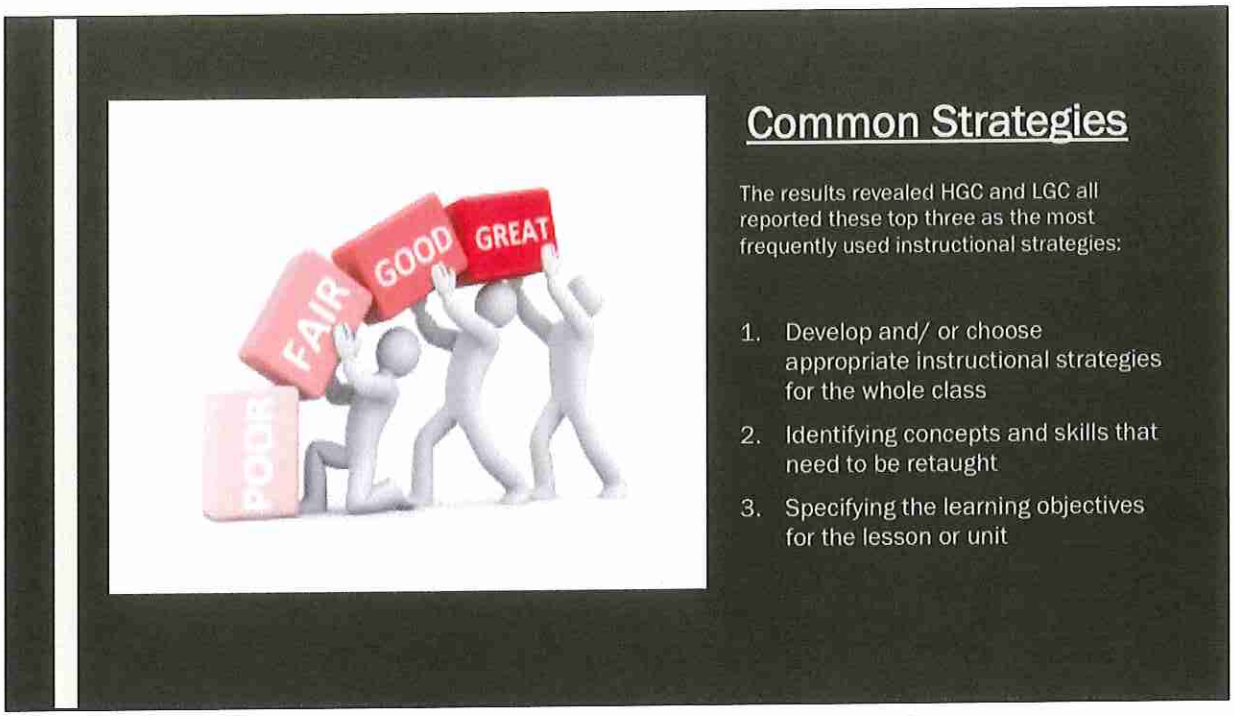
This study's findings suggest a significant relationship between the use of ILTs in classrooms and student growth on the NWEA/MAP assessment. Specifically, the research suggests that there is statistically significant student growth on NWEA/MAP assessments in classrooms that implement eSpark (p <.001) compared to classrooms who do not implement eSpark.

ESpark classrooms in this sample presented 4.7% higher growth compared to the Non-eSpark classrooms in overall percentage of growth indicating a relationship between the two Moreover, eSpark classrooms generated a mean growth of 19.3 overall points compared to 12.3 overall points in the Non-eSpark classrooms.

The results of the NWEA/MAP assessment for reading resulted in 4.2% higher student growth and 5.9 higher mean growth points. Additionally, the results of the NWEA/MAP assessment for math resulted in 6.1% higher student growth and 8.2 higher mean growth for eSpark classrooms.

The results indicated that there was a higher percentage of growth on the NWEA/MAP math assessment as compared to the NWEA/MAP reading assessment for eSpark classrooms.

The second phase of this study identified the instructional strategies that were reported to be most frequently used by eSpark teachers of HGC and eSpark teachers of LGC.



Initially, it was surprising to see that the top three instructional strategies were identical in the HGC and LGC. However, upon further reflection, the top three common strategies revolve around daily procedures in classrooms. Learning that resulted from this study is that high growth and low growth teachers have similarities in their most frequently used instructional strategies.

Despite the variance in classroom growth, these instructional strategies are to be expected in classrooms where there is positive student growth- even if it is deemed low growth; these three strategies are expectations of proficient teaching (Danielson, 2007) and are within the annual evaluation expectations of classroom teachers.

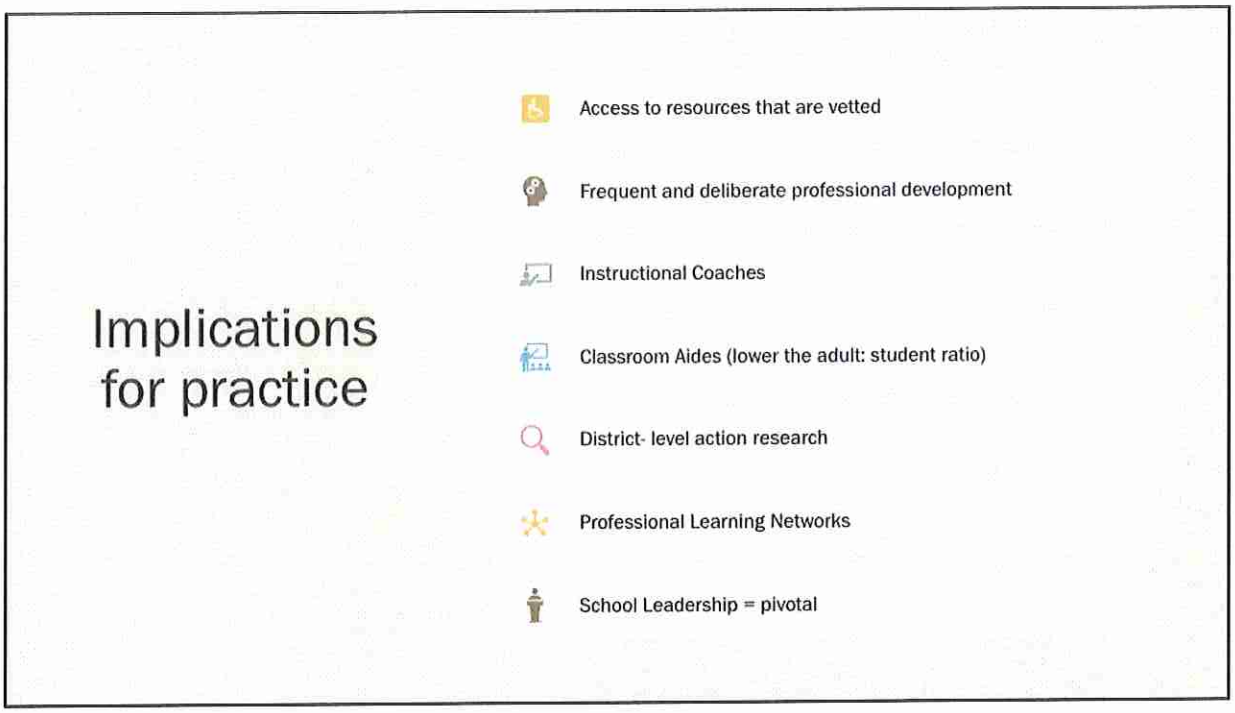
An interesting result, however, was the reported usage of individualized teaching strategies in the HGC as opposed to LGC. The survey results revealed that teachers of HGC design and implement interventions for individual students based on data (*M*= 4.32) at a higher rate than teachers of LGC (*M* = 3.85). Additionally, teachers in HGC more frequently (*M= 4.48*) differentiate individual lesson plans than teachers in LGC *(M*= 3.71). Lastly, teachers in HGC design station teaching with a classroom aide assisting (*M*= 3.12) at a much higher frequency than teachers in LGC (*M*= 1.14).

Instructional Strategy	Knowledge Type
Develop and/or choose appropriate strategies for the class as a whole	PK
Identify concepts/ skills to be retaught	CK
Specify the learning objective for the lesson or unit	CK
Design multi-modal approaches	TPACK

OVERVIEW OF FINDINGS: RESEARCH QUESTION 2

This research was grounded in the TPACK Theory which states that the effective integration of technology in the classroom requires depth of knowledge of technology, pedagogy, and content knowledge (Mishra & Koehler, 2006). The TPACK theory states that technology is not the sole answer to classroom reform nor increased student growth, but rather requires the skillful interplay of the three knowledge types by the classroom teacher.

The second phase of this research examined frequency of instructional strategy implementation in high growth and low growth ILT classrooms. This portion of the study revealed higher frequency of use of instructional strategies in both HGC and LGC which require varying knowledge types (CK, PK, TK) and in some cases require more complex knowledge types (PCK, TPK, TCK).



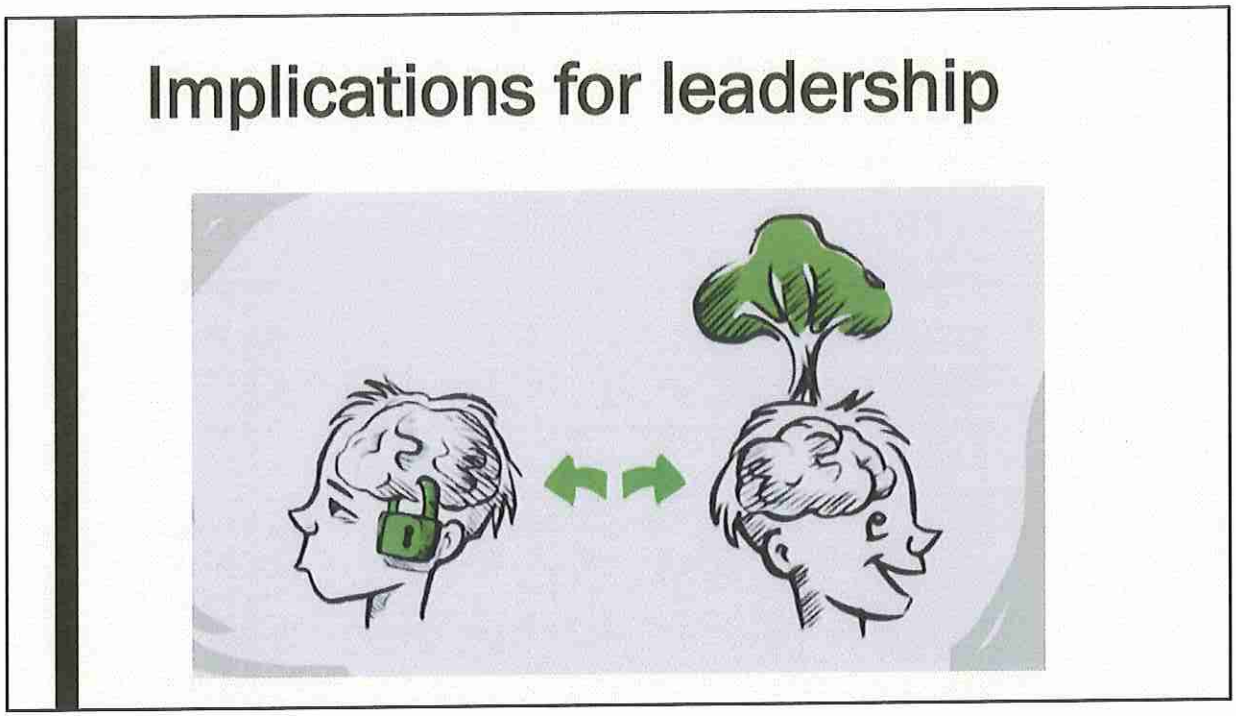
Allowing classroom teachers the ability to access resources- both traditional and technological, which are tailored to an individualized approach to learning is essential. If school leaders considered the benefits to acquiring and implementing effective tools, teachers would not have to contend with the overwhelming tasks of vetting the technological tools in addition to their other job requirements; if teachers need not focus on finding appropriate tools, then they can refocus on the task of truly educating their students. Should school leadership not recognize the benefit, then most likely, student growth would not be as high as teachers would have to take on this added task.

Classroom teachers are asked to perform a myriad of tasks on a daily basis- one of which is to ensure mastery of content for each student in the room. However, the pressure of standardized testing creates a rush to cover an array of materials without truly ensuring individualized mastery by the students. Asking classroom teachers to accomplish this is already a daunting task, but a virtually impossible one sans technology.

Another implication for practice is the benefit of the implementation of frequent and deliberate professional development and for the inclusion of instructional coaches on

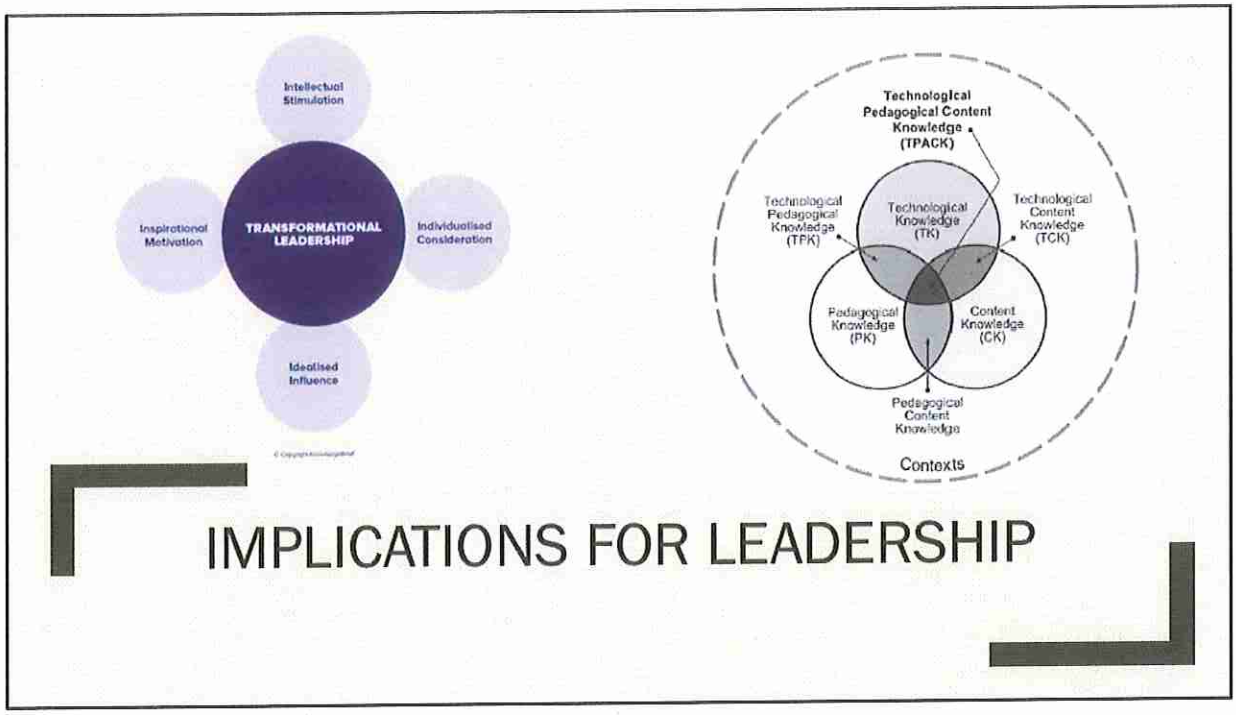
the teaching staff. Having coaching positions solely dedicated to supporting teachers and assisting them in refining and reiterating their craft of teaching would undoubtedly promote student growth. Aside from instructional coaching, the research also revealed that implementing a classroom aide into the design of the lesson- specifically in stations, is an instructional strategy that was used almost daily in HGC. Adding an instructional aide to the classroom lowers the adult: student ratio, which enables a more individualized focus towards the students' learning.

Action research, cohort teaching groups, professional learning communities, etc., are all ideas that can be implemented into the current public education model, however, without the guidance and vision and support of school leadership, these activities cannot be sustained. The goal of schools is to facilitate the learning of every student. In some cases, a school vision and mission will help drive this into reality. In an effort to promote individualized learning, school leadership must build it into the fabric of the district. Moreover, school leaders who are not currently promoting the use of an ILT should consider the purchase of one. This research has proven through statistical analysis that the incorporation of eSpark or a similar ILT into the classrooms has resulted in higher levels of student growth compared to schools who are not using them. Pairing the ILT with the NWEA/MAP assessments is also a key implication for not only school leaders, but classroom teachers as well.



The constant evolution of technology is a driving force for societal change and therefore organizations will require leaders who are perpetual learners (Schein, 2017). The implications that this study has on school leadership is the necessity of a growth mindset. The results indicate that school leadership must be active and dynamic lead- learners with an awareness of new educational tools. Moreover, they must contend with advances in technology, support the creation of an updated curriculum which infuses technological tools and monitor and adjust the vision of the organization to keep up with societal expectations.

In order to shift a school organization from the traditional to a more modern system of student- centered learning requires transformational leadership skills. According to Northouse (2017), transformational leadership is a process that changes and transforms people through concern with personal values, ethics and with long-term goals that moves those within the organization to accomplish more than is typically requested of them. Since this study has implications on practice which include the individualization of content, leadership could assist these efforts by providing a supporting and empowering culture and infrastructure. According to Northouse (2017), there are 4 characteristics of transformational leadership: idealized influence, inspirational motivation, intellectual stimulation and individualized consideration.

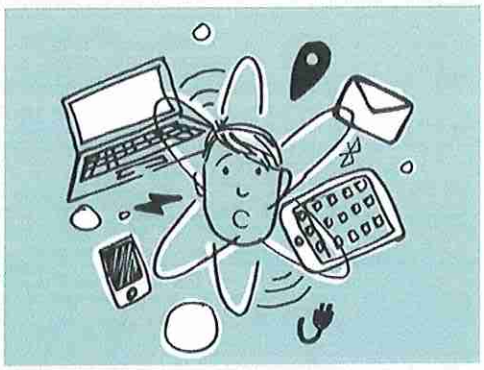


Transformational school leaders should recognize the benefits of idealized influence and by being an organizational role model and by establishing a foundation of trust through demonstrated competency and high standards of moral conduct (Northouse, 2017). Inspirational motivation requires transformational school leaders to communicate expectations to the stakeholders and inspire them to all work tougher towards the common goal of educating and growing each individual student (Northouse, 2017).

Individual consideration requires school leadership to provide a supportive climate in which they listen carefully to the needs of the teachers and students (Northouse, 2017). School leaders act in this circumstance as coaches who assist the teachers in becoming better at their craft. This could mean allocation of resources, individualized professional development, or updating curricula. Intellectual stimulation encourages teachers to think of new and innovative instructional strategies and to support them as they implement these new approaches.

The TPACK theory places an importance on a varying set of knowledge skills for educators (CK, PK, TK) and states more complex knowledge types (PCK, TPK, TCK) are essential in a modern learning environment. In order to facilitate an educational

paradigm shift, school leaders need to be aware of the varying knowledge types and the importance of designing and implementing these knowledge types in an individualized modern classroom environment. Classroom teachers, just like the student learners, all have different needs as it pertains to professional development, and will therefore require a more personalized approach to learning. This responsibility lies on school leadership; School leaders need to approach professional development very differently than has been done in the past. No longer will one-size-fits-all methods of professional development suffice. School leadership should assess the current needs of the organization as a whole, followed by the individual needs of classroom teachers. Some teachers may have a strong base in technological knowledge (TK) as well as a solid foundation in content knowledge (CK), but perhaps they struggle with the more complex knowledge type of technological content knowledge (TCK). School leaders' awareness of these different knowledge types and organizational need is the first step to setting a vision for a shift from a traditional method of teaching to a more modern one.



EQUAL ACCESS

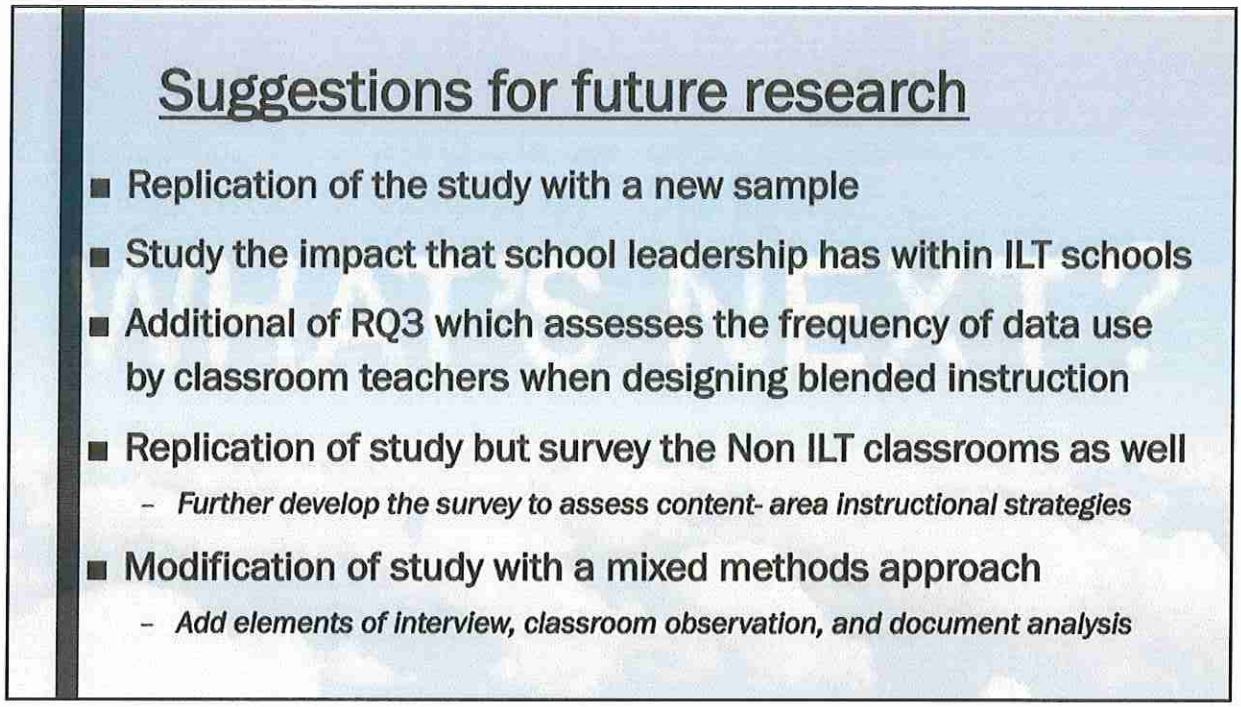
IMPLICATIONS FOR POLICY

1. The results of this study suggest a need for policy related to educational technology evaluations prior to the tool being made publicly available for purchase by school districts. There are no existing credibility requirements prior to an educational technology tool hitting the market. This lack of vetting and criterion has led to an oversaturation of the market causing challenges for schools to more efficiently incorporate ILTs.

2. Equal access to resources is always a contentious topic in education. The National Education Technology Plan (NETP) of 2017 presented the need for more equitable access to devices. School districts purchase within the confines of their own individual budgets and therefore have varying amounts of money allotted to computer access. The NETP of 2017 called for greater equity of access to technology and research conducted by J-PAL Evidence Review (2019) states that programs to expand access to technology have been effective at increasing computer use and access and therefore improving computer literacy skills.

The United States Office of Educational Technology has recently partnered with Digital Promise to develop the 2020 National Educational Technology Plan. Some topics that will be addressed in the forthcoming NETP involve further ensuring equal

computer access and also access to transformational learning experiences such as individualized learning technologies. Whether or not this forthcoming plan will address the need to implement more stringent vetting standards of educational technology is yet to be determined. Until there is a policy in place, however, school districts will have to rely on tools such as the Rapid Cycle Evaluation tool previously mentioned. This is less than ideal since school districts do not have the fiscal or human resources readily accessible to accomplish this vetting in a timely manner.



- Replication of this study with a new sample is recommended. This sample included 6 school districts in southwestern Pennsylvania, however, conducting this study with a completely different sample could further strengthen the results of this study.
- Another recommendation for further study would be to research the impact that school leadership has on the perception of high growth versus low growth classroom teachers. Attitude often reflects leadership, and therefore researching this could reveal whether growth is a result of leadership and culture. Assessing the impact that culture has on growth in high growth schools is another potential study and research is lacking in this area as well.
- It would also be worth studying the reported usage of student and classroom data by the classroom teachers when designing instruction.
- One recommendation for future research would be to replicate this study but also administer the teacher survey to the Non-ILT classrooms as well. Researching the techniques that Non-ILT teachers are using and comparing those strategies to the ILT teachers could potentially reveal a commonality of instructional design between the two groups- or a vast difference.
- employ a mixed methods approach. Adding elements of interview, observation, and document analysis would add a more qualitative dimension to the pool of

research thus making the data more robust. Interviewing classroom teachers about specific instructional strategies could potentially reveal effective strategies that had not previously been surveyed or assessed. Classroom observations would validate the importance of the relationship between teacher and student as well, which is something that was not assessed on the teacher survey.