RETURN ON INSTRUCTIONAL INVESTMENT (ROII) MODEL: A PRACTICAL GUIDE FOR SCHOOL LEADERS

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ABSTRACT

Return on investment is a concept originated in business, but with applicability in K-12 education. This article introduces a new model called Return on Instructional Investment (ROII). ROII is based on a data-driven decision model utilizing six sigma concepts for educational improvement initiatives. ROII measures the magnitude of educational benefit and potential impact among stakeholders as the return of the investment that must be weighed against the cost to obtain these benefits. Examples of application for this model and potential for future research are discussed.

Keywords: Education Finance, Return on Investment, Education Investment, School Finance.

INTRODUCTION

The goal of this paper is to provide educational leaders with a practical model that can allow them to strategically allocate limited resources to maximize student achievement in the K-12 educational arena. In the business world, one of the key metrics utilized to evaluate and select projects which will create value for the company is Return on Investment (ROI). The evaluation of return on investment allows business leaders to conduct a quantitative analysis of the dollar-denominated costs and benefits provided by varying potential investments. This quantitative evaluation is then combined with a qualitative, strategic perspective, which is unique to each specific company, regarding the optimal allocation of resources. Although return on investment is a key model used in the business industry, unfortunately, it has not been utilized extensively in the K-12 education industry. There are multiple reasons for this lack of implementation which will be discussed in this paper. A major logistical component of the problem has been the difficulty in applying the model to the education industry due to the frequent lack of dollar-denominated return data that can be used in the model. This is due to the fact that many investments within school settings are instructional programs in which the benefit is quantified based on student achievement or growth, rather than dollars. The authors of this article have developed a practical model to meet the needs of education leaders which they have entitled, return on instructional investment or ROII. This quantitative model overcomes the difficulties in applying the traditional return on investment model by using alternative metrics for evaluation. This paper first presents a literature review of the relatively new, existing research in this subject, followed by a review of the ROII model, results of its application in the education setting, and a discussion regarding future application of the model.

LITERATURE REVIEW

The proposed Return on Instructional Investment (ROII) model allows schools to evaluate investment opportunities based on their costs and associated benefits, often dubbed "*cost-benefit analysis*" in the business industry. The ROII model creates a transparent, objective methodology for ranking various instructional program investments. It allows school leaders to identify investments with the best "*bang for the buck*", in which "*the buck*" is often limited in the school setting, based on funding restrictions and guidelines. This model will aid educational institutions with their approach to major investments.

The expressions "*what you don't know won't hurt you*" and "*ignorance is bliss*" seem to describe the mentality used in the education industry regarding financial decision making and resource allocation. Based on discussions with many educational leaders during this study, as well as information collected from the literature review, several motives for this perspective emerged. Educational leaders often lack training, knowledge or have fear of using a quantitative evaluation tool. A significant portion of school administrators' time can be spent "*putting out fires*", or raising new funds through referendums which supplant strategic planning and evaluation. The school finance leader often plays many diverse roles, with a focus on reporting or accounting as opposed with performing a strategic role in allocation of resources. The lower priority given to the school finance position can also lead to a simplistic budget tweaking approach rather than a comprehensive approach to the evaluation of spending. On a transactional basis, high levels of spending on fixed cost items such as facilities, athletics and administration can minimize funds available for instructional spending.

There is often difficulty in obtaining reliable, accurate, clear, consistent and current data upon which to make decisions. A deficit of benchmarking and best practices at the local, national and global levels around collection and analysis of data-based results from implementation of instructional programs hinder these decisions. There is also the potential for a lack of accountability and transparency around investments.

In for-profit organizations the free market drives survival of the fittest. While tools from the free-market environment can provide benefits to educational institutions, there are concerns arising from perceptions of the origins or motives of these approaches. One bias against such tools may be a belief that finance and business are based upon greed, which is certainly not an appropriate motivator in education. Taking that to an extreme, the rejection of financial approaches to decision making may be based upon a belief that children deserve the best, regardless of cost, so money should have a small consideration in investment evaluation. Lastly, there may be a fairness concern stemming a scientific approach to investments, where a smaller experimental group of students receive the benefit of a potential intervention prior to full scale implementation, leaving the larger student body out of the initial test and lacking any benefit.

While these arguments should be considered, there are many benefits derived from using a financial model for resource allocation. The allocation of scarce resources is optimized among competing alternatives to maximize outcomes for the stakeholders of the organization– including children, parents, school & district employees, the community, and the economy. This approach also provides a tool to quantitatively and objectively measure the effectiveness of investments versus spending money and "*hoping for the best*". The ROII approach also minimizes new program spending or investment based on stakeholder pressures, no longer blindly accepting "*flavor of the year*" programs. Any failure to consider the investment's alignment with the strategic priorities of the school or failures to engage in data-driven, root cause analysis for problems will be minimized.

Unfortunately, the existing research and guidelines that have been developed to date regarding optimal resource allocation is minimal, but will be reviewed in the following section. The Center for American Progress, created in 2003, is self-described as "*an independent nonpartisan policy institute that is dedicated to improving the lives of all Americans, through bold, progressive ideas, as well as strong leadership and concerted action*" whose aim is to "*not just to change the conversation, but to change the country*" (Center for American Progress, 2018). The Center for American Progress pursued a project entitled, "*Return on Educational Investment: A district by district evaluation of educational productivity*" (Boser, 2014). This study provides an online tool that can be utilized to evaluate the return on educational investment for over seven thousand districts in almost forty states (Center for American Progress, 2014). The basic ROI index rating is a measure that rates school districts on how much student academic achievement they realize for each dollar spent per student, relative to other districts in their state. The model uses average student achievement based on standardized tests as the "*return*" and "*dollars spent per student*" as the investment. Each district in a state is given one of nine ratings which range from the worst rating of highest cost and lowest achievement, i.e. lowest ROI, to the highest rating of lowest cost and highest achievement, i.e. highest ROI. There are several short-comings of this model. First, the model utilizes spending and student achievement data which was only collected one time in the 2010-11 school year, rather than being updated based on current data. Secondly, twelve states were not included due to a lack of sufficient comparable districts within the state. Third, due to the major differences regarding funding models and standardized tests utilized among states, the ROIs of states cannot be compared to each other. The data is only applicable to compare among districts within a state. Fourth, the model only provides info at the district level of analysis, rather than at the school level. Finally, it is not a workable model that can be implemented by schools to make specific decisions regarding instructional investments and resource allocation. Nevertheless, it remains one of the few studies and models regarding resource allocation in a school district that is available. Based on this study, the Center for American Progress reported that the findings were, "*worrisome and underscored the fact that the nation suffers from a productivity crisis. The data suggested that low productivity might cost the nation's school system billions of dollars a year. What's more, too few states and districts tracked the bang that they received for their education buck*" (Boser, 2014). The following is a list of the study's key findings:

1. Low educational productivity remains a deeply pressing problem, with billions of dollars lost in low-capacity districts.
2. Some of the nation's most affluent school systems show a worrying lack of productivity.
3. In some districts, spending priorities are clearly misplaced i.e. athletics.
4. State approaches to improving fiscal effectiveness vary widely.
5. State budget practices are often weak, vague, inconsistent, and opaque.
6. Far more can be done to boost educational productivity.
7. Too many states and districts are spending dollars on programs that fail to improve student outcomes.

Two of the study's recommendations are that states should build capacity for greater productivity gains through benchmarking, targeted grants, and assistance teams; and education leaders should improve accounting procedures and create a multistate initiative that will focus on building more robust education budgets.

The Center for American Progress collaborated with Education Resource Strategies (ERS) to write a paper entitled, "*The New Education CEO: From Scorekeeper to Strategic Leader*" (Hovey & Boser, 2014). ERS is a non-profit organization "*dedicated to transforming how urban school systems organize resources—people, time, technology, and money—so that every school succeeds for every student*" (ERS, 2018). The two major findings from their study were that education "*CFOs are not always a key part of district management culture*" and "*CFOs lack the time and staffing to do more in-depth analyses or planning and face inflexible structures that make strategic resource use difficult*". They describe the traditional CFO as the scorekeeper and "*number cruncher*". He is also seen as "*the risk manager, reporting and compliance hawk, funder of others' priorities, book balancer, and cost cutter*". They emphasize the need for the new education CFO to take the role of "*capacity builder, value champion, strategic partner, planner, and strategist*". They state that the, "*CFO should promote value and find the best return for dollars invested by promoting a return-on-investment process that assesses how all district resources are aligned with priorities*". Their recommendations are: 1) Create induction and other training programs for CFOs, 2) Build CFO networks for mutual support, 3) Increase transparency and establish decision-support dashboards, and 4) Implement programs that support increased fiscal equity and flexibility.

ERS also conducted a study entitled, "*Return on Investment in Education: A System Strategy approach*" (Frank & Hovey, 2014). In the study, they refer to this body of research as "*educational productivity*" or "*academic ROI*". Their unique approach is to take a five-step systems approach to resource allocation and ROI analysis which include: 1) Identify the core need, 2) Consider a broad range of investment options, 3) Define ROI metrics and gather data, 4) Weigh investment options, and 5) Make investment decisions. They recommend using either teacher effectiveness data or research-based data of program effectiveness to determine the benefits resulting from the investment. This study focuses on the important concept of considering multiple approaches and using a comprehensive decision-making process. However, this study does not provide a practical, statistical model that could be utilized by educational leaders.

The District Management Council has conducted the following three related studies regarding educational value analysis. Kim (2014) presents an approach entitled, Achievement Value Analysis (AVA) to making decisions about resource allocation. His approach focuses on three components: 1) Segmenting and identifying students by their educational needs, 2) Measuring outcomes based on the specific educational skills being taught and the duration needed to achieve them, and 3) Capturing costs fully and accurately.

Levenson (2012) provides four tips for measuring the effectiveness of individual instructional programs: 1) use a controlled test, 2) look for pockets of data-based evidence in schools within your district that are outperforming, to identify their source of success, 3) use already available common formative assessments to evaluate programs, and 4) zero is an answer, meaning some programs will not provide an improvement.

Levenson et al. (2014) presented a chapter in their book, "*Spending Money Wisely*," entitled, "*Calculating Academic Return on Investment: A powerful tool and a great investment*". In this chapter of the book, they discuss their model called academic return on investment (A-ROI). The A-ROI Model=(Increase in Student Learning) x (Number of Students Helped)/$ Spent. They recommend to first overcome the obstacles to implementing A-ROI by: 1) Build A-ROI into nearly every aspect of budgeting, teaching and learning, and central office work, 2) Ensure strong support from the superintendent and school board, 3) Create a small staff with the skillset

and clout to make data actionable, and 4) Establish new ways of making decisions. They also recommend the following steps to conduct an A-ROI model: 1) find or hire staff with the key skills, 2) select just a few high priority topics, 3) use the data you need, not the data you have, 4) let the key stakeholders help set the measures of success, and 5) empower the process.

At the collegiate-level, the concept of return on investment has received increased attention in the press and public consciousness. Payscale Corporation is a salary benchmarking firm who has combined salary data of graduates with publicly available cost data to create a college ROI ranking. Their analysis performs the traditional ROI calculation using organization-level data (Payscale, 2015). There are several challenges that present difficulties to this approach, such as niche schools (e.g. engineering schools with higher salaries) are ranked consistently at the top. Even with limitations, their annual report is notable because public interest in return on investment in education is growing.

This literature review reveals a fairly new focus on the importance of evaluating the return on investment of instructional programs and the importance of strategic resource allocation for schools at a conceptual, policy level. However, practical, step-by-step, models that can be used by administrators to make strategic resource allocation decisions are still limited. This paper attempts to bridge that gap by providing a comprehensive, practical Return on Instructional Investment (ROII) model and spreadsheet that also offers statistical data and analysis as support. This model can be utilized by school leaders as a template for making investment decisions. It also provides evidence and samples of the use of this model for instructional program evaluation by emerging school leaders enrolled in an MBA in Educational Leadership program.

METHODOLOGY

The authors of this paper were charged with the task of developing a new MBA program at their mid-size, midwestern university for K-12 school leaders with the support of several grants. The program was entitled, MBA in Educational Leadership which launched in summer 2014. The rationale for creating this program was that many individuals who become school leaders are experts in the field of education, based on their training & experience, often as teachers, but have minimal experience in leading a large organization. Thus, the MBA in Educational Leadership was designed to provide business skills for leading an organization in the context of the educational setting. Each course in the program was designed as a unique course in which core business theories and knowledge are taught with an educational emphasis and application. These courses include data analysis & statistics in education; economics & public policy in education; education law & ethics; global business & educational systems; instruction, curriculum, & assessment; leadership development field project (internship); lean six sigma for operational excellence; marketing & communication in education; organizational leadership in education; school technology leadership; strategic analysis & development in education; strategic management of talent; and financial analysis & budgeting in education (Smith & Somers, 2016; (University of Indianapolis, 2018). The authors of this paper developed the financial analysis & budgeting in education course for the program. The Return on Instructional Investment (ROII) model was designed for this course to teach emerging leaders how to strategically allocate resources in their schools.

The ROII model is a comprehensive, step-by-step guide to identify which instructional investment proposals provide the highest benefit relative to their cost or "*best bang for the buck*". The ROII model creates a transparent, objective methodology for ranking various instructional

program investments. It reduces the risk of program investment selection based on stakeholder pressure; blindly accepting trendy programs; failure to align programs with strategic priorities; and failure to use data driven, root cause analysis to identify problems to drive investment. The ROII model should be used by all school stakeholders including teachers, staff, and administration. Target school stakeholders impacted by the program can include students, parents, or employees. Instructional investments are defined as programs providing a benefit to a stakeholder that is not primarily measured in dollars generated or saved. Instructional Investments should be ranked based on their Return on Instructional Investment (ROII) and their alignment with school priorities and goals. The ROII model can be used to compare and rank proposed or existing instructional investments within stakeholder groups at a school. The ROII can be positive or negative. The following is the ROII formula:

$$ROII = \frac{\%\ incremental\ benefit\ \ x\ \%\ stakeholders\ impacted\ x\ \$10{,}000\ avg\ investment\ size}{\$\ program\ investment}$$

Variables Defined

1. % Incremental benefit=% difference in results between control & experimental group.
2. % Stakeholders impacted=% of target school stakeholder group impacted by program/year.
3. $10,000 Average Investment size=assumes $10,000 average investment for instructional programs; provides scale for the return calculation.
4. $ Program Investment=annualized $ investment cost of the program, based on an assumed lifecycle of four years for the program.

The % incremental benefit is intended to measure the non-monetary benefits of the instructional program. In order to utilize a scientific approach to the data, a control and experimental group must be established. The experimental group is the children that receive the instructional program. The control group is the children that do not receive the instructional program. Some examples of control and experimental groups include:

1. Same group in a prior year i.e. 3rd grade students without intervention in prior year= control group *vs.* same kids in 4th grade with intervention=experimental group.
2. Different group in the current period i.e. 1-3rd grade class with intervention for quarter=experimental group *vs.* rest of 3rd grade classes without intervention for same quarter=control group.
3. Different group in the prior year (same teacher) i.e. 1-3rd grade class with same teacher without intervention in prior year=control group *vs.* 1-3rd grade class with same teacher with intervention next year=experimental group.
4. Same group in the prior quarter or semester (same or different teachers) i.e. all 3rd grade classes without intervention last semester=control group *vs.* all 3rd grade classes with intervention this semester=experimental group.

The cost of the program investment will vary based on the type of instructional program. This could include the cost of hiring additional staff or teachers, instructional materials, technology, equipment, supplies, facilities, and training costs. Rumble (2001) provides a structure for the types of costs that should be considered for instructional programs. These

include human resources; premises and accommodation; equipment and furniture; and materials, supplies, consumables, and expenses. He also emphasizes the need to consider both revenue costs and capital expenditures. Revenue costs are consumed as they are paid for such as salaries, expenses, and supplies. Capital expenditures have an ongoing value such as equipment, furniture, and buildings. Capital expenditures should include the initial costs as well as additional utilities, leases, depreciation, and taxes as a result of the capital expenditure. If capital expenditures have an expected market or sales value at the end of the program, then it should be deducted from the program investment costs. Consideration should also be given for the development costs of the program such as delivery, updating systems, and training. Additionally, if the program eliminates an existing cost or prevents an opportunity cost such as avoiding repairs or maintenance expenses, this should also be deducted from the program investment costs.

The ROII model is based on the groundwork established in the six-sigma process improvement methodology, first invented by Motorola Corporation. six sigma is based upon a standard five steps used to solve problems, with the pneumonic "*DMAIC*", which is an acronym for define, measure, analyze, improve, and control. The DMAIC model is a data-driven improvement cycle used for improving, optimizing and stabilizing business processes and designs, which is widely utilized by many organizations. Thus, this model was used as the structure in creating the ROII model in the educational context.

The first step of define requires the school employee to define the identified problem with the appropriate stakeholders. They must then identify the target school stakeholders that will be impacted by the full-scale implementation of the proposed program and the percentage of the target school stakeholder group they represent. Stakeholder groups could include total number of students, parents or employees at the school. The school employee will then describe the target goal(s) of the program in objectively measurable terms and identify how it aligns with the school's strategic priorities. Finally, the employee will quantify the gap between the current and target/desired results

The second step of measure is to identify and collect data to help determine the root cause(s) of the problem in collaboration with key stakeholders. This prevents dollars being spent on a program that is not related to the root cause of the problem. It also quantifies the magnitude of the problem.

The third step of analyze is to create a model to identify and prioritize the root cause(s) of the problem. Possible models that can be used in this step include the Ishikawa or cause & effect model, the 5 whys model, or nominal group technique. This provides a graphic description of the possible root causes. It also encourages brainstorming with stakeholders about possible sources of the problem.

The fourth step of improve starts by describing the proposed instructional program and how it will directly address the root cause. Next, if using a beta test, define the timeline for the project beta and full-scale implementation if the beta is successful or, if previously implemented, describe the timeline of previous implementation. Ideally, schools will begin to conduct a small beta test of the program before implementing it full scale. This is preferable to post-testing programs which may lead to a higher amount of wasted funds if it is not successful.

Then, the employee will list the required program resources and the cost of each for the beta and full-scale implementation. They should indicate both one time and ongoing annual costs. One-time costs should be divided by four (or other estimated lifecycle of program) & added to any additional annual costs to provide a total annualized dollar amount of the program

investment to use in model. The next step is to identify the key program leaders and their roles in implementing the program.

The employee must then describe the experimental group(s) and control group(s) for the intervention. The experimental group is the population that receives or removes the intervention under study. The control group(s) selected assumes their academic profile is similar to the experimental group. For example, the validity would be diminished if one group was in an honors program and the other was not in an honors program. The employee can conduct several ROIIs with multiple control groups for increased validity.

The next step is to use a spreadsheet or other tool to enter the collected data and compare the data between the experimental and control group(s) to determine the effectiveness of the proposed program. For this study the authors created an Excel spreadsheet that facilitated the data analysis and calculation of the ROII for an intervention under study. The ROII equation above and basic t-test analysis are all that is required for creation of other spreadsheets of this type. Results can be actual collected or research-based data. Two possible types of results are: 1) incremental change in results based on pre and post test results for each individual, which is preferable; or 2) absolute results for each individual when pre and post-test results are not available. Using a tool such as a spreadsheet, the employee will enter the data results in the model. The employee will then evaluate the ROII and additional statistical data of the program.

The results from the ROII model will be used to determine if instructional programs have a measurable positive effect before being more widely implemented. This testing of hypotheses, combined with traditional tests of statistical significance between control and experimental groups, encourages educators to base decisions on data and effects that are statistically valid. Any ROII model spreadsheet should utilize at least basic t-tests of statistical difference between means (both paired and unpaired samples) and calculate the standard error of the population estimates and communicate the confidence interval for each group mean. Calculations of the effect size when statistically significant differences between the groups are found and description of the effect size using common interpretations of Cohen's D (Cohen, 1988) should be used.

The ROII model spreadsheet used in this research formats the data so that it is easy to read and interpret. The calculations described in the previous section are formatted using proper academic vernacular to communicate the results of the statistical tests. The language used in the description of the results is automatically generated based on the results of the statistical tests so that only a basic understanding of statistics is needed to interpret the results. Several publicly available statistical packages can be used for this type of statistical analysis and communication of results.

For situations where raw data from control and experimental groups is not available, the direct input of group mean, standard deviation, and sample size can also be used to calculate the presence and effect size of any statistical difference. This enables educators to still utilize the ROII model, and t-test comparisons, even when they only have the summary descriptive statistics from the groups under comparison (such as from standardized tests which only report group-level results).

The utilization of the scientific method and decisions based upon commonly accepted statistical tests of significant difference increases the quality of educational investment decisions. When examining significant investments, the educator or administrator can be more confident that their investment recommendations will result in positive overall results for the relevant stakeholders.

After conducting the spreadsheet analysis, the employee will then discuss their recommendation for the project and any additional factors that should be considered. School leaders can then compare the ROIIs of multiple proposed programs within each stakeholder group, as well as their alignment with the schools' strategy and goals, to determine how resources should be allocated.

The final step in the process is control. If the ROII from the analysis is positive, the employee will identify the strategy that will be utilized to execute the program and monitor on-going effectiveness of the program after full-scale implementation. If the ROII from the analysis is negative or not statistically significant, the employee will identify the next steps that should be pursued regarding the program i.e. retest in future period, make changes to program, eliminate the program, consider a new program, or consider other possible root causes, etc.

RESULTS AND DISCUSSION

The students in the financial analysis & budgeting course in the MBA in educational leadership program were required to use the ROII model to evaluate an instructional program at their school for their course project. The students had to present a power point presentation of the process and findings of their project to their peers as part of the project. Thus, the authors/course professors have collected results from the projects and how the ROII model was actually utilized in a real-world setting. Most of the programs that were evaluated were existing programs, due to the time constraints of the course. However, students were encouraged in the future to conduct a beta test to determine the ROII of a program before implementing the program full-scale. The results of the students' ROII analyses revealed a wide spectrum, with some programs showing no statistical significance or a negative ROII and some showing a high ROII.

The students of the MBA in educational leadership program are primarily teachers or teacher leaders that aspire to become school or district leaders. Thus, they will be moving into positions in which they will have the ability to make decisions about strategic resource allocation. As a result of this project, most students were overwhelmed by deficiencies currently at their schools in the use of this type of evaluation of instructional investments. Most of the students articulated their belief that the current model for selecting instructional programs was not data-driven, and was often a random process based on stakeholder pressure or just following a trend in education with a lack of proven results. To quote several students in a post project feedback session, "*the impression was that the money was wasted*", and that school administrators tend to "*jump in without much background research or a look at the instructional investments*".

Qualitative feedback was received by the students in the program utilizing the ROII model. The results are based upon the qualitative feedback of 70 students using the ROII model to evaluate the return of educational investments being made in their schools and districts. The students were enthusiastic about being able to utilize the practical ROII model to make investment decisions. They recognized its value, especially given the financial restraints which most schools face. They also expressed their desire to provide professional development to all the employees in their school about the ROII model. They felt this would provide an objective, transparent model and process by which all employees could present possible investments that they feel would be valuable for the school and students. They believed that the utilization of the ROII model would enhance their ability to strategically allocate resources which would

ultimately help fulfill their goal to maximize student growth and achievement. Another student said "*the model has given me confidence to take my results to my administration and present my findings*".

The following review provides samples of some of the instructional investments which were evaluated by the students using the ROII model. This is provided to highlight several examples and ideas of how the ROII model can be utilized by school employees.

1. ROII of an investment into the salary for a new Director of Curriculum, Literacy & Interventions position. Evaluated whether the Director increased the relevant skills and satisfaction of teachers as shown in the teachers' surveys following professional development sessions provided by the Director.
2. ROII of an investment into an instructional software called Cloze Total Reader Program. Evaluated whether the program led to an increase in students' Dibels Daze testing data as a result of its beta test implementation.
3. ROII of an investment into a one year, free, full-day pre-kindergarten program for high need students. Evaluated whether the program improved the Dibel's assessment scores for incoming, high-need kindergarten students.
4. ROII of an investment into Saturday school for at-risk students failing at least one high school class. Evaluated whether the Saturday school resulted in a decrease in the failing grades of these at-risk students.
5. ROII of an investment into the hiring of a new social studies teacher in order to decrease class sizes. Evaluated whether the addition of a new teacher and decrease in class size resulted in increased course grades.
6. ROII of an investment into a program called Advancement *Via* Individual Determination (AVID) which trains educators in how to help 7-12th grade students prepare for success in high school, college, and career. Evaluated whether the new program increased the number of honors classes taken and also reduced the number of failing classes by the students.
7. ROII of an investment into a new library with extended student library visits. Evaluated whether the new library led to increased book circulations and standardized test English scores.
8. ROII of an investment into Project Lead the Way (PLTW) career paths at a middle school. Evaluated whether PLTW led to increased preparation for college or the workplace, engagement in school generally, engagement in a PLTW setting, and knowledge of STEM related career paths, based on student surveys.

CONCLUSION

The Return on Instructional Investment (ROII) model presents a scientific, data-driven approach for educational investment decisions that combines the best practices used to make business investment decisions to educational investment decisions. It is a flexible model that can be used even when the "*returns*" are expressed in values such as educational benefit instead of profit. The model utilizes the common six sigma improvement method and encourages decisions that are based upon statistically valid findings that will help to ensure that measurable benefits will accrue to educational investments.

This model is limited when comparing vastly different types of educational investments. In a business setting, return on investment can be quantified in the same terms (profit), enabling direct comparison of investments on the same basis. When educational benefits are vastly

different, we are comparing the magnitude of an improvement in an area and its reach. When comparing multiple investments in a single school, each investment may have varied impact on overall organizational goal achievement. Even with this limitation, the model is a vast improvement over current practices which often ignore the important elements considered in this model.

Further research on this model could include in-depth qualitative analysis and feedback from various stakeholders in a school after implementing this model in some key investment decisions. In the longer term, comparison of overall school performance between schools widely utilizing this model and peers which are not would help to validate the model's beneficial impact.

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