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Using Data-Informed Instruction to Drive Education: Keeping Catholic Education a Viable and Educationally Sound Option in Challenging Times

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In a time when parents are presented with many elementary and secondary schooling options, public and private schools often find themselves in a heated competition to attract and keep students. Parents choosing between educational options often consider a multitude of criteria before choosing an appropriate setting including the school's religious foundations, cost, and proximity to the family residence. More and more, however, new metrics have become part of this parental decision. With the desire to improve education across the United States, the No Child Left Behind act (NCLB, 2002) required a greater transparency in the reporting of academic achievement data than was previously required of pubic schools. While private, non-government funded, faith-based institutions were not required to commit to the same level of transparency, they often felt the need to do so in order to keep up with the information demands of parents considering the private schools as educational options for their child.

Teachers in Catholic schools are not immune from pressures to improve students' scores on high stakes tests and standards-based education is not new to Catholic schools. Nationally, many public school systems have moved to implement Common Core State Standards (CCSS) or other similar standards. Assessment, in turn, has been tied to these standards. In many states, Catholic schools have the option as to whether to implement accepted state standards or to create standards of their own. The Committee on Catholic Education (CCE) gives each bishop the authority to lead the CCSS discussion at the local level and to eventually make a decision based on what is best

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for each individual diocese (2014). Regardless of implementation of government mandates, students graduating from Catholic schools will ultimately be held to the same standards and outcome based measures when it comes to their graduates' ability to compete for post-secondary educational scholarships, national merits, and other accolades based in part on national standardized test scores.

The academic achievement data provided by public school systems allow parents and others to see if their students meet grade level standards. Catholic schools then, must provide such data if they wish to measure themselves against those enrolled in the competing public and private schooling options. Grades are no longer the sole measure of academic progress and do not suffice to provide an on-going measure of student achievement. Academic progress during the school year is a required measure of predicted summative achievement results. Therefore, data collection and analysis at the individual classroom and student levels during daily instruction is necessary to ensure competitive, school-wide scores will be achieved following any academic year.

Data collection and utilization requires that teachers collect information within both a formative and summative format from consistent assessment of their students. Unfortunately, teachers are often at a loss as to how to effectively collect and utilize data as a driving force within their educational assessment and planning routines (Marshall, 2009; Young & Kim, 2010). This is true within Catholic schools, as well as in competing private, public, and charter institutions. If Catholic schools are to remain a viable option in this ever-increasing competitive educational environment, teachers must become more comfortable collecting and analyzing data in an effort to help drive instruction and high levels of academic achievement.

The collection of data to drive instruction is often referred to as data-informed instruction (DII). Marsh, Pane, and Hamilton (2006) define DII as the practice of teachers and administrators systematically collecting and analyzing a variety of data to guide instructional decisions and advance the performance of students and schools. The premise behind DII is to imbed data collection into daily classroom routines, use the data to make any necessary instructional plans or modifications, and to continuously monitor student performance to predict academic gains. When DII is used properly, it becomes an ongoing formative assessment. These formative assessments allow progress monitoring at the individual, class-wide and building levels, while providing an opportunity for teachers to adjust teaching strategies and make instructional modifications as needed (Sattler,2001).

The focus for a DII model is to use data to shape instructional decisions and increase student success. In a successful DII model, teachers must possess knowledge and specific skills related to: data analysis, data interpretation, and the use data to make instructional decisions. Researchers have shown that DII practices are often unfamiliar to teachers and are infrequent topics of focus within teacher training and professional development programs (Marshall, 2009; Young & Kim, 2010). Therefore, teachers often feel unprepared to use assessment effectively. This is true in public, private, and charter school educational settings. According to a report from the U.S. Department of Education's Office of Planning, Evaluation and Policy Development (Means, Chen, DeBarger, & Padilla, 2011), teachers are challenged and frustrated when working with high-stakes test data. This report showed that teachers' struggles persisted from simple to complex tasks involving the use of data to adapt instruction. Means et al. (2011) also found that while most teachers could locate data on a table with ease, they struggled when asked to identify specific data. Likewise, teachers were not able to conduct comparison calculations. In most cases, teachers overlooked critical data points or became overwhelmed by the abstract nature of data analysis. Lacking basic analytic skills made it difficult for the teachers to understand the data in a table and justify the reasoning behind analyses (Means et al., 2011) that may have been critical in influencing daily academic planning.

The challenge of preparing teachers and administrators to use DII is felt in public and private educational settings. Teacher training programs typically introduce data analysis and interpretation skills in isolation. This creates a dichotomy that generally does not provide an infrastructure for understanding the integration of formative and summative assessment into daily instructional decisions or how to use data-informed decision-making strategies to positively impact student learning. Therefore, some burden is placed on school districts to provide professional development that focuses on developing each teacher's data analytic and interpretation skills as well as focuses on how to use data in the instructional planning process.

Assessment Guides Teaching

Data-informed instruction is intended to utilize ongoing data collection and analysis to closely approximate students' rates of academic skill acquisition and knowledge (Cizek, Fitzgerald, & Rachor, 1996; Herman & Dorr-Bremme, 1983). Assessment data can then be analyzed in a meaningful and ongoing way to help educators define learning goals for students as they

plan instruction (Brady & McColl, 2010). This type of formative evaluation practice is more personal in nature and serves several functions including: assisting in planning lessons, grouping students for differentiating instruction, targeting individual student strengths and weaknesses, and (perhaps most importantly) adapting instruction to meet students' academic performance needs as the school year progresses (Herman & Dorr-Bremme, 1983; Stiggins & Bridgeford, 1985). Data informed instruction is also well suited to the philosophies and constructs of Catholic schools, as according to the USCCB, "One of the strengths of Catholic schools is that there is great latitude at the local level related to standards, curriculum, textbooks, teaching methods and implementation in the classroom (2014, p.4)".

Currently many Catholic schools participate in a type of benchmark assessment and evaluation process. Such Catholic schools often use these assessments, typically administered in the fall semester, to better identify student needs prior to starting the fall educational programming. This data assists the Catholic schools and educational practitioners with identifying the needs of their student scholars earlier rather than later during the academic year. While such practices are helpful and data from such testing is utilized to inform instructional planning, this does not meet the standards of a DII model. More can and should be done to instruct Catholic school teachers and administrators regarding how to expand their assessment programs to better conform to the evidence based, DII model.

The remaining sections will systematically outline how to set up a professional development to inform, educate, and gain buy-in from teachers surrounding the use of data-informed instruction in Catholic classrooms and across a diocese. The steps that will be addressed include the need to change perceptions, inform teachers on how to collect and examine data (behavioral and educational), and end with ways to help make data collection and analysis an efficient component of daily routines.

Power of Perceptions

Traditionally teachers have based their instructional decisions largely on "experience, intuition, and anecdotal information (or professional judgment)" rather than systematically gathered data (Ingram, Louis, & Schroeder, 2004, p. 1281 as cited in Young & Kim, 2010, p. 13). Teachers' perceptions have been reported as the filter through which new teaching methods are interpreted and carried out during instruction (Borko et al., 1997). This may be a distinct barrier in moving teachers toward the use of systematic data collection and

analysis, as teachers have become accustomed to relying on their own intuitions when shaping or preparing instructional lessons (Young & Kim, 2010).

It is perhaps this intuition; however, that might be tapped in an effort to obtain teacher buy-in when seeking to change their instructional foundations from intuition to data driven instructional practices. The research of Young & Kim (2010) has shown that tapping into teachers' views can be a plausible avenue to promote follow-through on the way to data-informed continuous improvement efforts. These authors further reported the extent to which data effectively advance instructional practice in schools is greatly influenced by educators' pedagogical view, in addition to the relevancy, usefulness, and accessibility of the data.

Additionally, according to studies by Borko et al. (1997) and Mayfield, Marion, Flexer, & Cumbo (1997), the impact of teachers' ideas and attitudes are strongly linked to their instructional practices. Borko et al. (1997) found teachers' perceptions to be important to the generalization of training effects, and therefore stated that explicit attention to teachers' experiences in addition to content practices included in any training, should be a mandatory priority. It might be hypothesized then, that if training were to enhance teachers' perceptions of a method, they may be more likely to implement the method in their classrooms. Professional development and programming for teachers should therefore begin with methods that incorporate teacher perceptions into the training process as a way to obtain teacher buy-in. Such buy-in may be influenced by the logical application of research already found in the literature. Jasper, Hunter and Williamson (2015) noted that data collection and analysis is essential if teachers are to avoid returning to strategies that are analogous to "…aimlessly firing behavioral and instructional strategies and interventions toward the moving targets of student achievement." (p.??) As teachers struggle to apply lesson solutions to complex educational standards, they must understand that data is the marker upon which lesson choices can most efficiently be made (Jasper, Hunter and Williamson, 2015).

How to Collect and Examine Data

Curriculum-based measurement. Curriculum Based Measurement (CBM) is one form of DII and has been recognized as one of the most effective means of formative assessment related to student achievement and obtaining an accurate account of student performance across the curriculum (Capizzi & Fuchs, 2005; Stecker, Fuchs, & Fuchs, 2005). CBM can be characterized as any set of measurement procedures that use direct observation and systematic, pre-determined, research based guidelines to assess student

learning against school curriculum standards (Deno, 1985). Specifically, CBM includes evidence-based guidelines that focus on time (duration of the assessment, latency between questions posed and responses received, and inter-trial response times); integrity of the implementation of the assessment including scripted step by step instructions; normative data for comparison to the individual testers' scores; and pre-made assessment tools (if needed). The design of CBM procedures allow for frequent assessment and repeated measures that directly tie to possible academic interventions. Many features of CBM have been shown to have advantages as a method of data informed instruction. According to McLoughlin and Lewis (2004), these advantages include:

> (a) immediate, accurate, and concrete positive feedback… to teachers, students and parents when students are experiencing gains; (b) rapid identification of negative performance trends allows a teacher to quickly make responsive changes in students' programs; (c) and graphed results can be used to judge whether or not an intervention made in a student's program is having the desired effect, and respond accordingly. (p. 167)

Gansle et al. (2004) stated, "CBM provides educators with a stronger link between assessment and instruction than do standardized tests of achievement" (p. 291), making CBM an ideal choice for a formative assessment that can be used to guide students at his or her own pace so that he or she can be successful as they matriculate from one grade to the next. Again, this is a more personalized form of DII but fits within the philosophy espoused by the United States Conference of Catholic Bishops (2014).

> Catholic schools, and the teachers within Catholic schools, typically take account of the academic environment in which they find themselves both nationally and locally. This allows teachers to prepare and challenge students who will be transferring to secondary and higher education institutions. (United States Conference of Catholic Bishops, 2014, p. 5)

Incorporating Data into the Routine

Blending data collection and analysis into the daily routine is an integral part of ensuring that data driven decisions are being utilized within the context of the classroom. Assisting teachers with identifying ways in which

to blend data collection and data analysis into their routines will help teachers to feel more autonomous in the required assessment processes. Initially teachers will be overwhelmed by the concept of adding an additional task to their daily activities; however, teaching effective ways in which to embed data collection practices into the daily routine will prove to enhance classroom programming and decrease the stress level of the teacher.

In a 2007 study conducted by National Educational Technology Trends survey (NETTS) the findings indicated that only 39% of the teachers that had access to data systems within their districts and received professional development about the data systems felt competent in using the data collection system. Today, less complex yet more robust systems can be utilized by teachers to collect student assessment data. Advances in hand held, real time data collection technologies often utilizing tablet-computing appliances are only now beginning to be studied. Preliminary results of such studies seem to indicate that these devices are having a positive impact on student outcomes (Pilgrim, Beldsoe & Reily, 2012) and likely influence teaching efficiencies (Jasper, Hunter & Williamson, 2015).

Technologies, while efficient and effective at collecting and examining data to make curricular and methodology decisions, can be expensive to cash strapped Catholic schools. For this reason, utilizing free or near free services available from entities such as Google for Education (https://www.google.com/edu/) or excel or chartdog, which is accessible through www.interventioncentral.com may be cost effective options.

This Google service for example, allows for the use of low cost computing hardware such as the ChromeBook (starting at $250.USD as of this writing) to be used in coordination with cloud based, collaborative, and free applications such as: Google Forms, Google Docs, and Google Sheets. These applications can be collaboratively applied to create easy to complete data recording documents that collect, organize and chart data. This data can then be easily entered from component parts (see Figure 1) and aggregated into information regarding the overall achievement trajectory of an entire school or diocese (see Figure 2).

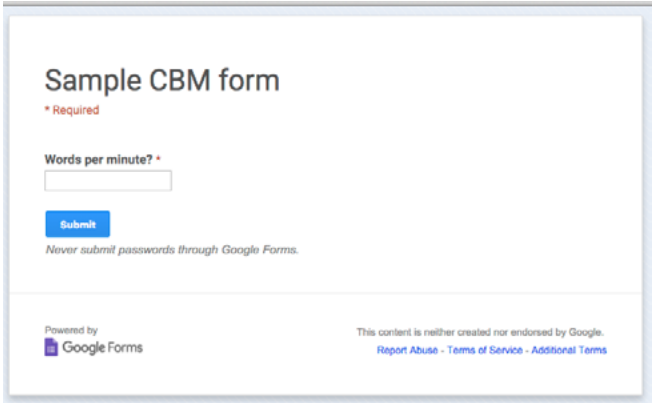

Figure 1. Individual student form (sample)

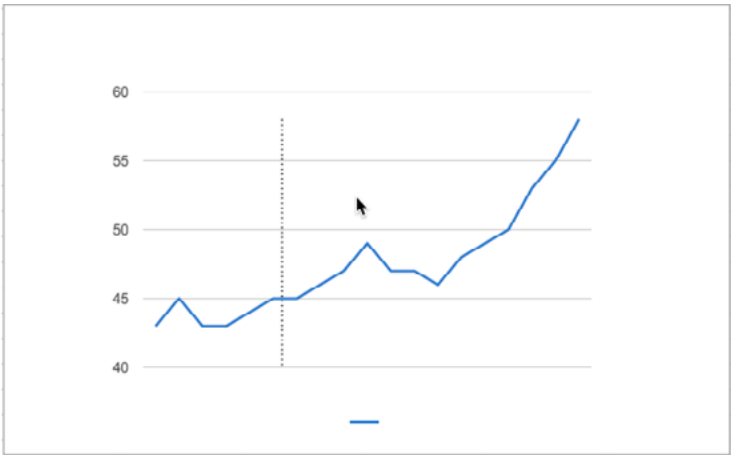

Figure 2. Class aggregate CBM averages data graph with intervention line (Sample)

Figure 3 is an example of a graph generated through excel that illustrates an individual student's performance. In the figures, you will notice, the vertical axis represents the skill measured and the horizontal depicts the time.

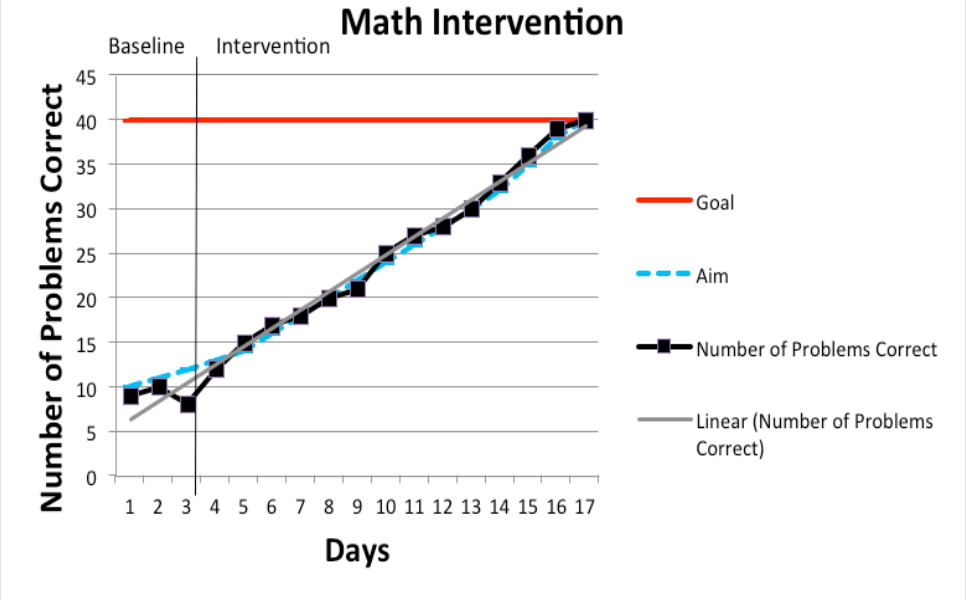

Figure 3. Example math intervention graph

As shown in the figures, data collection and monitoring does not need to be complex. Each example shown involves very little training and often such graphical displays can be automatically generated from pre-existing templates (https://drive.google.com/templates?q=gradebook&sort). Still, any data collection and analysis methodology will need to be trained, reviewed, modeled, and monitored with continuous corrective feedback given in order to ensure that data collection practices are being implemented with fidelity. In other words, interventions and individualized instruction are only effective if implemented as intended. The more support that teachers have in embedding these data collection practices into their classrooms, the more likely they are to attempt these practices on a daily basis.

Data can be collected on academic and behavioral needs of the student, and it can be collected on individual students, the classroom as a whole, or across classrooms. Figure 4 depicts classroom averages.

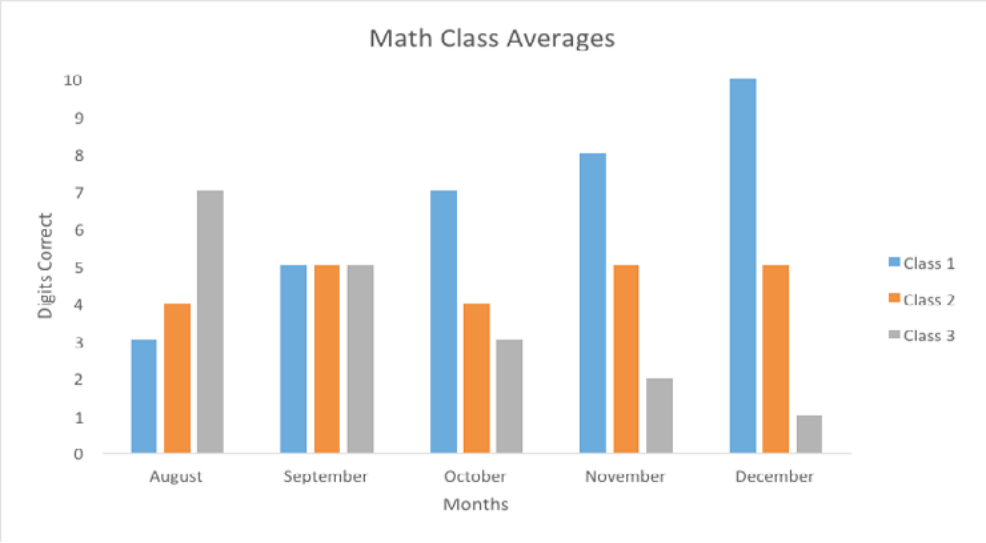

Figure 4. Example math classroom average graph

It is also important to note that schools that utilize data systems that are integrated with existing systems of data collection, for both behavioral and academic data, will decrease the stress that teachers have with embedding these practices into their classrooms. The 2007 NETTS study also identified a barrier to data collection management and use by teaching clinicians was largely evident due to the lack of integrated systems within the school district.

Not only is it important to collect data on academic performance but it is also essential to collect data on behavior. Comparing periods of off task behaviors to on-task behaviors during academic work times can shed additional information onto the grades, particularly if you notice fluctuations. For example if a child is on-task and working hard throughout the assignment but his or her grades are falling this may indicate a "Can't do" problem. If grades are falling and data reveal that the behaviors are primarily off task, then this may suggest a "Won't do" issue. Both of these, "Can't do" and "won't do" are significant barriers to success but both require a different approach to remediation.

Ensuring that teachers are trained efficiently in understanding the different type of data collection procedures and practices is an important part of professional development. Teachers should be informed and trained on the

different types of data collection methods, when each data collection would be appropriate to use, and provided step-by-step coaching and instruction on these practices (refer to the paragraphs below on frequency, duration, latency, and time sampling). This should be done whether using traditional paper and pencil techniques or when using more robust electronic means of taking and keeping data. Once these steps are completed, fidelity checks on data collection practices should also be conducted to monitor teacher progress towards data collection methods. Often times, the best method to monitor teacher fidelity in data collection practices is to collect the Inter-observer agreement (IOA) data of a particular data collection sample. This is a method in which the teacher and a third party individual take data during the same time period, analyze the same behavior, use the same data collection method, and an calculate an analysis of agreement between observers for that data. This is helpful in identifying if additional coaching and professional development is needed to remediate any issues within the data collection practice procedures. Data is not helpful if it is skewed or inaccurate. Below are a few tips on teaching specific data collection practices.

Momentary time sampling. Momentary time sampling is also known as an interval recording method. This data collection method requires the observer to determine whether a behavior occurs or does not occur during specific time frame. Once the length of an observation session is identified, the time is broken down into smaller intervals that are all equal in length. For example, a 30-minute observational session may be separated into 30 intervals that are one minute in length. The observer simply makes a mark in the identified interval if the targeted behavior occurs or doesn't occur depending on the data being collected, at the very end of the identified interval. A number of different tools can be used to assist the observer with the beginning and end of a designated interval. Some examples are a kitchen timer, an alarm on a hand held watch, or a tape recording with a sound. The utility of this method is that is not labor intensive and allows one to collect data on multiple behaviors or skills.

Frequency data collection. Frequency data collection is simply having the observer count how many times a behavior occurs during a designated period of time. Those designated periods might be a minute, an hour, a day, or a week. This data collection is most useful with behaviors that are discrete (definitive beginning and end) and short in duration (e.g., number of curse words, number of short talk-outs without raising hand), or are permanent products that the student has created (e.g., number of correct math problems,

number of homework assignments submitted). Collecting frequency data can be time consuming, as it requires a great deal of attention; however, if done correctly, it yields data that is valuable and exact.

Duration data collection. This data collection method monitors the amount of time that a behavior occurs during the observation period. Specifically it is used for behaviors that last for more than a few seconds and/or for varying lengths of time (e.g., on-task or a tantrum in the classroom). This data collection method is best completed with the use of a timer, stop watch, etc. Collecting the duration of behavior is important when the goal is to shorten or lengthen the behavior. For example, some behaviors such as on-task are behaviors that are desired but not occurring to the extent needed and a baseline measure of initial time allows one to see gains more quickly.

Latency data collection. Latency refers to the time between a prompt and compliance. Often students display the correct behavior but the length between demonstrating the behavior and the request is delayed. In instances when compliance is slow, collecting latency data can assist with shaping the behavior to shorter, more appropriate response times.

Collecting and Using Class-wide Academic data

Using formative data. Ongoing data collection, whether academic or behavioral, represents the cornerstone of all successful classrooms. With regard to academics, based on the student's formative assessment data, the teacher can make determinations about restructuring assignments to meet the needs of the student. As seen in figure 2, this teacher changed her methodology as indicated by the dotted intervention line. After changing her methodology, she then saw an increase in the rate at which her students achieved. Only through the visual analysis of the early data as aggregated together using Google Forms and Sheets, could the teacher note the slow progress and change her methodology accordingly. While figure 1 and 2 portray a fictional example of the visual power of graphed student formative assessment data, the idea can go considerably deeper. Using the Google apps, this teacher could drill down to individual student data, find trends within groups, formulate groupings for differentiated instruction using group analysis trends or even serve up her students' data to be analyzed similarly by school administrators or diocese officials. The trick is to make the data collection as simple as possible so as to not burden the teacher while also making the data easy to organize and visualize for daily use. Google

apps for education is only one low cost example for doing this. Numerous software applications are available that essentially do this same thing making the process of implementing DII relatively easy compared to years past.

Conclusion

If Catholic schools are to remain competitive with other public and private educational institutions, it is important that they can track and demonstrate the academic achievement of their students using data. Thankfully, showing this achievement is a relatively simple process when DII is used as a primary methodology for evaluating and modifying instruction. It is important for both leaders and teachers within all educational systems to understand the pedagogical practices that will enhance educational outcomes for their students and DII is fundamental to this understanding. Leaders must utilize these practices and disseminate information in a way that will encourage teachers to use evidence-based assessment, analysis, and interventions in the applied practice setting.

Much of this has already been taking place within the public school and charter school realm through collaborative efforts and on-going professional development opportunities. This is due, in large part, to legal mandates and an increased focus on accountability. Regardless of the reason, professional developments with this focus have proven fruitful and teachers as well as students are benefiting from the new trend of using DII. As Catholic schools are in competition with these entities, similar actions should be taken to ensure that they remain relevant and viable options to families seeking a Catholic focused education that also maintains a high level of academic accountability and rigor.

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