No Data Left Behind

By Edwin Wargo

If technology can affect student learning, shouldn't it be considered in making decisions? Data-driven decision making models include data from curriculum, instruction, test scores, lunch programs, budgets, and transportation. None of the current models include anything about technology. I've seen some of the best programs come to a halt when this information wasn't considered because of either a lack of data or because the decision maker didn't find it important. I believe that true integration of technology will not occur until educational technology data is considered.

The challenge with any type of data-driven decision making process is threefold: collecting the information, finding what set of filters (questions) need to be created, and ensuring the filtered information is understandable and meaningful.

Decisions are limited by the information used to make them. As the information becomes more complex and plentiful, it's harder to discern which pieces to use and what each piece means. Take information about your school's educational technology, for example. It can be both complex and plentiful, but it needn't be difficult to use.

Raw data is both complex and plentiful. The key to making it meaningful is filtering it specifically for the person viewing it. Questions need to be formed about which data is important. This is the essence of a process that takes raw data, filters it based on questions, and then provides answers in a meaningful format and understandable language. The reported data (or answers) can be used for all school stakeholders to make decisions. Because filtering is the bridge from the technical to the meaningful, we'll begin with it.

Ed Tech data can be filtered and ultimately made meaningful. Once the answers are provided, this data can be used like any other data to make decisions. The decisions include curriculum, instruction, learning, and assessment.

Ed Tech Data Filtering

Ed Tech data filtering is as simple as organizing information relating to educational technology. The data is filtered according to who is viewing the information, making it as meaningful as possible for them. Once filtered, the information can be translated into an understandable format and used to make decisions.

Each of the filters is a question. The process is very similar to using an Internet search engine. Type in your question or a few keywords and a listing of Web sites containing the specified information is displayed. Done correctly, and carefully, you'll get just the results you are seeking.

If the principal wants to know if the handheld computers are being used, he or she can find out what the percentage or totals are for a given time period. If a curriculum coordinator wants to know what technology is being integrated into lessons for the upcoming week or for a particular topic, by grade, school, or district, it can be displayed.

Ed Tech data in more traditional formats is especially challenging because most people view it as a foreign language and require the school's technical person to assist them. Although the school's technical person should be chief translator and gatherer of technical information, all school stakeholders can benefit from using this data themselves.

Student learning is what we are all striving for in education, so creating a set of filters for each stakeholder to show how educational technology affects student learning makes the data meaningful. With

meaningful data, decisions can be made.

Filtering is like the old adage, "Tell 'em what they need to know" with a few exceptions. First, telling them what they need to know is risky because it may not answer their questions or make sense. Done correctly, though, it can provide a good starting point. Second, what they need to know may not seem important at the time or out of context. The information should be presented in a clear and understandable manner. Third, there should be means for school stakeholders to also ask and not just be told.

Filtering and reporting can also be viewed as a chicken and egg game. What comes first, the answer or the question? If a school stakeholder doesn't know what questions to ask, how does the information get presented? Information can't be just arbitrarily presented.

Ed Tech Data

Ed Tech data can be broken into five areas. The total cost of the tools needed to gather the data for an average size school district is only about $1,000. If the free version of Ilient's SysAid Help Desk software is used, the price becomes even less. (***Editor's note:*** For this and other URLs, see the Resources section on p. 25.) Also, all of the products mentioned offer evaluation and shareware versions that allow you to test the software.

Capacity. Capacity is what your technology is capable of providing. This information can be collected by a variety of inexpensive tools such as Paessler Router Traffic Grapher (PRTG) and CatTools. Capacity information tells you if the program you plan on offering is technically feasible. For example, videoconferencing holds great promise for schools and students, however, it requires bandwidth and high performance computers. Capacity information will tell you whether your systems are capable of efficient videoconferencing.

Issue Tracking. Issue tracking is having teachers, staff, and administrators log their issues in a program (preferably Web-based), also known as Help Desk software. I recommend Ilient's SysAid Help Desk software. This information can then be queried by the technical support staff and responded to in a timely manner. Feedback can also be returned to users in a timely manner. As time progresses, this information can be used to see trends, which school buildings or technologies are consuming the most resources, what the top issues are, and the need and effectiveness of teacher training.

Logging. Logging records errors and significant events from your school's technology. Kiwi also offers a scalable, inexpensive tool called Kiwi Syslog Daemon. This is one of the most powerful tools because it can collect a great deal of technical information. It can determine when the Internet is not accessible and generate an alarm to the technology staff. It will note when objectionable Web sites were accessed and by whom. It can also help with troubleshooting. Logging can also be the root for the information showing usage patterns of certain technologies. This is a perfect example of information that may seem too complex and obscure; therefore, it's often not collected and considered. Don't fall into this trap. This data, especially, can provide answers to important educational questions. Even if all the filters (questions) aren't yet crafted, begin to collect the information. It most likely will be useful later.

Availability and Performance. Availability and performance tools collect information about what is working

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and how long it takes to work. One of the best tools is HostMonitor. The benefit of having this information is its ability to provide real-time status of your school's systems. This tool can produce a Web page that lets teachers, staff, and administrators know the e-mail server is down in just those words. Having this information at their fingertips, school stakeholders don't have to waste time figuring out that it isn't working, making a call, or entering a ticket in an issue tracking system. They will know and can plan accordingly.

Resource Management. Resource management is the information that doesn't fit into any other category but is vital for decision making nonetheless. This is information such as network and infrastructure diagrams. This is also the area where databases can be created and used to find out what technology is planning on being used. If a current electronic database of lesson plans is already created, it can be integrated into this area. As school networks become more complex, documentation is absolutely vital. Another vital area of information is asset management. Ilient offers free and for purchase Web-based asset management tools. This includes information about where computers are located, their model, operating system and service release, serial number, warranty information, and IP addresses (if fixed). For efficiency and accuracy of decision making, this information should be at school stakeholders' fingertips.

Creating Filters

Determining what filters need to be created can be challenging. All of the raw data from all the categories must be filtered and then made meaningful. Remember that the filters are really just questions. The best approach is to ask what questions each stakeholder may have about technology. This can be done by directly asking them or coming up with your own list. This is the chicken and egg. I find that, in many cases, until I start with the questions that can be answered, school stakeholders don't know where to begin. Providing some type of base of questions can really help to show the value of this information.

Although I believe there are many questions, even complex ones, that can be answered, I recommend beginning with simple questions, such as "is my district's capacity information being collected?" or "do I have enough capacity to store student portfolios?"

You may notice some overlap of questions. That is normal, as different stakeholders need to know the same information but for different reasons. Also, this is a process not an end point. As with any other process, start off small. Build out as time and resources and in this case, questions, permit.

Meaningful Reports

The third component is making filtered data meaningful and understandable. Answers to questions should be in wording that stakeholders can easily understand. For example, saying the "Internet is down" is understandable. We shouldn't say, "The core router is experiencing CRC errors on its ATM interface due to policing issues."

I would also suggest that all technology activities relate directly to curriculum and instruction. The information should show the effect on curriculum and instruction. What curricular goals and objectives are directly affected by the Internet outage? What curricular goals and objectives are directly affected if we don't have enough Internet capacity? What curriculum objectives are directly affected if the Internet is slow?

What is affected if we don't have enough IP addresses for those additional wireless laptop carts? All of these questions should show the curricular effects on most school stakeholders, leaving out the technical details. Technical details are for the technologists.

Showing curricular effects makes the technical information much more meaningful and understandable. I also find it interesting that once technical data is put in their context, school stakeholders really begin to take note.

Presenting Data

The next question is how to present this information to school stakeholders. I believe there are three primary means: Web-based reports, dashboards (which are currently in development), and through traditional communication such as e-mail or newsletters. PRTG, Ilient SysAid, and HostMonitor all produce Web-based reports. Dashboards could provide much valuable information in an easy to read graphical or textual format. The reports can be used in e-mail and newsletter publications that are disseminated to school stakeholders.

Integration into DDDM/SIF Standards

The phrase data-driven decision making has been popularized through the No Child Left Behind Act. Although we all use data to make decisions, this initiative calls on schools to consider multiple sources of data to make decisions at both district and classroom levels. Because multiple information sources must be considered, the Schools Interoperability Framework

Association has created a standard called School Interoperability Framework (SIF). The standard holds a great deal of promise to ensure that all that data can be easily integrated and thus be made meaningful.

Keep two issues in mind when considering SIF. It doesn't consider educational technology information as a valid source and none of the applications mentioned here are SIF compliant. However, I believe it's only a matter of time before this data is considered valuable and applications will thus become compliant. But for now, don't let SIF compliance get in the way of being able to make decisions based on all of the facts.

A Role in Educational Standards

Ed Tech data can ensure that standards, whether local, state, national, or organizational, are achieved. Take the National Education Technology Plan for example. The fifth objective in the plan is to "Encourage Broadband Access." The following are excerpts from the text:

> Most public schools, colleges, and universities now have access to high-speed, high-capacity broadband communications. However, broadband access 24 hours a day, seven days a week, 365 days a year could help teachers and students to realize the full potential of this technology and broadband technology needs to be properly maintained.
>
> Thoroughly evaluate existing technology infrastructure and access to broadband to determine current capacities and explore ways to ensure its reliability. Encourage that broadband is available all the way to the end-user for data management, online and technology-based assessments, e-learning, and accessing high-quality digital content. Encourage the availability of adequate technical support to manage and maintain computer networks, maximize educational uptime, and plan for future needs.

Ed Tech data can help ensure broadband technology is properly maintained, is reliable, managed and maintained, and used to maximize educational uptime.

Other standards are no exception. Ed Tech data can help ensure they are met from a technical perspective, notify those involved when they can't be met, and show their effects. In making decisions about how to achieve standards, consider this data.

School Technology Plans

Looking farther down the road, school technology plans will take on a new look and role using Ed Tech data. School technology plans can be much more dynamic and fluid when the data used to measure them are electronic and retrievable real-time through filtering. If a goal is to have 30% more use of videoconferencing in the district, this data can not only determine whether videoconferencing is possible, but also report whether the goal of a 30% increase is achieved. If it's not achieved, it can help to shed light for decision making through the issue tracking and other logging means.

Putting It in Perspective

A great deal can be learned about the DDDM process by studying the business intelligence (BI) process embraced in the corporate world. I believe as we begin our DDDM journeys we should consider how BI is being implemented and used. BI allows corporate stakeholders to make decisions based on real-time data that has passed through a set of filters. These filters include questions such as: How are sales in each region? What inventory do I have remaining? What are my bonus obligations? This information is real-time and meaningful to the person viewing it. The trend now in many BI reports is to use a dashboard containing charts and graphs to represent the data. I imagine once these processes become implemented, educators will realize the power of meaningful data in various decision-making processes.

Conclusion

Decisions are limited by the information used to make them. All possible information should be considered. Not doing so can have a direct effect on student learning. Although the data may seem complex and overwhelming, take the information bull by the horns. Start simply and start small using questions as your guide. Once underway, you will look back wondering how you ever worked without it—leave no data behind. Let the filtering begin.

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Resources

HostMonitor: http://www.ks-soft.net
Ilient: http://www.ilient.com
Kiwi Syslog Daemon: http://www.kiwisyslog.com
National Education Technology Plan: http://www.nationaledtechplan.org
PRTG: http//www.paessler.com
Schools Interoperability Framework Association: http://www.sifinfo.org

Edwin Wargo is a graduate of Penn State University's College of Education. He has served as a K–12 district technology coordinator, teacher, and technology consultant for Fortune 500 companies. Wargo has participated in county, state, and national technology committees and currently works as an educational technologist for R Squared Consultants.