

THE COMPUTERWORLD HONORS PROGRAM

CASE STUDY



ORGANIZATION:

Ohio Department of Education

PROJECT NAME:

Interactive Local Report Card

Summary

The Interactive Local Report Card (iLRC) provides dynamic analytic reporting against the Ohio Department of Education's data warehouse to the public. Parents, educators, researchers, and other interested parties have direct access to the same information and statistics used to generate the state Local Report Cards that rate the performance of each school and school district, but can tailor the returned data according to their specific needs.

Introductory Overview

The Ohio Department of Education (ODE) regularly collects data from over 600 school districts and over 4000 public schools, representing approximately 1.8 million students. This massive data collection is effected by the Education Management Information System (EMIS), a set of processes, data files, and mainframe computer programs developed in the early 1990s. A few years later ODE began publishing the Local Report Card, an analysis of district and school performance based on measures such as standardized test results and graduation rates.

With the rising public use of the world wide web in the late 1990s, it was determined that an online version of the Local Report Card should be offered. It was quickly realized that this online tool would be difficult to build on top of the existing EMIS legacy files, so ODE decided to create a data warehouse containing the Local Report Card data. This data warehouse, an OLAP reporting engine, and a new web site comprised a system named the Interactive Local Report Card (iLRC). The first version of the iLRC went online in 1999, and evolutionary improvements have been made almost every year since to enhance the user experience, to take advantage of emerging technology, and to respond to legislative requirements (e.g. the No Child Left Behind Act of 2001).

The primary goal of the iLRC is to provide performance data about Ohio schools and districts to the people that want it, when they want it, and in the way they want it. ODE identified two distinct audiences for this data:

- Casual users include parents, teachers, and new users of the web site. They are most often seeking very general information or an answer to a specific question about their local school or

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district; e.g. “What is the enrollment in my school?”, “How did students in my district perform on the state achievement tests?”, or “How was my district ranked on the Local Report Card?” The goal for this audience was to make information available through a simple and easy to understand interface that does not assume any knowledge about the underlying data or technology.

- Advanced users include researchers, legislative staff, ODE staff, and anyone else for whom the simple interface does not provide enough information or flexibility. The goal for this audience was to provide direct access to ODE’s data warehouse through a large set of customizable reports.

To adequately serve the differing needs of these two audiences, the iLRC contains two interfaces: the “simple” interface and the “Power User Reports” interface.

The simple interface is a very directed experience. A typical session using the simple interface consists of the following steps:

- 1.Click a button to specify whether you are interested finding information about a school or a district.

- 2.Select the school or district of interest from a filtered list. The large number of school districts in Ohio is made manageable by first clicking on either the name of the county containing the district or the first letter of the district name. A list of districts is returned which, when clicked, returns the individual schools in that district if the user is interested in school level data.

Alternately, a user can bypass that navigation path by entering all or part of the school or district name in a search box.

- 3.Finally, a list of questions is presented to the user. Each question is a hyperlink that, when clicked, provides information intended to answer the question in the local school or district context.

The question hyperlinks are readily configurable by iLRC administrative staff. The text of each question and where it is positioned in the list can be configured, but the interesting part is defining what should happen when a link is clicked. The most common use is to link a question to a report in the Microstrategy reporting engine. The iLRC uses Microstrategy’s application programming interface (API) to execute a linked report against ODE’s data warehouse for the selected school or district, and then reformats the result to blend into the surrounding web site. Traditional links to static files and reports can also be created for question hyperlinks. For example, one link allows a user to download the “paper version” of a district’s Local Report Card as an Adobe Acrobat (PDF) file.

Where the focus of the simple interface is directing users to the answers to specific questions, the focus of the Power User Reports is to provide data and analytical capabilities to more advanced users. Using a customized version of the Microstrategy Web product, the Power User Reports offer a direct portal into ODE’s data warehouse. The additional features available only in the Power User Reports include:

- Many more predefined reports to execute
- Multiple schools or districts can be compared side-by-side
- Multiple school years can be compared for year-over-year trend analysis



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- More complex disaggregations can be analyzed (e.g. student gender within race)
 - Drilling down from county to district to school (among many other possibilities) is enabled
 - Reports can be formatted to suit individual needs or tastes; e.g. the data can be sorted on any column; row headers can be drag-and-dropped to turn them into column headers; or the entire color scheme can be changed with a single click.
 - Data can be exported to Excel or PDF for further analysis or printing
- The iLRC can be accessed at <http://ilrc.ode.state.oh.us>.

Benefits

The iLRC has benefited both ODE and its customers in several ways.

- **Data Availability:** The most obvious benefit is the transparent availability of all performance and accountability data to the public. The iLRC provides data and reports to a wide spectrum of audiences, from the casual user seeking an answer to a specific question to a researcher seeking in-depth analysis of trend data across regional boundaries. The run-time customization options available to users essentially provide an almost limitless catalog of reports, many of which were not previously available in any form without dedicating programmer resources to satisfy ad-hoc data requests.
- **Distribution Logistics:** The Local Report Card was originally a paper instrument mass-produced at significant cost and distributed to school districts, with additional steps necessary at the local level to put the LRC into the hands of schools and parents. It would take several weeks before this complex distribution was complete, and so Local Report Card availability generally coincided with winter break. With the iLRC, paper copies of the LRC have been all but eliminated, saving considerable expense. And the Local Report Card information is available directly to parents over the internet before the start of the next school year. This can be very useful for parents deciding where to enroll their child for the upcoming year, and is actually now mandatory under No Child Left Behind, which allows students to transfer out of low performing schools in certain situations.
- **Data Quality:** The iLRC data warehouse was the advent of the “one true picture of the data” mindset at ODE. The project exposed several weaknesses, assumptions, and inconsistencies in how ODE processed data in some legacy reporting programs. The data warehouse is now the official repository for all of ODE’s performance and accountability data, and all calculations are thoroughly tested through independent processes to ensure correctness. As a result, ODE’s data quality has never been higher than it is today.
- **Analytical Flexibility:** The architecture of the iLRC and ODE data warehouse ensures flexibility to adapt to the changing landscape of education. One notable example is the enactment of the No Child Left Behind Act of 2001, which dramatically changed the data analysis requirements of all state education agencies. The ability of ODE’s data systems to adapt to the new requirements was one factor in the U.S. Department of Education’s recognition of Ohio as one of the first states to have an accountability system aligned with NCLB.

Looking ahead, one of the fastest growing areas of interest in federal and state education agencies is the creation of “longitudinal data systems”, which allow for deeper analysis of school and



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district performance by following the progress of individual students as they progress through grade levels. The architecture of the iLRC and ODE data warehouse is well suited for longitudinal analysis. ODE has in fact already made initial forays into using longitudinal data, positioning Ohio as a leader in this area of ongoing development.

The Importance of Technology

The iLRC leverages several key technologies to deliver its services:

- Consolidating the massive volume of EMIS data into a data warehouse created the ability to do large scale analysis across logical data silos. By employing standard data warehouse design practices and building on a best-of-breed relational database product (Oracle), this critical data repository is extremely flexible and can be adapted to constantly changing requirements.
- The reporting engine (Microstrategy) is a key component of the public iLRC interface. The unified reporting repository makes it possible for the simple interface and Power User Reports to execute on a single engine despite having very different access methods and appearances. The highly customizable out-of-the-box web pages comprising the Power User Reports deliver a user experience rivaling a desktop application with so much functionality that it would be simply impossible to develop in-house.
- The internet enables immediate and targeted distribution of analytical data and the Local Report Card, replacing the cumbersome delivery model used in earlier years.

Originality

When development of the iLRC began in 1998, Ohio was one of the first states utilizing data warehousing and business intelligence tools to analyze performance and accountability for schools and districts. While projects of this nature were commonplace in the private sector, ODE was breaking new ground for a state educational agency.

Over the years more and more states have recognized the value in creating a data warehouse, and several states also offer reporting portals to the public. However, the iLRC continues to be a leader in this area. The combination of the casual interface and the Power User Reports offers users a choice of access paths according to their specific needs and/or skill levels, and the robust Power User Reports offers a level of report customization and manipulation that sets the iLRC ahead of its peers.

Success

The original version of the iLRC was brought online and made available to the public in the spring of 1999. It was instantly popular, often with so many users attempting to access information at once that the system was filled to capacity.

In 2002, the iLRC underwent a major overhaul including a complete interface redesign and an upgrade of the server hardware and reporting technology. This upgrade included the introduction of the Power User Reports, a previously unrealized goal. At this point, the original vision of the iLRC had been fulfilled.

The iLRC continues to improve, however. In 2005 another upgrade to the reporting engine



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was performed that enhanced the Power User Reports. Using dynamic HTML web technology, these reports now behave much like a full desktop application (e.g. familiar menu bars and buttons, right-click functionality, and the ability to drag-and-drop report elements to reformat the layout “on the fly”). ODE also now has the ability to create “report documents” that combine multiple reports and graphs into a single customizable layout, offering deeper insight that requires multiple views of data to effectively convey. These new capabilities have taken the iLRC beyond any initial expectations of the original project team.

The iLRC currently services several thousand data requests each week. The value of this service is summarized by this statement from an administrator of State and Federal Programs for the Columbus Public School District:

As a district administrator that heavily relies on consistent, accurate data for decision making, I truly appreciate the accessibility and ease of use that the iLRC provides. In a matter of minutes, I can get historical data to create trends for an examination of various student groups’ performance over the years. This type of analysis helps the district plan, budget, and create new programs to suit our needs. Without the information available in the iLRC, my job would be much more difficult.

Difficulty

One of the challenges in implementing the iLRC was the simple fact that data warehousing and business intelligence was new territory for ODE when the project began. The EMIS system was a mainframe data process based on flat files and COBOL programs, and the skill sets of ODE staff were matched to those needs. There was therefore a learning curve in many areas to get the project moving forward at full speed. As with almost all data warehousing projects, questions often arose about legacy data processes and quality; and the “it has always been done that way” mentality had to be overcome. These issues are fortunately in the past because the iLRC has demonstrated the true value in rigorous data processes.

A second challenge, which ODE continues to face, are constraints and requirements imposed by law. One example is a requirement that the iLRC reports not display any calculated number based on data from less than ten students in order to comply with the Family Educational Rights and Privacy Act (FERPA). Although simple enough to implement in a spreadsheet type report, for technical reasons this unfortunately interferes with the ability to display reports as graphs in many cases. Ohio law is very concerned about protecting the privacy rights of students, so ODE is always seeking new ways to provide more intelligent insight while still respecting privacy rights.