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ABSTRACT

Automation of the survey process has proved successful in many industries, yet it is still underused in educational research. This is largely due to the facts (1) that number crunching is usually carried out using software that was developed before information technology existed, and (2) that the educational research is to a great extent trapped in its methods of producing tabulations, charts, and reports. This paper demonstrates the use of an automated survey data processing and reporting system called AutoRide, to cut costs, increase turnaround, and improve the quality of products delivered in both paper and online formats. With it, customized reports are automatically generated with faster and reliable results. (Author/SLD)

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# Automation of survey data processing, documentation and dissemination: An application to large-scale self-reported educational survey

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## Abstract

Automation of survey process has proved successful in many industries, yet it is still under-utilized in educational research. This is largely due to the fact that: (1) number crunching is usually carried out using software developed before information technology existed, and (2) the educational research is to a great extent trapped in its methods of producing tabulations, charts and reports. In this paper, we will demonstrate how we use automated survey data processing and reporting system, called AutoRide, to cut costs, increase turnaround and improve the quality of products delivered in both paper and online formats. With it, customized reports are automatically generated with faster and reliable results.

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## **Introduction**

Automation has affected every part of survey process. Survey design, sampling, respondent selection, fieldwork administration, data capture, quality control, coding, editing, analysis, reporting and dissemination have all been influenced by technological changes. Computer assisted telephone interview (CATI), computer assisted personal interview (CAPI) and Web-based online survey make automated collection of large-scale surveys possible. Optical mark recognition (OMR) technology allows data capturing to be done quickly and efficiently. Recent development of internet technology makes the resultant data reported interactively on the Web.

Automation of survey process has proved successful in many industries [Hearn, 2000], yet it is still under-utilized in educational research. This is largely due to the fact that: (1) number crunching is usually carried out using software developed before information technology existed, and (2) the educational research is to a great extent trapped in its methods of producing tabulations, charts and reports. In this paper, we will demonstrate how we use automated survey data processing and reporting system, called AutoRide, to cut costs, increase turnaround and improve the quality of products delivered in both paper and online formats. With it, customized reports are automatically generated with faster and reliable results.

## **Background**

A large-scale survey (hereafter, the Survey) was developed to examine the degree to which a broad range of recommendations for effective school reform are implemented in a school as well as to examine more fully their impact on students and staff. It has provided much needed empirical data for most of the major foundation-funded initiatives in middle grades including the Carnegie Corporation's Middle Grades School State Policy Initiative, the Lilly Endowment's Middle Grades Improvement Project, and the Kellogg Foundation's Middle Start Initiative. The survey has been extended to serve students in grades K-12 in other projects including the State of Rhode Island's ongoing statewide improvement efforts.

During the past 10 years, over 90,000 teachers and approximately one million students in over 3000 schools have participated in the Survey. In the case of Rhode Island, the Survey was used as an integral part of statewide accountability system [Felner *et al.*, 2001; Felner *et al.*, 2000]. The data collected from survey is summarized and presented in the format that helps schools understand their current status and the future goals. Over 300 public schools in Rhode Island participate in data collection each year. The data collected from teachers, students, administrators, and parents are tabled and charted via AutoRide and reported back to each school for their school improvement planning. As the reporting procedure includes a huge amount of information from a large number of schools, it is imperative that it is reliable and efficient. Time-sensitive survey data processing occurs during academic year. In most cases, we work with tight deadlines. In order to cover a wide range of schools with different building configuration, the procedure also needs to be flexible to be easily customized.

### **Technical Issues**

AutoRide was developed using Visual Basic 6.0 with the OLE (Object Linking and Embedding) control [Balena, 1999]. OLE was used to run the application software by Visual Basic. The application software includes SPSS, Quattro Pro, WordPerfect and Harvard Graphics. Data Access Objects (DAO) in Visual Basic enables the user to access and manipulate data in local and remote databases created in Microsoft ACCESS format (see Figure 1). Macro functions in the application software are used to simplify Visual Basic programming and make the maintenance easy. Since Harvard Graphics does not support the OLE control in Visual Basic, SendKeys method in Visual Basic was used. SendKeys sends one or more keystrokes to the active window as if typed at the keyboard. SendKeys method is not safe and needs to have some knowledge of timing control. Extra time is helpful to ensure the task will be done in the time limit.

Figures 2 illustrates the interaction between various components necessary for the AutoRide to work. School data information database is integrated into the system to provide the parameters such as school name, network number (the year joined), grade range, and project name. And the

file information database was created to include the file information used to process all templates and files. AutoRide is designed to be user-friendly with graphic interface (see Figures 3 and 4).

Three running modes, interactive, batch, and easy batch modes are provided. In the interactive mode, a user interactively processes school by school. The user enters a school code, then select one of the application software to run (i.e., to run SPSS, to create WordPerfect tables, or to create Harvard Graphics charts). The user also selects which survey form to be used: teacher, student (elementary, middle, high, combined), TSRS (teacher-student rating scale), or parent surveys. In the batch mode, a user can process as many schools as possible. The user can select one or more options of running SPSS, WordPerfect or Harvard Graphics. Multiple types of survey forms can be selected (see Figure 5). In the easy batch mode, a user does not need to type school codes, to specify the application software, nor to specify survey forms. Once the user puts all raw data in one folder, AutoRide retrieves all the school codes in the folder and produce reports. This mode is very efficient when a large number of schools should be processed at once. AutoRide can process up to 100 schools per personal computer at one night, from running SPSS to creating all reports without any human presence. In addition to data reporting process, there are two additional programs developed to supplement AutoRide: verification of scanned data before reporting and PDF file extraction on the web. The scanned data verification checks the validity of input data by comparing this year's data with last year's data (min, max, mean values). It helps prevent errors in scanning and new survey design. After a hard copy report (over 150 pages) is produced for each school, each page is converted into the PDF (portable document format) file for Web publishing using PDF file extraction program. This process is also automated.

## **Benefits**

Over three year period, AutoRide has reduced a significant amount of manual process for large-scale educational surveys and improved the efficiency of the survey processing system and the quality of the products that are delivered in both paper and online formats. The scope of automated process that is considered includes data processing, customized documentation, and electronic dissemination. Not only were hours saved in staff time, but the automation was also

much more error-free. A huge manpower was put to run the data processing in previous years. By using the automated system, one person can run all of data processing in much less time period. The accuracy was also greatly improved. Typically, one staff was able to run approximately 10 schools per day manually. After automation was implemented, data from more than 500 schools were processed overnight. This demonstration will show how the automated data processing can help process the survey data more reliably and efficiently. Hands-on demonstration format would be beneficial for interactive discussions and presentations.

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Figure 1. System flowchart of AutoRide

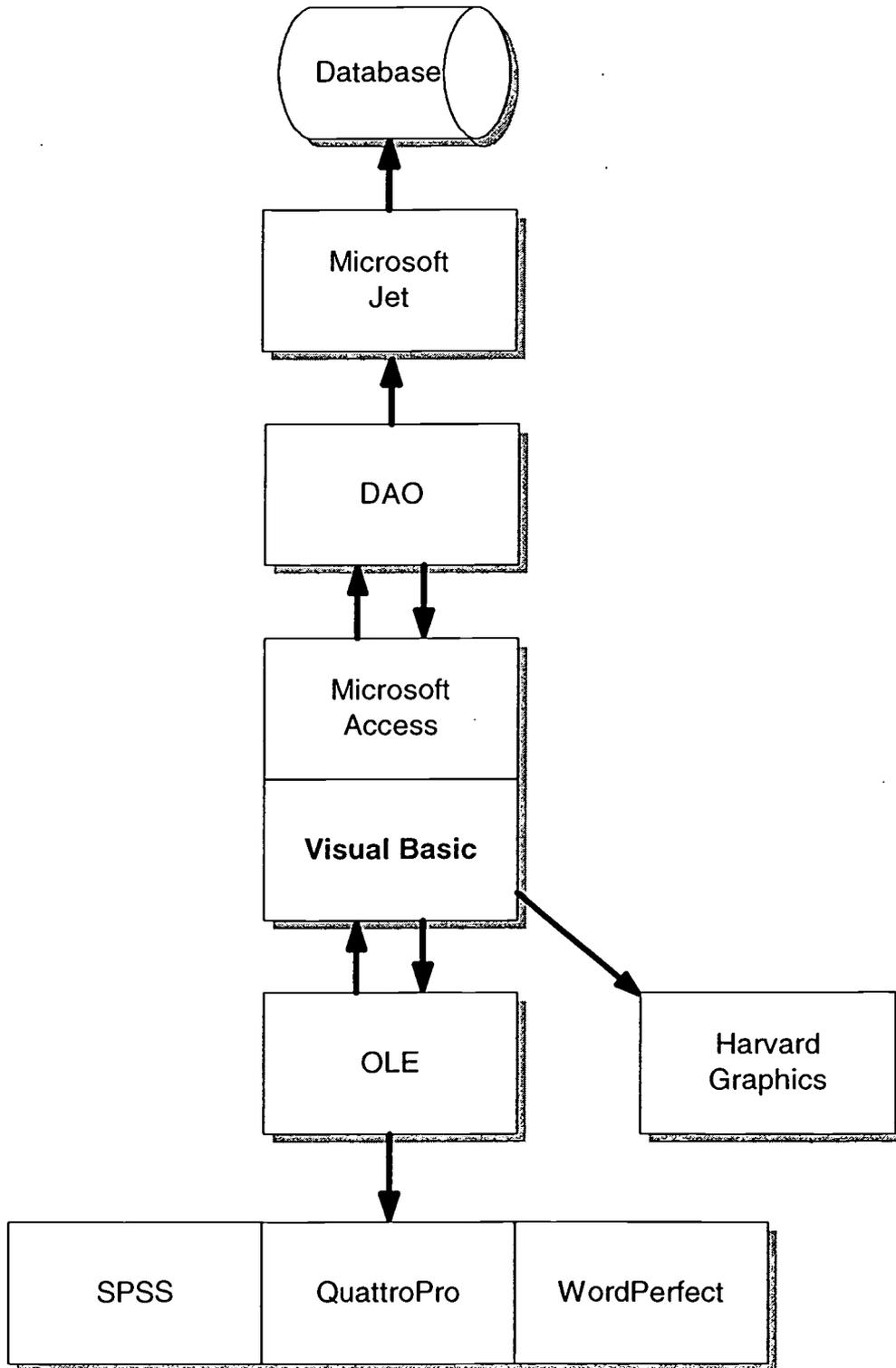


Figure 2. Procedure of AutoRide

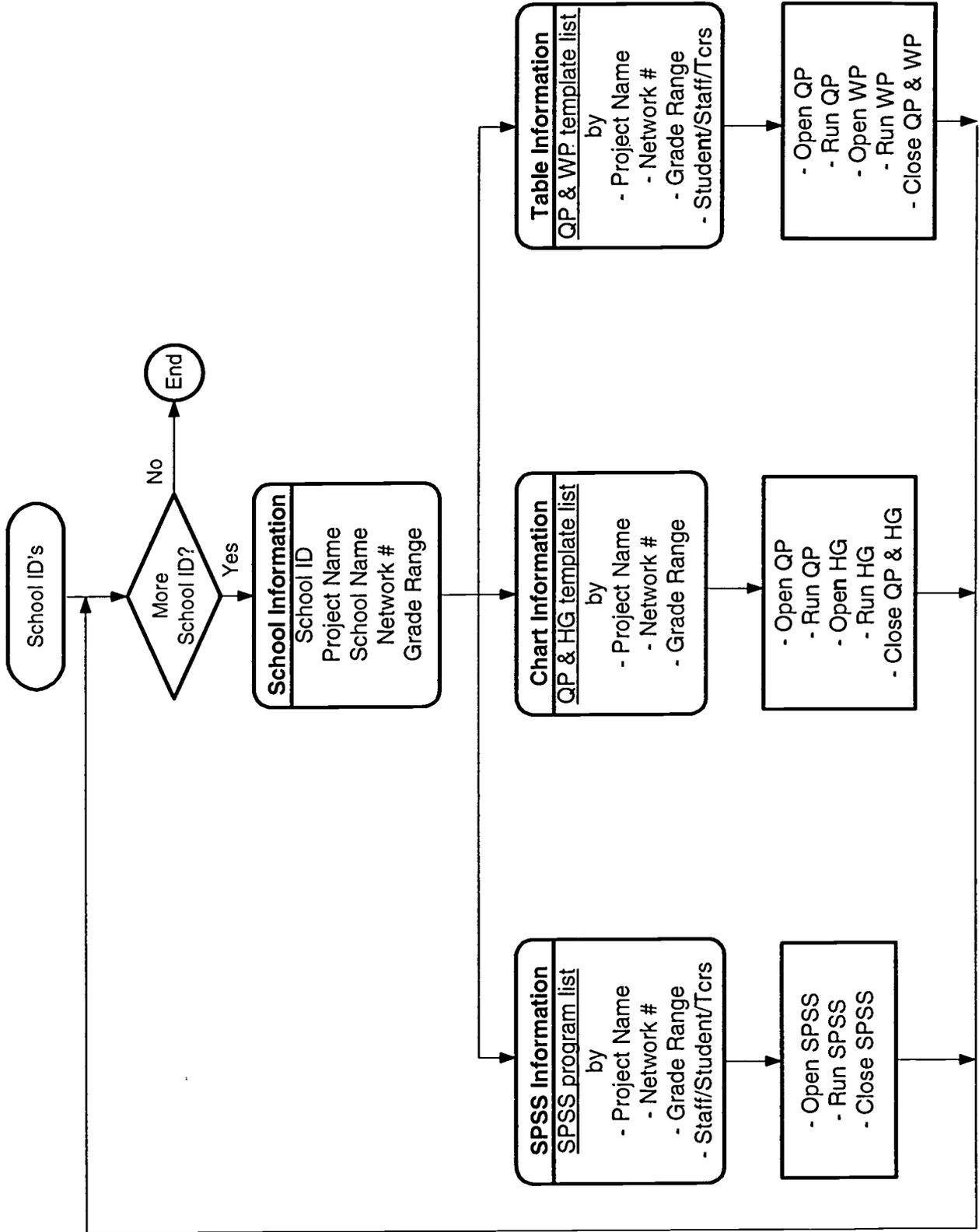


Figure 3. Screen shot of AutoRide (#1)

The screenshot shows a window titled "School Information for School code: 91001". At the top, there is a label "Type School Code:" followed by a text box containing "91001" and a "Display Info" button. Below this is a section titled "School Information from Database" which contains several fields: "School Code:" (91001), "Survey Grades:" (4-5), "Network:" (11), "School Grades:" (K-5), "School Type:" (Elementar), "Project:" (Atlanta), "School Name:" (Adamsville Elementary School), "City:" (Atlanta), and "State:" (GA). At the bottom of the window are three buttons: "Batch Process", "Next", and "Quit".

Type School Code:	91001	Display Info	
School Information from Database			
School Code:	91001	Survey Grades:	4-5
Network:	11	School Grades:	K-5
School Type:	Elementar	Project:	Atlanta
School Name:	Adamsville Elementary School		
City:	Atlanta	State:	GA
Batch Process		Next	Quit

Figure 4. Screenshot of AutoRide (#2)

Enter School Codes for Batch Process

Selected School Name  
Alfred Blalock Elementary School

Type School Code here  
91007

Network 11 Project Name Atlanta

School Grade k-5 Survey Grade 4.5

Total Selected 7

Schools for Batch Process  
91001  
91002  
91003  
91004  
91005  
91006  
91007

Run All Jobs in Batch Bin

Easy Batch

Add School

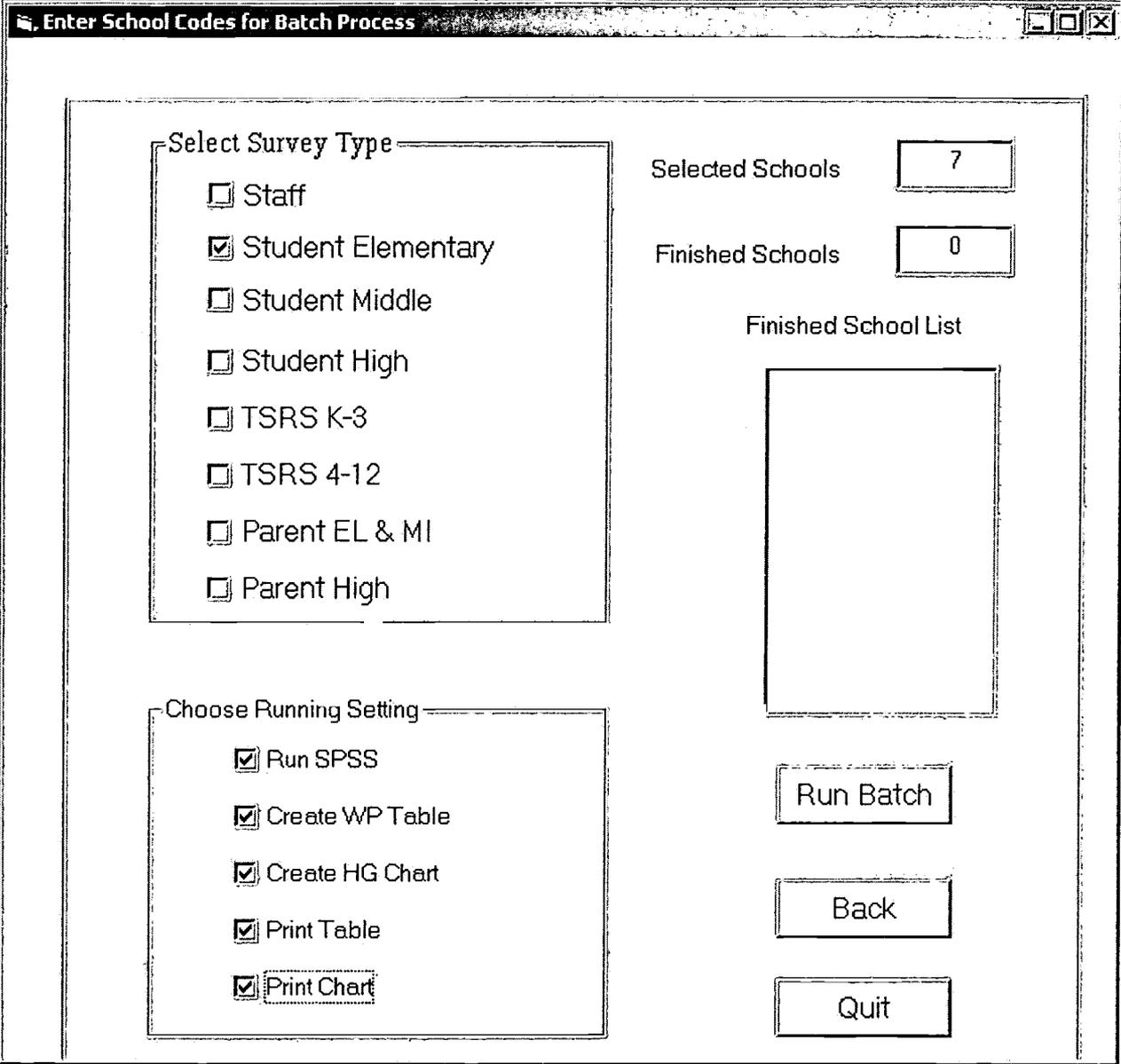
Delete School

Go Batch

Back Interative

Quit

Figure 5. Screenshot of AutoRide (#3)





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