

# In Search of a Teenage Research Tool

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**Abstract:** Observations of high school student researchers indicated teenage frustration and apathy toward conducting quality research. The purpose of this action research was to evaluate an instructional tool designed to assist students in demonstrating exemplary research skills. Two hundred twenty students in ten classes participated in a lesson, which covered the use of research guide worksheets designed according to Eisenberg & Berkowitz's Big Six skills. Instruction was followed by two hours of guided individual research. Student progress was measured through pre and post-tests, scoring of the worksheets, an attitudinal survey, and private interviews. With the use of guides students gathered more information through more sources. Although students did not like using the guides, they felt that the guides were helpful organizational tools and confidence builders. Guides will be revised based on the results of the study and will be incorporated into future research projects in all areas of the curriculum.

## Introduction

One busy morning while working with a group of students in the media center, I watched a student nervously sit down in front of a computer. I recognized him as a student from a class with an assignment due the next day. He was to create a multimedia presentation on the Federalist Papers. Being a proficient user of PowerPoint, he was not concerned about how to put the presentation together. The problem that worried him was that he had no content to use and did not know how to find it. Unfortunately, I had my hands full with my group and could not provide much assistance to him. So he launched an Internet browser clicked the "Search" button and began his hunt. This led him through a tremendous amount of information about federalism, but when the bell rang he had visited close to 30 sites and had found only one paragraph about the papers. This type of behavior made me wonder if there was a tool that could guide teenagers through the research process to find quality information.

My action research focused on the research skills of first year students in a mid-size public high school, housing grades nine through 12. One of the school improvement goals is to improve the freshman success rate. Supporting achievement of this goal was an initiative to improve all freshman courses, including those involving research skills. To help in that improvement effort I designed, implemented and evaluated the use of generic worksheet guides that led students through the processes of planning and conducting research.

## Purpose of the Study

This study was prompted by my observations of the way today's students approach research tasks. More often than not, when given a research assignment, students in our media center choose to go directly to one Internet search engine and expect to find all of their answers within a short lunch period. Filling their time with after-school jobs and social activities, they expend little thought on assignments and expect instant results. The behavior of these students seems to be well described by Burrell when he says, "In an age of convenience, the time poor expect magic bullet solutions to their questions. In the popular imagination, the Internet has become a modern version of the philosopher's stone, the key to the universe" (1999, paragraph 8). The source of the behavior is unclear. Is it that teachers are not describing the process they expect their students to follow? Are students less than motivated to put forth the effort required? On the other hand, could it be that their previous learning has not transferred to new research projects? Perhaps it simply is that the students need more guidance at the time of the research. I decided to see if I could find out if my observations could be explained by any of these factors.

I developed generic planning and research worksheets as guides to help organize students' thoughts before and during the research process. These guides were designed around the Big Six skills (Eisenberg & Berkowitz, 1988). My action research attempted to study how these guides affected the research skills and research

projects of students and their attitudes toward research in general. I wanted to know what the effect of the research guides would be on:

- students' description of the research process
- students' demonstration of research skills
- their final research products
- the motivational level of students

I also wanted to find out if there would be any lasting effects of the study. Would students be likely to choose to use the guides for future projects? How could we use the results of the study to improve research instruction? These were the issues addressed in the action research.

## Literature Review

I reviewed the literature concerning research methods of teens using electronic resources, and concluded that there was a need for further research about this topic. There was much literature in the area of students' cognitive abilities and research tools in general. However, the data sources specific to teen research methods and developmentally appropriate research tools were weak. Major findings that contributed to this action research included works by Bilal (1998), Kearsley (2001) and Piaget (1954) that established that children's conceptual understanding of the search process was limited, as was their ability to think abstractly. Abstract thinking has been proven necessary to the development of research skills. Before a student could begin to think abstractly, she needed a conceptual knowledge base of the topic. Thus, it was necessary for teachers to construct the learning environment such that it encouraged self-initiated inquiry, and not rely on self-taught units of instruction (Brooks & Brooks 1993). Locating resources and determining relevance of resources to the topic was shown to depend upon higher order thinking skill. High school students have not proven to be adept at filtering out irrelevant information or selecting an appropriate database for a specific topic. It was apparent that they needed additional guidance in this area (Burrell 1999; Kahn and Locatis, 1998).

Researchers have made observations similar to mine. It is common for students to initially expect to find easy answers to all questions through the Internet (Burrell, 1999), yet quickly forfeit this expectation after a few simple searches. No correlation has been found between the variables of user satisfaction or frustration levels and success in conducting research. The major factor influencing success rates of student searches was, rather, their familiarity with the search tools (Bell, 1999; Diaz, 1997; Rosenthal & Spiegelman, 1996).

Few search tools have been designed to assist children (Bilal, 1999). Existing search tools have continued to require skilled manipulation to result in quality references (Bilal, 1999; Tomaiuolo & Packer 1996). More research in this area is needed to provide our students with tools that fit their developmental needs. Leading to the development of instructional research tools, Eisenberg & Berkowitz (1988) defined the process of research as involving six steps: (1) task definition, (2) information seeking strategies, (3) location and access, (4) use of information, (5) synthesis and (6) evaluation. They have found that when taught integrated into subject area courses, these steps develop information literate students. For more detailed information see the literature review entitled, *Factors that Inhibit Research Methods of Teens: A Literature Review*, by Rebecca E. Beal.

## Research Methods

The classes I selected for this study were comprised of 220 students from 10 ninth grade biology classes. They roughly mirrored the population of the entire ninth grade in terms of cultural background and academic ability levels. Four of these classes were working on a research paper to support their science fair experiment, while the other six were writing a research paper about their self-selected topic. Each class was taught by one of two teachers.

Although our school system required no consent forms for anonymous data collection, I wanted to ensure that the students were participating without coercion. Before the study was underway, I carefully explained to the students that I was studying how teenagers conduct research. I told them that during the course of this research project they would be given a pre and post-test and an attitudinal survey. I assured them that all of the tests and surveys would be kept confidential, and no names were ever used on any of these instruments. Although none were required to participate, all 220 students agreed to join in the study.

Before instruction began, I presented the students with an open-ended pretest to determine what research skills they could describe. During their first trip to the Media Center for this project, I gave students printed

worksheets that served as planning and research guides. In addition, I posted a web page containing that worksheet in an electronic portable document file (PDF) on the Media Center web page (<http://www.glynn.k12.ga.us/GA/media/student.html>) for students' future use. The guide covered each research skill based upon the Big Six process of Eisenberg and Berkowitz (1988). Before students began their research projects, I provided instruction on how to use the guides and how to locate the PDF copies. The students and I discussed each step in the research process in depth using student-generated examples.

Following the instruction and the planning sessions, which lasted approximately 30-40 minutes, the students began their research in the Media Center, assisted by their teacher and two media specialists. All classes spent at least one additional class period (55 minutes each) on research in the center. During these work sessions, the teachers and media specialists continually reminded students to work with their guides. It was evident that some students were leaving the guides in their notebooks or otherwise ignoring them as they conducted their research. Following their last class day in the center, students were asked to again answer the same questions they did in the pre-test. The pre and post-test scores were compared to determine if the guides helped students describe the research process. I collected the guides at the end of the research sessions and scored every fifth one for completeness and correctness. If the worksheets showed detail and accurate contents, this was an indication that students were conducting thorough research.

I administered a simple six-question survey to all students who participated in the instruction concerning their feelings about the guides. In addition, the two teachers and eight students had follow-up interviews. Each teacher selected four students, two who appeared to benefit from the guides and two who did not. In this interview, I asked teachers about characteristics of those students who fared well with the guides and their counterparts. I asked students to gauge the difficulty level of their research assignment and how the guides might have helped or hindered their work. Both teachers and students provided input on how to adjust the guides to make them more useful.

## Research Results

The tests measured students' ability to describe the steps of planning and conducting research through an open-ended format. The eight steps that students were expected to identify were directly correlated to the instructions for the guides. For most of the students, these tests proved to be a difficult challenge. Pre-test scores were very low, averaging a total of one and one-half points out of a possible eight. Even though the post-test results were also low, students' scores averaged two and one-half points, which is nearly twice the score of the pre-test average. During both the pre and post-tests students scored lowest on the planning step, "list possible search terms" and the research step, "keep a record of your searches". Furthermore, these two steps showed the least amount of improvement between pre and post-tests. In addition, students scored very low on the step, "record bibliographic information" on the pre-test, yet the score for this step tripled on the post-test.

As I informally observed the students conducting research, it appeared that several students had difficulty in working back and forth between the screen and the worksheet. Often they forgot to record their searches, and most chose to print from the screen rather than take notes. The comment that I heard most often was that it was too much trouble to follow the guide, or that the student had his or her own method of research.

I collected 205 research guides from 220 students enrolled in the classes. Some students did not turn in their guides because either they had not completed them, had lost them, or left them at home. I graded every fifth guide, totaling 41 guides. Students could score 12 points in each of the two categories: completeness and correctness. The 41 students averaged eight points for completeness and 10 points for correctness, for 18 out of 24 points. The highest score was 21, while the lowest score was eight. At first glance, their scores look very low at an average of 75%, however 60% of the students averaged scores of 80% or better.

The students completed the surveys quickly due to the straightforward design of five questions on a five point Likert scale. The overall results were mostly positive and consistent with student behavior demonstrated during the research process. To simplify the reporting process I chose to combine the two highest scores (strongly agree and agree) as one and the two lowest scores (strongly disagree and disagree) as one. The remaining percentage that I did not report responded that they had no opinion on that question. Sixty-two percent of the students found that the guides helped to build their confidence in conducting research while only 8% disagreed. Sixty-one percent felt that the guides were helpful tools, but 19% disagreed. The one area where students' opinions were closely divided was when asked if the guides were a motivating factor in conducting good research. Thirty-six percent found them motivating, but 28% did not. When asked if they would search for new resources next time, 58%

thought they would and 13% thought not. One of the most valuable questions asked if the students would choose to use the guides again. Sixty-two percent said that they would and 17% said that they would not.

The last question on the survey asked for helpful comments about the guides. Ninety-six surveys came back with no comments attached. Forty-three had only general statements about the guides being useful tools. Comments from thirteen students said that the guides were not helpful, but they offered no suggestions on how to improve the guides. Nine indicated that the instructions on the guides needed more clarity. Eight students suggested that they would have liked more space for notes and bibliographic data. Seven students thought that adding a list of Internet resources would have been helpful. Four wanted the guides personalized for different users and different types of projects. Three other comments were that the guides were somewhat redundant, needed to look more motivating, and should have included a brainstorming section.

The final measurement instrument was a private interview with both teachers and eight students. All participants agreed to the interview without reservation. Both teachers felt that the students did better research this semester than in the past. Indicators of this included the use of more resources within bibliographies and the inclusion of more facts and sources on note cards. The teachers agreed that the students who seemed to fare better by using the guides were those who lacked organizational skills and who needed step by step help. One teacher noted, "The guides gave them a starting point and kept them from floundering." The other teacher mentioned that students who were self-starters and visual thinkers adapted to the guides better than other students did. Those who did not benefit from the guides had low reading comprehension, lack of motivation and low frustration levels. Both teachers mentioned that the guides did nothing to help those students who become overwhelmed with large assignments or heavy reading. Because the projects have not been completed yet, it was difficult for the teachers to identify what parts of the assignments were improved most by using the guides. However, both teachers again mentioned that their students used a variety of sources, which was an important part of their projects. In addition, students' bibliographies were more complete than in previous semesters. To improve on the guides one teacher suggested having a place for recording their bibliographic information and notes. The other thought that providing an example of each step on the guide would be helpful as the students began working independently. To improve student research skills the teachers offered the following suggestions: (a) assign more research-related work in other content areas; (b) focus on using indexes in books; and (c) provide training for teachers in the area of research skills.

Of the eight students selected for the interviews, the teachers identified four for whom the guides had been helpful tools (identified as category H) and four for whom the guides were not helpful (identified as category NH). When questioned about their previous experiences, each of the eight students reported writing at least four research papers, and one NH student reported writing 11 papers. All students had written research papers for science classes, while four also reported doing the same for social studies or other classes that they could not recollect. When asked to compare the difficulty level of their previous assignments with the current one, the students were split down the middle within both the H and NH categories. Half found this assignment easier, and half found it to be harder for various reasons. All students in both categories said that they already knew how to conduct research before they began their current project; however, one NH student conceded that he had never before used the Internet as a resource. When asked if the guides were helpful, students made some interesting comments saying that the guides, "showed me what to look for", "made me think about keywords to use for my search", "kept me organized", and "gave me a framework and helped me to know what to research". One student was direct in saying, "I didn't like them, but they were helpful." When asked if the guides made the process more difficult, students said that they, "had trouble asking the questions", "couldn't pick a topic", "just don't like writing or research, but the guides made me do it". Although many students offered suggestions on the survey for how to improve the guides, during the personal interviews students were less than willing to make suggestions. No H students offered suggestions and only two NH students did. One thought that it would be more helpful to indicate which resource the students used directly beside each question rather than in a separate section. The other student thought that the guides required too much writing.

## **Interpretations and Implications**

Did the use of guides affect students' description of the research process? There was a slight improvement in their ability to describe the research process following the use of the guides. However, I do not think that the guides themselves are the only instructional tools needed for that skill. Even after using the guides with assistance from teachers and media specialists, the students were not able to describe the steps of research adequately. Is this a real problem? The curriculum does not require students to describe the steps of research, only to implement the process. Describing the process is a higher order thinking skill which when accomplished would indicate that the

student is a highly proficient researcher. It is unlikely that many of our ninth grade students will become this proficient. This is an expectation, however, that we should strive for in our graduating, college-bound seniors.

Did the use of guides affect students' demonstration of research skills? Although observations showed that many students needed extra encouragement to use the guides, the scores showed that the students used the guides as a tool for better research. Scoring an average of 75% from a group (freshmen) that historically has had a failure rate of approximately 30% indicated some improvement. Many of the teachers have suggested that this year's group of freshmen are less mature than in previous years. This may indicate a higher failure rate for this year's freshmen over last year's freshmen. This raises the question, "Does an average of 75% indicate higher success than in the past?" Scores indicate this is so. In addition, during interviews teachers noted that the students used an adequate number of resources rather than relying upon one source for all of their information. This marks an improvement in their skills as researchers. The majority of students indicated through the attitude survey that the guides were helpful research tools. This alone did not show that they helped, but this comment combined with their scores and teacher interview remarks indicated that the guides apparently made some effect on students' demonstration of research skills.

Is there evidence of improved final research products among the students using the guides? Both teachers indicated that there was evidence of improved research products this semester. Although they had not yet seen the final product (the final draft of the paper), they mentioned that students' note cards contained more information and their bibliographies included more sources than in past semesters. Reviewing their final papers will provide a more complete answer to this research question.

Did the use of guides affect the motivational level of students in conducting their research? Only 35% of all students stated that the guides were motivational tools. One student mentioned in the survey that it would be helpful if the guides "look more motivating". The student gave no clear indication of what "motivating" looks like so further investigation is needed. My unstructured observations of students indicated that many students preferred not to use the guides. I interpret this and the survey results as indicators that the guides were not motivational tools.

Are students likely to choose to use the guides for future projects? Although surveys suggested the students did not find the guides motivating, over half of the students confirmed that they would use these guides for future research projects. Unfortunately, we cannot know this for sure until I measure its use in the future. To test this, I can put a counter on the web page that provides the PDF download. After I have revised the guides, I hope to see a trend toward independent use.

How can the results of this study be used to improve research instruction? The students' responses from the survey and interviews were helpful for determining what types of changes I need to make to the guides. First, it is apparent that different students desire different types of guides. Having one guide for all students and all projects may not be a practical solution. An alternative method would be to have a generic guide available by download for student and teacher use. In addition, I will work with teachers on developing a guide specific for each project they assign their students and for each type of learner. Second, I will add a space for notes and bibliographic data. This is an obvious need and has a simple solution. By combining all required writing into one packet, the students may feel less overwhelmed than when being required to write in their notebooks or note cards and guides. Third, one teacher indicated that faculty members need training on using the Internet as a research tool. Our school system has not conducted professional development in this area for many years. The Staff Development Committee should revisit this area of need.

In the past, teachers have not given students a worksheet to complete during the research process, only guidelines for research. This may have contributed to student confusion and apathy. The guides used in this study need some refinement, but will be used again by these and other teachers and expanded into other content areas as well through cooperative planning. A more technical and individualized solution is to create a web site or small application that walks students through the research process one step at a time, incorporating an area for recording their notes and bibliographic data. This solution is in the direction I hope that we can eventually proceed, however it is not feasible at this time.

One area of need that I have not addressed in this study is how to deal with students who have low reading comprehension. No matter what research tool they use, poor readers will continue to have difficulty in conducting research until their reading skills are on grade level. These students must be provided resources containing the material that they need on their reading level. Such resources are not currently available to our students.

This action research has enlightened me on various aspects of our students and their needs. Some helpful ideas grew from the suggestions of teachers as well as students. The teachers in partnership with the media specialists and administration will continue efforts toward tools that assist students in conducting better research.

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