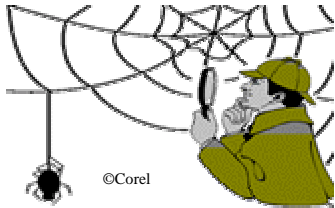


In the past two years the World Wide Web has become the most powerful tool in the world for finding research and evaluation about education and training. For the first time in history, developing countries now have quick and often free access to the world's store of knowledge. All that is needed is a microcomputer with Internet access and a web browser such as Netscape or Internet Explorer.



# Web Research and Evaluation

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This article discusses various ways in which developing countries can make good use of existing research and evaluation to improve their planning and management of education and training. It introduces several search tools that are particularly helpful for finding these resources on the Web. It also explains how to avoid problems and errors that can arise when using existing research and evaluations. In addition, the [WorthWhileWebs](#) section of this issue of *TechKnowLogia* describes 10 web sites that have considerable education research and evaluation information.

## Uses of Research and Evaluation in the Planning and Management of Education

The challenges of planning and managing education in developing countries are more difficult than ever before. The aspirations for education are rising throughout the world faster than the resources to fund them, and the measures to fulfill them. At the same time, education and training are increasingly important to the futures of developing countries. International economic, technological and trading trends make the future of these countries partly dependent on their ability to expand and improve their education systems.

Are the developing countries doomed to impoverished serfdom in the global economy and the information age? Some officials undoubtedly think so privately. Others are so filled with optimism that they blindly move forward. This article is not for either. Rather it is for those who are both cautiously hopeful, who are mindful that the good intentions of past efforts have not always been accompanied with satisfactory results, and who are determined to work smarter in the future when planning and managing their educational systems. In this context, consulting existing research and evaluations is essential as a way of broadening the knowledge and experience brought to bear in making decisions. Research and

evaluation can do that in several ways. More specifically, past studies:

- ◆ Can indicate the range of innovations that have been tried for improving education structures, teacher preparation, and courses of study, curriculum, and teaching methodologies.
- ◆ May indicate problems and opportunities that have arisen when implementing a given innovation, strategies used in response, and the extent to which the actual implementation corresponded with the planned implementation.
- ◆ Often indicate how well various innovations have met their objectives.
- ◆ Can indicate unanticipated side effects (both positive and negative) that may occur from a given innovation.
- ◆ Can indicate the costs of a given innovation.
- ◆ Can indicate whether a given innovation was soon abandoned or long retained.

## Finding Research and Evaluation on the Web

There are three basic ways of finding research and evaluation studies that may be of use in the planning of education. The first is to use *search engines* that will help you find appropriate studies located throughout most of the Web. The second is to use *indexes* to specific fields of research, such as education. The third is to check the *web sites* of organizations that do many studies applicable to education in developing countries.

### 1. Search Engines

Search engines explore most of the Web, index what they encounter, and then steer you to web sites that appear to correspond to your interests. There are now more than 100

search engines. Alta Vista ([www.altavista.com](http://www.altavista.com)), Northern Light ([www.northernlight.com](http://www.northernlight.com)), and Yahoo ([www.yahoo.com](http://www.yahoo.com)) are likely to be the most useful to those concerned with education in developing countries. Each has a broad range of coverage, but develops and arranges its indexes differently.

Search engines are a good way to find research and evaluation reports conducted by international development organizations, NGOs, some government agencies, and university research centers. Search engines are not a good way to find the scholarly and professional journals, because most of those journals are not yet available on public web sites. The Northern Light search engine, however, does make the full-text of about 50 education journals available on the web. These include *Academe*, *British Journal of Sociology of Education*, *Change*, *Comparative Education*, *Harvard Education Review*, *Review of Education Research*, and *Sociology*. If a search in Northern Light finds an article in one of these journals, it will allow you to read an abstract for free, and then for a fee of U.S. \$1.00 to \$4.00 it will allow you to view and print the full text of the article. The fee is automatically charged to the user's individual or corporate credit card.

Each of the above search engines appears easy to use. It seems that all you have to do is type a word or phrase in the search box on the web site. Occasionally it works that easily, but without some knowledge about how to use each engine, you are likely to get no *hits* or thousands of hits unrelated to your interests. It takes an hour or two of study and practice to become moderately skilled in using any of these search engines. The needed instruction can be found on the Web:

To date, the best web site for this purpose is Sprintmail's Web Search Strategies at:

<http://home.sprintmail.com/~debflanagan/main.html>.

It provides explanations and interactive exercises that involve the actual use of search engines. These exercises will divide your screen into two *frames* with the left side providing the instructions and the right side opening and displaying the actual search engine. **HINT:** You will have to use the horizontal scroll bar near the bottom and right-hand side of your screen to view the full width of the search engine display.

Another good site for learning how to use AltaVista and Yahoo is Lincoln College's site at:

[http://learn.lincoln.ac.nz/comn103/www\\_srchs/index.htm](http://learn.lincoln.ac.nz/comn103/www_srchs/index.htm).

The tutorial for each search engine is displayed on the left of your screen and the search engine opens and is displayed on the right of the screen. A tutorial is divided into several sections, each of which provides information, assigns searches for you to conduct in the right hand side of the screen, and quizzes you on the results. **HINT:** To move between the

[Info], [Tasks], [Quiz], and [Hints], click on the file card tabs with those headings (near the top of the screen). To move to the next section of the tutorial, click on [Next]. You will have to use the horizontal scroll bar near the bottom and right-hand side of your screen to view the full width of the search engine display.

Each search engine has some instructions for its use on its web site, but finding the appropriate link to click can be difficult because of the cluttered home pages. Look for something labeled [Search Tips], [Simple Searches], [Advanced Searches], [Help], and [FAQ]. Most search engines have a [simple] and an [advanced] search mode. If one does not work well, try the other. The advanced mode of some engines actually provides better guidance than the simple mode. Some search engines also have an e-mail address to which you can send questions about how to use the search engine when you have had difficulties. It usually is on one of the just indicated pages, towards the bottom.

The best book on the use of search engines is Alfred and Emily Glossbrenner's *Search Engines for the World Wide Web*. Since search engines are changing frequently, make sure to get the latest edition. The second edition came out in early 1999. It costs U.S. \$17.99 and can be ordered through [amazon.com](http://amazon.com) and [barnesandnoble.com](http://barnesandnoble.com).

#### If your search yields few or no hits:

- ◆ Check the spelling of the terms that you typed in the search window.
- ◆ Use synonyms for some or all of the search words.
- ◆ Use a *wildcard* (for most search engines this is an asterisk) at the end of key words that can have multiple endings (such as using school\* to represent school, schools, schooling, and schooled).
- ◆ Use broader terms.
- ◆ If your hits include a few useful web sites, check those for links to other web sites.

#### If your search yields too many hits:

- ◆ Check the first 10 or 20 listed hits to see if they are useful; many search engines try to list hits in order of their apparent relevancy for the specified search.
- ◆ Capitalize the initial letters of proper names (names of persons, places, and titles).
- ◆ Use synonyms for some or all the words.
- ◆ Use more specific terms.
- ◆ Do a *phrase search* by enclosing multiple words within double quotations (e.g. "education reform").
- ◆ Do a *title search* so that the search will find only those web pages that have your search term in their titles (the manner in which this is specified depends on the search engine).

### 2. Indexes to Development and Education Documents

**Eldis:** [www.ids.ac.uk/eldis/eldis.html](http://www.ids.ac.uk/eldis/eldis.html)

**Eldis** is a gateway to information sources on development that are available on the Web. It indexes and provides links to appropriate information throughout the WWW. It also has put the full-text of selected documents on its own web site.

**Eldis** aims to provide policy makers, managers, NGOs and academics with easy access to the high quality information about development that is on the Web. It currently indexes and links to 5,000 selected documents available in full-text, to 2,700 home pages of organizations, and to descriptions of 120,000 books and articles.

From the home page, click on [Search] near the upper left corner. That will take you to the Eldis *simple search* page. It is not simple, so click on the [Help with Searching] for some brief instructions, then go back to the *simple search* page. If you are looking for organizations and cannot find appropriate ones that way, do the following from that page: click near the bottom on [more search options], then click near the bottom on the [subject guides], and then click on the specific subject of your interest. That will take you to a page, which lists organizations, statistical sources, bibliographic sources, research centers, and training courses related to the subject. On the left side there are links to various related tools and resources, including a link labeled [Education online broad search] which will list more than 8,000 documents related to education for development.

#### Educational Resource Information Center (ERIC)

Several countries maintain indexes to the articles published in their education journals and to other documents on education that are published in the country. Presently we understand that only the United States makes its index available publicly on the Web. Its ERIC system has indexed more than 1 million journal articles, monographs, reports, conference papers, and books related to all topics in education. This probably includes half of the formal education research and evaluation conducted in the world. Most of the indexed studies have been conducted within the U.S., but some have been done abroad. In addition, some of those in the U.S. will be applicable in other countries. The ERIC system also has produced hundreds of *Digests* that provide excellent brief reviews of the literature on any given topic. These Digests are available in full-text on the Web. For other documents, ERIC only provides the document citations and abstracts on the Web. The abstracts, however, sometimes are quite informative. The full text of most indexed documents, except journals and books, can be ordered on microfiche for a small fee.

The ERIC search system looks easy to use, but without moderate competency you will miss important documents and get many unrelated documents. The ERIC Clearinghouse on Higher Education at The George Washington University has created a web-based tutorial that will teach moderate competency with the ERIC search system in less than two hours. For those who still are not able to find what they want, ERIC accepts e-mail inquiries that go to expert searchers who do the search and e-mail it back. When making such an inquiry, be specific about what you are trying to find and also indicate related topics that are NOT of interest.

For ERIC Digests: [www.ed.gov/databases/ERIC\\_Digests/index](http://www.ed.gov/databases/ERIC_Digests/index)

To search ERIC: <http://ericir.syr.edu/Eric>

For a tutorial

on using ERIC: [www.eriche.org/Workshops/searching.html](http://www.eriche.org/Workshops/searching.html)

For human assistance with ERIC

send your e-mail inquiry to: [askeric@askeric.org](mailto:askeric@askeric.org)

**HINT 1:** When searching the ERIC system or the ERIC Digests site, when using a multiple word term, such as basic education, place double quotations around the multiple terms - "basic education". Otherwise ERIC will find all documents indexed on basic plus all documents indexed on education, and many will not be about basic education.

**HINT 2:** You can quickly scan the more recent ERIC Digests by clicking on various dates at the bottom of the first screen, then clicking on the number to the left of a given title to access that Digest. To search for Digests related to a given topic, specify the topic in the search box to the left of the *Find* button and then click that button. ERIC will list the Digests, which it thinks are related to your topic, with those that it thinks are most related at the top of the list.

### 3. Web Sites of Education Development Organizations

There are many organizations that do studies on education in developing countries. They include the major international agencies, development banks, international NGOs, international consultant organizations, national governments, and local university research organizations. The *WorthWhileWebs* section of this issue of *TechKnowLogia*, features the web sites of 10 such organizations

#### Interpreting Existing Studies

While existing research and evaluation can be very helpful when planning improvements in educational systems, it can also be misleading. Some reports are nothing more than the writer's opinion based on no empirical evidence. Some are the result of seriously flawed methodology. Some report only the positive outcomes and fail to mention the negative ones that were discovered. Sometimes there may be many

studies of a given issue and they have yielded inconsistent results. In addition, an innovation that has worked well in one context may not work well in another context.

There are several strategies that can be used to avoid being misled by incompetent studies and biased reports. Below are suggestions on how to interpret individual studies and how to interpret a set of studies with inconsistent results.

## How to Interpret Studies

Questions	Warnings
Is the report really based on a study, or is it just someone's opinion?	
What was the problem that was addressed by the study?	Some reports do not indicate the problem clearly. If the problem was different from the one you face, the results may not apply to your situation.
What were the contexts in which the innovation was to be implemented? What contexts may have affected whether or not the innovation would work?	Sometimes reports provide little information on the contexts.
What innovation was planned to reduce or eliminate the problem?	Sometimes impressive names are given to innovations that involve only minor changes.
To what extent was the planned innovation actually implemented? How did it perhaps fall short, and for what reasons?	If the planned innovation was not well implemented, then the findings are not about the planned innovation but rather whatever was actually implemented. If several studies find that the plans were not implemented, that suggests the innovation is difficult to implement.
How much does it cost to deliver the innovation?	For much research and evaluation, there is little or no information on the costs. Look for all costs: start-up, physical and human infrastructure, maintenance, evaluation...
How did the study determine whether the innovation, rather than something else, was actually responsible for observed changes in the objectives of interest?	It is best to assess outcomes by measuring the objectives before and after the innovation, in a group exposed to the innovation, and in a similar <i>comparison</i> group not exposed to the innovation.
How were changes in the objectives measured? By self-reports, tests, observations, or other means? Are those means likely to be valid?	Self-reports of program planners, administrators, and teachers responsible for implementing an innovation usually indicate greater success than more objective measures made by people not directly responsible for the innovation.
From whom were the data about the objectives collected?	It is best to have before and after measures of the objectives on all those in the group exposed to the innovation and all those in the comparison group. If data are not available for a substantial portion, that may seriously bias the results.
Is the average size of the changes in the objectives reported, or do the authors only indicate whether the results are statistically significant?	If there are more than 100 learners participating in the innovation, it is possible for small improvements in the outcomes to be statistically significant even though they may not be educationally important.
Does the average size of the changes in the objectives vary for different sub-groups of intended beneficiaries?	If intended beneficiaries vary in some ways that may influence the effectiveness of the innovation, it is important to examine the average changes in the objects for each sub-group.
Are all the reported findings strongly positive or strongly negative?	Educational innovations operate in complex environments, and rarely is there complete consistency in the findings unless the study has been biased or some of the findings have not been reported.
Are the conclusions and recommendations directly supported by the findings?	In some study reports, the conclusions and recommendations are not always based on the findings, but also involve speculation.



## 1. Individual Studies

The table of questions and warnings above will help you interpret individual research and evaluation studies and consider their application to your own situation

## 2. Sets of Studies

While one study can help inform decision-making, several applicable studies will provide more reliable information. There are many existing reviews of the research and evaluation literature that synthesize findings of several studies on various topics. They are published in scholarly journals and also in the reports of some organizations. They can be located most efficiently with Eldis and ERIC, but web search engines may help, and some can be found by scouting the web sites of major education and development organizations.

Just as with individual studies, reviews of the literature can both guide and mislead you. Some are deliberately biased to support a predetermined agenda, whereas others are skilled efforts to discover whatever has been learned from the existing research and evaluation on a given topic. To check for possible biases, consider the relevant questions and warnings in the attached Table.

When you consider several studies on the same topic, each should be examined using the guidelines indicated in the Table. That examination may indicate that some are not really applicable to your problem or the innovation being considered. It may also reveal that others are of such poor quality that they cannot be relied upon. You should then focus your attention on the remaining studies. **Commonly, even those studies may exhibit inconsistent findings. How should you interpret them?** There are at least three strategies for doing this.

### Stratification

Inconsistency in the findings of several studies on a given topic may be due to several different conditions. The contexts in which the innovation is tried may not have been the same in all the studies. The intended beneficiaries may have differed in ways that influence the outcomes of the innova-

tion. The innovations may have differed in some important feature, either in the original plans or in the actual implementation. Finally, the methods of the evaluation may have varied and affected the results. If distinct differences in these characteristics are noted, it is advisable to sort the studies into categories of those characteristics, and examine whether the findings vary from one category to another. That will provide an estimate of what the result is likely to be when you use the innovation under any given condition.

### Averaging

If your examination of the individual studies suggests that the studies were conducted under similar contexts, implemented similar innovations, and used similar evaluation procedures, then the best estimate of the effects is the average finding. The best average is that of the magnitude of the findings, assuming they have all been measured on the same scale. If the magnitudes are sometimes not reported, or reported on different scales, the next best simple strategy is to calculate the ratio of positive findings to negative findings. If it is well above 0.5, you can be reasonably confident that the innovation will have positive effects when used as it was in the studies.

### Meta-Analysis

Meta-analysis uses stratification and averaging approaches with the assistance of multiple regression statistical methods. Meta-analysis computes and averages the effect-sizes and analyzes how the variation in the study outcomes is related to variations in the study contexts, interventions, and evaluations. Meta-analysis requires considerable time and the skills of a professional statistician.

## Conclusion

Prior research and evaluation studies can be a powerful tool for the planning and management of educational innovation. Web developments over the last two years now make a substantial portion of the world's collection of education research and evaluation easily available to those in developing countries that are working to improve their education systems. When used skillfully and carefully, this resource can expand the perspectives and analysis available to inform decisions.