



## **Attaining Information Literacy: Evaluating a Theory and Research Based Educational Intervention**

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### **Abstract:**

*The Attaining Information Literacy (AIL) project workshop, titled *Information Skills: Finding the Information You Need*, was developed to respond to the particular characteristics of first year college student who demonstrate below proficient information literacy skills. In response to data collected about the target population, three specific research goals were developed as desired AIL workshop outcomes: to make students aware that information literacy is a skill set that can be learned, to help them better assess their own information literacy skills, and to teach them at least one skill that they can immediately apply when searching for information. This paper presents an overview of the AIL workshop design and discusses how the design responds to the AIL project's research and instructional goals. It also describes the formative and summative evaluation plans used to guide the development of the workshop and to measure the extent to which the research and instructional goals of the AIL project have been met. For interested parties the resulting workshop and materials -- including PowerPoint slides, worksheets, handouts, and pre-and posttest evaluations -- will be made freely available through the project website <http://attaininfolit.org>*

### **Background and Research Problem**

In 2008 the Institute of Museum and Library Studies funded the Attaining Information Literacy (AIL) project, which focuses on how to best teach information literacy skills to college students who have below proficient skills in this area. This is a particularly interesting population because research has shown that people who lack skills do not always know it and in fact often have the incorrect idea that their ability surpasses what most people can do. That is, they rate their own skills as "above average." This characteristic has come to be known as the Dunning-Kruger effect (Morris, 2010).

This population is important because recent research has demonstrated that students are entering college without the information literacy skills expected at this level of education (Foster, 2006; Gross and Latham, 2007, Peter D. Hart Research Associates/Public Opinion Strategies, 2005). Other research has demonstrated that students in community college environments experience additional disadvantages. While broad access to education is provided at this level, this means that students bring a wide variety of backgrounds, skill levels, and academic orientation to their studies. Many of them are the first in their family to attend college and come to college with skills that must be remediated before they can fully engage with college level content (Boswell and Wilson, 2004). Statistics show that retention rates at these colleges are low and that many do not complete the degree or go on to transfer to four-year institutions (Jacobson, 2005). Regardless of whether students complete an academic degree, the attainment of information literacy skills is assumed to be important to their success on the job and in their personal use of information. First year community college students were chosen as the population for this project as they represent a broad cross section of society likely to include students who need remediation in terms of their information literacy skills.

In terms of information literacy skills, below proficient students, regardless of where they attend school, are of special concern because they suffer both from an inability to find and evaluate information effectively in their lives as well as from a lack of awareness that there are skills they could learn that would improve their experiences with information (Gross and Latham, 2007). This deficit prevents them from recognizing that others, such as librarians, have skills they lack and that there might be information they are missing or better information available than what they can find (Gross, 2005). This point of view may prevent them from seeking assistance and/or keep them from working with the best information available related to their information need. The AIL project sought first to develop a deep understanding of how these students relate to information and how they prefer to learn. Its second goal is to develop an intervention that will help them overcome their skill deficits and develop a more accurate self-assessment of their information literacy skills.

Two other theoretical frameworks guide the AIL project in addition to the Dunning-Kruger effect. These are Bruce's (1997) relational model of information literacy and Gross's (1999) imposed query model. Bruce's model was developed to provide a deep understanding of how educators perceive and experience information. The AIL project used her framework and the phenomenographic approach to gain an in-depth understanding of students who test as below proficient on a test of information literacy skills. The imposed query model differentiates between information seeking that is personal in nature (comes from one's own interests or life circumstances) from information seeking that is externally motivated (an assignment from a teacher or employer, information seeking on behalf of someone else such as a friend or family member). Phenomenographic analysis was used to understand experiences and perceptions of information in both the self-generated and imposed categories and how these relate to perceptions of knowledge and skill in the domain of information literacy skills.

### **Understanding the Target Population**

In order to understand the mind set and learning needs of students who have below proficient information literacy skills a variety of data collection methods were used. First, in order to ensure that the student participants are representative of the population of interest, all potential subjects in the study were asked to take the Information Literacy Test (ILT), which

was developed and validated at the James Madison University (Cameron, Wise, and Lotterage, 2007; Wise, Cameron, Yang, and Davis, 2009). This test is based on four of the five competency standards for information literacy developed by the Association of College and Research Libraries (ACRL) (2000). It provides an objective score that indicates whether a college student has below proficient, proficient, or advanced level information literacy skills.

At the same time that students took the ILT they were asked to complete a couple of short surveys. These surveys collected demographic information, such as age, gender, and race. They were also asked to identify how they have developed their information literacy skills to date by choosing as many answers as applied from a fixed list that also contained an “other” option in which to supply answers that weren’t reflected in the list. The fixed choices included: library instruction in the school library media center, library instruction in the classroom, helped by parent, helped by librarian in a public library, helped by a librarian in a college or university library, helped by a classmate or friend, and taught myself. Both before and after taking the ILT students were asked to estimate their information literacy skills and to predict their performance on the ILT. Over the course of two and a half years, 561 students completed the ILT and surveys. Only students who tested as below proficient on the ILT were invited to take part in other aspects of the study.

In order to understand the experience and perspectives first year college students have of information literacy in-depth interviews were performed with 57 students. In order to explore these students’ learning preferences and needs, six focus groups were conducted in which a total of 64 students participated. This baseline data informed the development of the AIL workshop, which was then assessed using formative and summative evaluation techniques, which are described below. Formative and summative evaluation also included the participation of below proficient students. The result is an information literacy workshop that is theory driven, research based, learner focused, and which fits into the context in which many academic librarians teach. This paper will focus on the objectives that the intervention was designed to meet and the formative and summative evaluation procedures designed to assess the intervention.

## **Intervention Development**

The educational intervention, referred to as the AIL workshop here, was designed to respond to research data provided by first year college students who tested as below proficient on the ILT. In addition, the design of the intervention utilized the following instructional frameworks: Bruce’s informed learning (2008), Keller’s Attention Relevance Confidence Satisfaction (ARCS) model (1987), and Gagne’s nine events of instruction (Gagne, Bridge, and Wager, 1992). Central to all of these is the need to attract and maintain student attention and the need for instruction to be personally relevant to the student. The AIL workshop gains and maintains attention by making the personal relevance frame central to the educational design. Personal relevance is achieved by focusing on self-generated (personal) rather than imposed (assigned) questions as outlined by the imposed query model (Gross, 1995) and by concentrating on improving information searching using one of the most popular search engines, Google.

A one hour, “one-shot” format was chosen as reflecting the most common (not necessarily the best) educational format available to librarians. This format should be easy for librarians

to adopt or adapt and can be used in a variety of contexts including orientation, first year experiences, and library or class room visits. In terms of adaptation, subsets of the workshop can be incorporated into other workshops tailored to the needs of specific classroom content or specific user needs.

It is suggested that the workshop take place in a classroom or computer lab that is equipped to allow students to work at computers in pairs (or at most threesomes) to search the Internet. The instructor will need access to a computer, projector, and screen, as well as the ability to access the Internet for demonstrations and for student practice.

### **Workshop Components**

Based on the guiding theoretical frameworks and how students report preferring to learn, the workshop design includes several features to facilitate learning. For example, a high level of student interaction is required. Students work in pairs (or at most small groups of three) and it is suggested that the overall size of the class be kept to a maximum of sixteen students. These design decisions support the project's focus group findings, which indicate these students like learning from others, prefer a face-to-face environment, and need an environment that is comfortable and in which it is easy to ask questions. Keeping the group small ensures that the instructor is available to them and that students who are not actively engaged in the learning process will be noticeable.

Active engagement in the process is supported in a positive way by allowing students to supply their own topics and by employing a resource students feel confident using (Google). Active engagement is further supported through the use of worksheets and an instructional design that provides information in small steps through a demonstration, practice, and discussion format as each new skill is presented and used. Students, after analyzing their information need, conduct searches and compare results using various techniques. They also learn to evaluate website results based on the criteria of relevance, credibility, and currency.

Workshop design includes assessment of learning through classroom interaction, instructor observation, class worksheets, and formal pre-and post- tests targeted to the specific instructional goals set for students at the beginning of the workshop. For the purposes of the AIL project level assessment, the ILT is also used as a pre-and post-test of subjects' general information literacy skills.

### **Research and Instructional Goals**

The AIL workshop, as the product of research, is designed to respond to students' reports of their experience and perceptions with information as well as their self-reported, learning needs. Because the AIL project is both a research and a demonstration project, two different types of goals for the workshop were developed. One set of goals relates to the research orientation of the AIL project and the second set of goals relate to the specific instructional goals set for student learning in the AIL workshop. While it is theorized that achievement of the workshop goals is related to achievement of the research goals, this is not a given. Likewise, if the AIL workshop is not successful in meeting its instructional goals, it is still possible that some of the research goals might be achieved. The extent to which the research and instructional goals are aligned is an additional facet of the overall research project that will be assessed.

In terms of the research aspect of the project, three goals are formally articulated for the workshop that have to do with attitude, self-assessment, and skill. The first goal is the result of a phenomenographic study of interview data collected from first year college students (Gross and Latham, 2011). Among the many concepts gained in this study is the understanding that students, regardless of their information literacy skill level, do not perceive information literacy as a set of objective skills. Rather, students measure ability in this domain using a product approach. From the student point of view, the measure of success is whether a person can find needed information, not the process a person uses to find the information. Therefore, one of the research goals of the AIL workshop is to see if the intervention can influence this view by demonstrating skills students can attain in a context of personal relevancy. The attainment of this level of awareness is complicated because the Dunning-Kruger effect tells us that these students are unlikely to accept that someone else has expertise in this area that they themselves do not have. This works against the instructor's ability to gain and maintain attention. In this case, the use of the personal relevance frame and interactive design work together to maintain student engagement and to raise ability in the areas of knowledge and skill. If knowledge and skill can be elevated, the awareness of skills associated with information seeking and use are expected to be elevated as well.

The second research goal seeks to demonstrate whether or not improving the ability of below proficient students also impacts their ability to self-assess their own information literacy skill sets. The Dunning-Kruger effect, which has been found to pertain in the domain of information literacy (Gross and Latham, 2007), is theorized to be best overcome by teaching below proficient individuals the skills they lack (Kruger and Dunning, 1999). People overcome incompetence, by becoming competent. If this is true, students who gain knowledge and skill in the AIL workshop should also demonstrate more realistic self-assessments when asked to estimate their performance on an objective test of their information literacy skills.

The third research goal is to teach AIL workshop participants a minimum of one information literacy skill that will improve both their self-generated and imposed information seeking experiences. The workshop itself focuses on self-generated topics, but teaches skills that should be transferable to other information seeking contexts such as school or employment assignments.

The ability of the AIL workshop to improve skills is critical as the previous research goals are dependent on students attaining at least one new skill. The extent to which the attainment of new information literacy skill has affected participants (personal impact) was explored within a few weeks of AIL workshop attendance in in-depth interviews. In all, 30 interviews with workshop participants have been completed.

In terms of instructional goals, students are told that by the end of the workshop they should be able to identify three steps that make up the information skills process, use keywords to search for information and be able to evaluate Internet search results. The three step information skills process was formalized as the ASE (Analyze, Search, Evaluate) process model and constitutes the heart of the intervention. The use of keywords is presented under the topic of "search" and includes deriving keywords from a topic as well as specific skills such as using truncation and exact phrases to broaden and narrow searches. The "evaluate" topic covers the concerns of source relevance to search goals, source credibility, and the

currency of information. Student attainment of skill is monitored by the instructor during the workshop using observation. Skills gained are assessed using pre-and post-tests and in post workshop interviews.

### **Formative Evaluation**

Formative evaluation was focused tightly on the efficacy of the workshop to support the instructional goals presented above. Formative evaluation was iterative in nature and took place in four stages. In the first stage individual (one participant, one member of the research team) sessions were held with three students who met the profile of the target user group. These students were presented with workshop content and materials and asked, using a think aloud protocol, to provide their response to all aspects of the proposed workshop.

The PowerPoint slides from the workshop were presented one by one and student reactions were elicited and recorded at each step. Students were also presented with worksheets, pre-and post-tests, and workshop handouts and asked to comment in terms of clarity of presentation, usefulness, and ease of understanding. The feedback received from each of the one-on-one reviews were discussed by the research team and revision to the materials were made to improve wording and changes were made to the sequence of the activities.

In the second stage, the workshop was presented simultaneously to a small group of three students who previously tested as below proficient on the ILT. This time the students experienced the workshop as a whole before feedback was elicited from the group. Their responses resulted in further revisions in wording and the ASE model, which was initially conceptualized as a four step process, was reduced to three steps. The result was a model that is simpler to explain and to remember.

In the third stage the workshop was piloted in two separate sessions in the kind of classroom environment called for in the general workshop design. The first pilot included 12 students who had tested as below proficient and the second workshop was held with seven below proficient students. Workshop materials and pre-and post-tests were analyzed and revealed that students in the first workshop gained skills and demonstrated some recalibration of their self-views of their ability. The results of the second pilot also evidenced gains in skill, but the data related to self-views were less clear. These findings resulted in further modification of the pre-and post-test instruments and some minor rewording of the instructional materials. As the second workshop included an odd number of students, one student was allowed to work individually rather than as part of a pair. This reified advice given by students in the data collection phase of the project that working in teams or small groups would enhance the workshop experience.

In the fourth stage instructional librarians were asked to attend a “train the trainer” workshop in which project background, the instructional design, and the workshop and related materials were “taught” to them. In a simulated workshop format, librarian participants completed all workshop materials themselves and provided feedback based on their experience as students in the workshop as well as from their perspective as instructional librarians. Librarian responses to the workshop content and materials were positive and the ASE model was seen as adaptable to multiple contexts and adaptable to other presentation styles and formats.

## Summative Evaluation

Summative evaluation was conceptualized as an experimental design in which the learning gains of one group of students, who attended the AIL workshop, are compared to information literacy skills demonstrated by students who did not take the workshop. There were 46 participants in the experimental group and 46 participants in the control group. As the goals for the instruction include not only changes in skill, but also changes in attitude and self-assessments a variety of measures are brought to bear in the summative evaluation design. In all, five workshops were held in order to keep the number of students per group in the target range. All workshops were performed by the same librarian (a member of the research team) in order to control for instructor effects.

Direct measures of skill attainment were collected using the pre- and post-tests developed in the formative evaluation stage designed to measure the specific content covered by the workshop, and via the ILT, which measures four of the five ACRL standards as discussed above. Skill attainment was also monitored by the instructor within the context of the class. Pairs were observed and helped, if needed, as they completed worksheets and were asked to report their findings to the class as a whole. Worksheets completed in class were turned in so that individual student understanding of workshop material could be assessed and compared to pre- and post-test and ILT outcomes.

As noted above, the pre- and post- tests were tailored through the formative evaluation process to reflect the specific content taught in the workshop. The ILT is a more general test of information literacy and covers skill sets not specifically taught in the workshop. For this reason, skills learned in the workshop may not affect total scores in statistically significant ways. However, the ILT contains four sub scores, one for each of the related ACRL competency standards the ILT measures. The content of the AIL workshop relates to three of the ILT subscales. These subscales are (Wise, Cameron, Yang, and Davis, 2009, p. 4):

1. Determines the nature and extent of the information needed.
2. Accesses needed information effectively and efficiently.
3. Evaluates information and its sources critically and incorporates selected information into his or her knowledge and value system.

The fourth subscale: “Understands many of the economic, legal, and social issues surrounding the use of information and access and uses” is not addressed in the AIL workshop materials at this time.

The ILT subscales will be analyzed for both groups, as will overall scores, and compared to baseline (pre-workshop) scores to assess whether any changes are evident during the time of post workshop testing. Workshop participants took all tests at the close of the workshop. Participants who were part of the control group completed the post test in their college library around the same time that the workshops were being performed. It is expected that greater gains will be evidenced on the workshop evaluation than on the ILT for those students who are in the experimental group. If any gains are made by the control group, on either the pre/post workshop test or the ILT, it is likely that these will not be statistically significant. If they are, the potential for spurious variables and other potential threats to the internal validity of the design will be reexamined.

Students in both the experimental and the control groups were also asked to assess their skills using both short surveys before and after taking the ILT, and in the pre- and post-tests developed for the AIL workshop. Self-assessments around each administration of the ILT will be analyzed and compared for movement in the ways subjects are rating their own abilities. The AIL workshop pre- and post-test also asks subjects to consider and reconsider what they know. These results will also be analyzed for indications of a recalibration in self-assessments such that self-views become more reflective of demonstrated ability.

In addition to the measures used above, 30 in-depth interviews were performed with students who attended one of the five workshops presented order to collect data related to the personal impact of attending the workshop. Interviews began two weeks after the completion of the workshops. Students were asked:

- whether they had had an opportunity to use what they learned in the AIL workshop,
- what they remembered best about the AIL workshop,
- what impacts (if any) they experienced as a result of attending the AIL workshop,
- to describe their current view of information seeking and use,
- to describe how they see they own ability in this domain, and
- to provide any feedback they had on how to further improve the workshop

The final mode of data collection is the process of debriefing with the librarian who led the five workshops. Post workshop discussions were held with the instructor and other members of the research team after each workshop. These discussions have led to further improvements to the delivery of the workshop. A final debriefing with the instructor will be held after data analysis is complete and will be presented to the AIL Project Advisory Board. To date, no changes to the content of the AIL workshop appear warranted.

### **Summary**

This paper has presented the formative and summative evaluation process designed to evaluate an information literacy skills workshop designed based on theory and evidence collected from the population of interest. The workshop was deliberately designed to meet the needs of the target population, and was developed with subjects who are representative of the group. Throughout, assessment has employed a combination of quantitative and qualitative analysis. Methods employed include tests, interviews, focus groups, and observation.

Summative evaluation of the AIL workshop employs a variety of data sources collected from both an experimental and a control group. All data sources will be analyzed and triangulated to determine the extent to which the AIL workshop influences student views of information literacy as a distinct skill set, helps below proficient students to recalibrate their self-views of their ability, and results in students gaining at least one skill that will improve both self-generated and imposed information seeking.

The completion of this summative evaluation is the culmination of three years of study. This study is distinctive for its reliance on theory, its focus on understanding the relationship between skill and objectively measured ability, and its deep interest in understanding the perceptions of the target population.



All materials, including the training manual, PowerPoint slides, workshop materials, handouts, and assessment tools will be posted to the project website at the completion of the summative evaluation (<http://attaininfolit.org/>).

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