The Actor-oriented Transfer Perspective in Information Literacy Instruction

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Introduction

Librarians who perform instruction frequently wonder just what makes some students retain and continue to use the information literacy skills that they have worked with during instruction, while others display atrophy of the skills. The change can be noticeable during the course of a full degree program, or even during multiple meetings in a single academic year. Thanks to the extended working relationships that students develop with librarians, the librarians often have an informal longitudinal view of students' information literacy skills. The field of educational psychology provides some insights into reasons behind this differentiation through theories of transfer of learning. *Transfer of learning*, sometimes simply called "transfer," explores factors that affect students' abilities to develop a skill in one situation and then apply it in another situation. Reading about transfer of learning can provide rich ideas for librarians who wish to better support their students' transfer.

Over the past 15 years, some faculty in the fields of mathematics education and science education have the "actor-oriented transfer perspective" (AOT), to frame and guide their research and improve their teaching. AOT has the potential to help information literacy instructors understand and research the ways in which students transfer information literacy skills. Two meaningful differences between AOT and other transfer perspectives are that (a) AOT explores students' perspectives on why they chose to use skills in the ways that they did, and (b) AOT gathers meaningful data from student performance even when that performance is imperfect. Both of these differences offer tremendous potential benefits for librarians who perform information literacy instruction in academic libraries. They offer opportunities to gather in-depth data and insights on the choices behind students' usage of information literacy skills. By extension, they also offer librarians the opportunity to develop new strategies based on what they have learned through their use of AOT.

This paper introduces AOT in a manner tailored to information literacy instructors in academic libraries. It provides detailed background on AOT, as well as framework for planning AOT-based research in libraries. It also points toward new directions in AOT research in academic libraries. The framework and techniques described in this paper merit a place in the range of research techniques used to investigate learning in information literacy classrooms today. They offer the opportunity to gain greater insights into students' processes of reasoning and learning.

Defining AOT

Mathematics and science education professor Joanne Lobato introduced a specific type of transfer, AOT, which "emerged from design and experiment work" (Lobato, 2003, p. 17). Lobato explained that AOT relies on exploring the actors' (in this case, students') perceptions of the similarities between the situation in which a skill or information was learned and the situation in which it was applied. Thus, it sees the study from the "actor's" or "learner's" viewpoint (Lobato, 2003, p. 18). In contrast, most transfer studies view the study from an "expert" viewpoint and, more or less unintentionally, evaluate based on expectations of "expert performance" (Lobato, 2003, p. 17). AOT thus allows researchers to explore situations of transfer from the students' perspective. It also allows researchers to gather information from imperfect instances of transfer, which may likely have been discarded in transfer studies that used other perspectives. AOT typically employs qualitative research methods in order to interview students to some degree about their choices and perceptions.

Researchers who perform interviews inspired by AOT employ a number of steps that are common to much educational or social science interviewing. For example, an AOT-based interview will use many of the standard practices of a guided interview (Radcliff, Jensen, Salem, Burhanna, & Gedeon, 2007, p. 61) in that they have a set group of processes and topics to discuss with each participant. The process of direction and redirection of the conversation, clarification, and deep follow-up questions on points of interest will reflect fairly standard protocol for other forms of educational interviewing (Radcliff et al., 2007, p. 64). The points that distinguish AOT from other, generalized types of educational interviewing are the specific content that must be covered. For example, an AOT interview protocol will typically ask each student to walk the researcher through their thought process in solving or approaching a particular challenge. The researcher may pay special interest and additional questions about areas in which the student's reasoning seems to be confused or misguided, in order to gain insights into the thoughts behind flawed attempts. Becoming comfortable with standard interviewing practices will support researchers who plan to use AOT. These practices support successful application of AOT-based

content.

The Dutch mathematics education research team of Roorda, Vos, and Goedhart performed a two-year longitudinal study using AOT, after which they condensed the following guiding principles for researchers in AOT.

- "Look for the personal construction of relationships between activities from an actor's perspective";
- "Investigate the effect of prior activities on current activities and how actors construe situations as similar";
- "Analyze what relationships of similarity are created by actors and how these are supported by the environment" (2015, p. 866).

This list clearly identifies principles guiding researchers' roles in AOT. Roorda, Vos, and Goedhart's work, as well as other studies using AOT, also exemplifies major benefits of using the AOT perspective.

Literature review

AOT is researched in a small but growing body of literature. The key articles on this topic are those that its creator, Joanne Lobato, has written herself. Her earliest work on the AOT perspective provides both a clear outline of steps and information to be gathered and relatable examples of AOT in use (2003).

In 2006, Lobato wrote an article that situated AOT within the scope of transfer studies, compared her perspective with other types of transfer, and outlined its connections with other perspectives regarding transfer. That article describes major works in the field of transfer quite thoroughly. Readers who are interested in other views of transfer that are still considered current may use her article as a guide to these theories. Highlights include Bransford, Brown, and Cocking's seminal work "Learning and Transfer" (2000), a cornerstone of courses on learning theory.

By 2012, Lobato and AOT had truly made an impression on the field of educational psychology. An article that she published in a special issue of *Educational Psychologist* that year demonstrated its connections with other current work on learning theory, appearing in that issue (Chi & VanLehn, 2012; Day & Goldstone, 2012; Engle, Lam, Meyer, & Nix, 2012; Perkins & Salomon, 2012; Richland, Stigler, & Holyoak, 2012; Schwartz, Chase, & Bransford, 2012). Her 2012 article also lists three major areas in which AOT has emerged as being especially insightful in terms of exploring transfer: (a) exploring transfer situations from students' perspectives, (b) exploring the role of social interactions in transfer situations, and (c) the role of context or learning environment (p. 233).

Major concepts within AOT

The AOT perspective uses several specialized terms to define its situations and discuss its methods. First is the idea of *focusing phenomena*. *Focusing phenomena* refer to the range of tools, processes, and teaching techniques that a teacher uses to help students learn to focus on the most critical parts of a new skill. For an example that may resonate with many instruction librarians, a librarian might use a wide range of tools, techniques, exercises, and instructional materials to demonstrate the process of finding "reliable sources" of information on the Internet. All of these tactics and tools would count as focusing phenomena. They would focus students' attention on a process for finding sources and making decisions.

The second specialized term used in AOT is *personal salience*. This refers to aspects of the way in which a teacher conveyed a message that personally resonated with an individual student, and thus promoted successful transfer (Lobato, 2003, p. 19). As the name suggests, personal salience is specific to each individual. An instructor of a course aims to provide a range of messages regarding how and why a new process or piece of information is used. The aim is that all students will

connect with enough personally salient messages to support their own learning. For example, in a library instruction session, a librarian might mention both that seeking out reliable online sources of information will have powerful practical applications in one's future career and that piecing together the picture of a website's reliability can make a fun puzzle. A student who hopes to become a doctor may immediately connect with the importance of seeking out current, correct information from the wealth of sources that she will have access to in her medical profession. Another student, who enjoys a good mystery, may find that he likes the process of critiquing intriguing sites that he comes across online. Although the students connected with different portions of the librarian's teaching, both ultimately connected with the information literacy-related messages in ways that supported strong performance on class assignments.

Techniques and instruments used

Thus far, the majority of studies using the AOT have used a fairly predictable set of methodologies and instruments. Interviews are one of the primary tools used in AOT research. The largest number use interviews with students (nearly always one-on-one, with one student and one researcher). Methodologies often comprise a pre-instruction interview with each student, then a post-instruction interview where a student either completes sample problems and verbalizes as he or she works, or completes problems and then explains his or her decision-making processes (Ellis & Grinstead, 2008; Gray & Rebello, 2005; Hohensee, 2016; Lee & Sriraman, 2011). Lobato and Siebert (2002) included an additional interview, speaking with each student three times during the five-year duration of the study. A few studies gathered their data during a single interview, in which students explained their methods during or immediately after working through problems (Ellis, 2007; Nagle, Casey, & Moore-Russo, 2017).

Many researchers chose to videotape parts of the interview process to allow for future, or more detailed, analysis. Generally, interviews between a student and a researcher were videotaped so that the researcher could watch them again or code data at a later time (see, for example, Roorda et al., 2015). Others recorded interactions between pairs or groups of students to give the students space and allow the researcher to view and code them later (see, for example, Lockwood, 2011).

Sample groups are generally ten or fewer students, due to the intensive nature of the interviews and data collection. Nagle et al. (2017) performed a slight variation in which they drew some conclusions about a larger group of 33 students, and then chose two exceptional students to interview.

Due to the nature and formats of the data collected, studies thus far have focused on qualitative methods. Most studies gathered data over time periods ranging from a few class periods to a few weeks. Several others were conducted over a full semester. A rare outlier was Roorda, Vos, and Goedhart's work, in which individual students' development was followed for two years (Roorda et al., 2015). The majority of past studies have been conducted by researchers partnering with K-12 classrooms, although more studies conducted in higher education settings are starting to emerge.

Subject-specific disciplines

AOT has been used primarily in mathematics, physics, computer science, and closely-related education programs. A few researchers in other fields are beginning to explore the possibilities of AOT. However, their works discuss AOT as a future methodology. AOT has not yet been used as the perspective for their own research. For example, DePalma and Ringer discussed AOT's potential for research in second language education (2011). Larsen-Freeman (2013) also included AOT in a detailed piece discussing theories of transfer in second language learning. She highlighted its potential for future research and practice. Martin,