

Constructing Mental Model Paradigms for Teaching Electronic Resources

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Library media specialists activate numerous mental models when teaching electronic information literacy database access, research, and retrieval in the context of authentic school assignments. The paper identifies these models and examines what occurred when the mental models in a study sample interconnected in the complex changing environment of a lesson. Discussion focuses on the changes to the mental models the library media specialists held with respect to the electronic database, the role of the library media specialist, the lesson goals, and their teaching strategies. Findings suggest that (a) most of the library media specialists' mental models of teaching with electronic databases were influenced by their models of teaching access, research, and retrieval with print resources and (b) even though many library media specialists identified the necessity to incorporate mental model changes for more effective teaching, these were not sufficient to counteract their habituated teaching behaviors.

New policy thrusts in education are increasing the range of electronic learning technologies for use by students, placing them as central to the core curriculum, and calling for equitable access to information via these technologies (Tallman 1998). Part of this equity includes individualized instruction to help students “develop a systematic mode of inquiry to gain physical and intellectual access to information and ideas that reflect diversity of experiences, opinions, and social and cultural perspectives” (American Association of School Librarians and Association for Educational Communications and Technology 1988, 29). Effective teaching of computer-based electronic resources requires library media specialists to have appropriate mental models of the characteristics and protocols of these resources and strategies to teach competent problem-solving access, research, and retrieval skills to meet the needs of individual students. One method for constructing mental-model profiles of library media specialists is to explore their mental models in situ. This involves identifying changes to the mental models during and after teaching episodes. This paper demonstrates that constructing a representative teaching paradigm for the library media specialists in the study sample involved examining the relationship between various mental models. It reports the study of the interconnected relationships of various mental models utilized by ten American and Australian library media specialists when involved in one-on-one teaching-learning episodes with students using electronic resources in the context of information-seeking for authentic school assignments.

Post-Interviews

Two individual post-interviews containing a set of open-ended questions were administered and audiotaped. One was conducted immediately after each stimulated recall interview while the final, smaller post-interview was administered to each library media specialist at the conclusion of all previous data collection sessions. The purpose of both post-interviews was to increase detection of any changes in the library media specialist's mental models. The post-stimulated recall interview gave the library media specialist a place to explain the relationship between the mental models they held prior and after each teaching-learning episode. Importantly, it also allowed the library media specialists to comment on any perceived changes to their mental models during each lesson. Besides providing a last opportunity for reflection, the final post-interview permitted the library media specialists to identify any changes they in the second teaching-learning episode as a consequence of the first lesson or the research itself. Thus, by having the library media specialists each teach two students, the researchers could identify any adjustments in the library media specialists' mental models in response to each student's needs and the library media specialists' reflections.

Findings and Discussion

From analysis of the data, the researchers identified various mental models utilized by the library media specialists during the teaching-learning episodes. By triangulating the data, it was possible to construct a "before," "in-action," and "after" profile of the mental models of the library media specialists' as teachers of electronic information literacy databases. Those selected for discussion are mental models of: (a) the electronic data base, (b) the role of the library media specialist, (c) their lesson goals, and (d) their teaching strategies. This paper is concerned with examining the runability of these mental models in the in-action stage of the teaching-learning episode. Hence, the before and after profiles are summaries of the findings that, nevertheless, help provide a contextual overview.

The "Before" Profile

The before profile contained [several] the following types of mental models. All media specialists held perceptions that their mental model of the database was satisfactory. Their mental models of the role of teachers contained samples of teacher-as-expert, teacher-as-director-of-events, teacher-as-colearner, and teacher-as-facilitator. Their teaching strategy mental models advocated a hands-on approach with the student 3(ol)-2itator5.17 ol Tc 2(a)6(lf t)-2(h)-12(Tc 0 -2(hew)2(.)JTJ

The In-Action Profile

An examination of the in-action library media specialist profile highlights the effect that changes in one mental model had on other mental models.

Mental Models of the Electronic Information Databases

Not surprisingly, all the library media specialists perceived they had an adequate mental model of the electronic database for the lesson they chose to meet the students' assignment needs. The teaching-learning episodes exposed discrepancies with these perceptions. Analysis revealed that the mental models ranged from flawed to reliable depending upon the level of working knowledge of the database that the teachers possessed. Significantly, understanding of the complexities of the databases fluctuated within several of the inadequate models. Such inconsistencies in their mental models of the database had repercussions for the library media specialists' mental models of (a) the role of the library media specialist and (b) the teaching strategies utilized during the lesson. The following example helps clarify what happened due to inconsistencies.

Two media specialists experienced nearly identical "technical nightmares," that is, breakdowns in their mental model conceptualization of the database protocols when attempting to establish dial-up access through the Internet to a university and a public library, respectively. Certain of their other mental models impacted the inadequate mental model in practice to produce different scenarios. One media specialist's mental model of herself as a library media specialist of electronic databases was that of co-learner with the student. Putting her mental model into practice, she openly discussed her bewildered lack of success with the student and ensured that the student was co-solver of the library media specialist's predicament. During the stimulated-recall interview, the library media specialist stopped the video and pointed to the TV screen:

. . . I was thinking there, I see it as valuable, the fact that they see their teachers learning too, that I don't know everything. I've never ever claimed to know everything and I don't hide that. I see that as a valuable part of their learning.

The library media specialist stressed that she consciously thought that her teaching strategy demonstrated her mental model of the library media specialist as co-learner and that it would help the student create a new (or reinforce her existing) mental model of the legitimacy of the library media specialist as a continuing learner. In contrast, another media specialist's mental model of herself as library media specialist permitted ambiguity: it allowed her to admit errors while still maintaining the role of director-of-events:

The modem is actually dialing out . . . We're waiting. I heard somebody talking but I don't know why. It didn't connect. Maybe [I] forgot the number! [She did and told the student the correct number to dial.] Now enter. Did you mash enter? . . . I don't hear it dialing. Mash enter again. Back up. It's not letting us escape out either. Let's start over . . . I don't know what happened. It's connected now.

She reported that her overriding consideration during technological "moments of panic and discomfort because of unfamiliarity with the database," involved a mental model of the role of library media specialist as expert: "I was concerned a little bit about my own image . . . I didn't

want to come across as if I didn't know what I was doing." Her mental model involved her normal immediate preference for "abandoning ship" and asking the student to come back later. Time-out would allow her to develop a more consistently near-expert mental model of the database that, in turn, would reestablish her mental model of herself as library media specialist-as-expert with electronic information databases in both her own and, ipso facto, the students' eyes. Because of her mental model of the appropriate role for a media specialist, she overlooked the possibility of inviting her student's involvement in finding solutions.

Mental Models of Lesson Goals

Most library media specialists' mental model of the lesson goal were for the students to (a) acquire procedural understanding, that is, be able to repeat the procedures for access to the database and location of appropriate content and (b) obtain the best immediate resources for their assignments. These objectives dovetailed nicely. For these, the goal was that the session be useful for the students. "Useful" was interpreted as having a resource of value, a printout of reference call-numbers of books located in the public library or printouts of articles from the World Wide Web. Thus, the library media specialists had a mental model of the electronic database as a tool to be used by the students when finding resources for assignments. Their aim was that the students follow and be able to repeat the procedures necessary for access to, searching, and retrieval from, the database.

A few of the media specialists helped their students form a mental model or image of the resource itsdataessou

assessment of the student's ability: "The temptation to touch the keyboard was too much given the student's hesitancy, and I sort of jumped in." Others encompassed a show-and-tell-then-copy-me strategy whereby the students took control during the latter half of the lesson in order to demonstrate their ability to replicate the library media specialist's procedures.

Although all allowed hands-on, many library media specialists used directive statements or questions; only a few adopted a questioning technique that involved procedures, predictions, and consequences of the database's navigational and hypermedia features. An examination of the interconnectivity of two library media specialists' mental models with respect to their lesson goals, teaching strategies, and role of the library media specialist helps clarify these points.

One media specialist concentrated on the student's acquisition of procedural skills while the other saw conceptual as well as procedural understanding as the important learning outcome. Both used questioning strategies. A simple tally of the number and types of questions from the transcriptions of the videotaped lessons revealed significant differences. The first library media specialist asked 79 questions, of which 30 (38 percent) required a response (41 percent) and 49 (62 percent) were open-ended (62 percent).

Conclusion

The purpose of the study was to delineate the implicit in-action mental models of library media specialists when teaching information literacy access, research, and retrieval with electronic databases. The before, in-action, and after mental model paradigm highlighted how different mental models influenced the library media specialists' teaching when rescuing an inadequate mental model (in this instance, the database dial-up protocols), how the mental models interacted, and how questioning was affected. Findings indicated that the in-action mental models of their conceptualization of the database, role as library media specialist, lesson goals, and teaching strategies directed the library media specialists' teaching. Indeed, their mental models acted as a controlling element, defining the library media specialists' responses to situations occurring in the teaching-learning episode.

Our study suggests that mental models are ingrained during initial experience with print resources and the procedures used to teach access to information in print resources. Thus, transition to electronic resources requires changing some mental models to incorporate a reliable conceptualization of electronic databases into their mental models. Acknowledgment of flawed mental models after a teaching-learning episode appears to be inadequate for change to occur in moJubsmob

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