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The Notion of Relevance in Teacher Information Behavior

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ABSTRACT
Educators use information to support their teaching, which is largely concerned with the transfer of information. To support this information exchange, teachers manage complex information environments that are continually changing based on outside influences. Decisions on when to go out and seek additional information, what information to incorporate, and what information to dispose of are all based on notions of relevance. This exploratory study found that notions of relevance are largely driven by the educational context and are therefore unique to this particular user group. Relevance is often prescriptive for teachers, that is, information needs are driven by curriculum and school policy. Teachers also appear to stack the deck when looking for relevant resources, increasing their chances for finding a good resource fit by drawing on shared experience and information from close colleagues. Resource selection is again curriculum based, but also has the interesting feature that teachers are proxies for relevance decisions that affect their students. Anticipated relevance is present in various aspects of teachers' personal information management (PIM), such as deciding whether to keep resources for future use, organizing their physical classroom space, and resource housekeeping decisions.

Keywords
Relevance, information behavior, teachers, educators, Personal Information Management, information seeking

INTRODUCTION
This paper is based on data from a qualitative study of the personal information management (PIM) of elementary and secondary (middle and high) school teachers. The data were collected to understand how teachers manage their personal information spaces. During the analysis, the role of relevance (a user's view of the usefulness of a resource given their information need) in teacher information decisions steadily emerged. The importance of the role of relevance in teacher informational tasks such as teaching preparation, information sharing, and file management clearly warranted a closer look at the information science construct in a new context.

Educators use information to support their teaching, which is largely concerned with the transfer of information from teacher to student. To support this information exchange, teachers manage complex information environments that are continually changing based on outside influences (Porter, McMaken, & Hwang, 2011). Decisions on when to go out and seek additional information, what information to incorporate, and what information to dispose of are all based on notions of relevance. However, not much is known about teachers' notions of relevance. This paper provides an exploratory foundation for future work on teacher information seeking behavior and personal information management. Like our previous study (Diekema and Olsen, 2011), this study also builds on prior work on information behavior, namely that of Kwasňik (1989, 1991), Barreau (2008; 1995), and Jones (2007). In addition, this study incorporates research on relevance by Saracevic (1975, 2007a, 2007b) and others. This work is situated within the theoretical framework of the pragmatic view of relevance (Saracevic, 1975), where relevance is considered to be related to the goals, values and interests of the individual (Hjørland, 2010).

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BACKGROUND
Little is known about the PIM practices of teachers and even less is known about the notion of relevance within these practices. Thus, this study explores new notions of relevance in the context of teacher PIM and how relevance impacts teachers' information seeking, information sharing, and information management behaviors. This knowledge can inform future research on teachers' PIM and help build a better understanding of how teachers navigate and manage their increasingly complex and changeable information spaces. Developers of educational digital libraries and other online services supporting the teaching profession will benefit from an understanding of how relevance affects teacher information behavior.

Relevance
Relevance is a much-debated concept in information science, particularly its definition and its use in information retrieval experiments for system evaluation purposes.

Schamber, Eisenberg, and Nilan (1990) state the two opposing notions of relevance: relevance to a subject (i.e. topicality), and user relevance (i.e. perceived utility). The latter notion of relevance is, as the authors point out, dynamic and situational. System evaluations, on the other hand, assume that 1) relevance can be approximated by topical similarity; 2) relevance is binary; 3) relevance of a document is independent of other documents; 4) relevance of a document is static; and 5) user judgments are representative of all users. (Salton, 1992; Hull, 1993). Not surprisingly, these assumptions have been criticized as being rather unrealistic (Eisenberg & Barry, 1988; Schamber et al., 1990; Saracevic, 1975; Ellis, 1996). While this argument is certainly outside the scope of this paper, some of the resulting literature is of interest as it demonstrates the complexity of the relevance construct.

In her exploratory study, Barry (1994) identified seven groups of criteria that come into play when users decide whether or not a resource is relevant. Categories of criteria are related to the information content of the resource, the user's background and previous experience, the user's beliefs and preferences, other information and sources within the information environment, the provenance of the resource, the document as a physical entity, and the user's situation. Saracevic (2007b) also presented seven criteria, drawn from the literature, used to make relevance decisions that incorporate aspects of the resource itself and the user. Here, relevance decisions are based on the content characteristics, and validity of the information object and on whether the user can understand the resource (cognitive match), beliefs what is in it (belief match), and emotional response to the resource (affective match). While the criteria largely overlap, one important factor is missing from Saracevic's set and that is the impact of other resources in the information space, which is mentioned by Barry (1994). As we will see later, the existing information sources play a key role in teacher information management and related relevance judgments.

In this paper, we will use a definition of relevance based on Schamber et al. (1990). Relevance is a human judgment based on inferred relationships "between certain aspects of the information and information need", influenced directly or indirectly by the user's context and circumstances. For this reason, it is of interest to examine relevance not just as a set of criteria but also as a process. Saracevic (2007a) contributes seven attributes of relevance that are helpful to consider when thinking about the process. The relevance process takes place in a variable context, both internal and external to the user. During this process, a relationship needs to be expressed between certain properties of the information need and information object, and there must be the intent to establish this relation. Inferences have to be made about this relation informed by the interaction of the user with the resource and eventual selection or rejection based on measurement to maximize the relation or minimize the effort. Using this description we can describe this process in terms of the teacher as follows. Teachers work in the context of their classrooms, students, curriculum, and existing information environments. In preparing their classes, they use their existing information and context to establish what gaps they would like to fill. In searching to fill these gaps, teachers make inferences about the resource and make a selection based on the relationship between the resource, the topic at hand, and properties of their students all the while maximizing the utility of that resource while saving precious time.

Up until now, relevance has not been studied in the context of teachers and education although it has been used in related work by Reitsma, Marshall, and Zarske (2010) who study the use of elementary and secondary school relevance criteria to align educational resources with standards.

Teacher personal Information Management

This study takes place in the context of teachers' PIM which concerns the activities related to managing a teacher's personal information space. As such, PIM revolves around the three intricately related activities of finding and re-finding, keeping (storing), and organizing and interpreting information (Barreau, 1995; Boardman, 2004; Jones, 2007; Lansdale, 1988). Teachers have not been the specific focus of PIM studies except for our study of 5 secondary (middle) school teachers (Diekema & Olsen, 2011). This study found that teachers' personal information spaces were similar in their physical structure and content but differed in the way information was organized within it. Some teachers organized their information by topic, while others organized resources by educational standard or by teaching unit or textbook chapter. Teachers were generally pleased with their organizational schemes. The keeping of digital information seems to be a largely personal judgment of quality and relevance; the storage of these resources includes saving to computer hard drives, printing, bookmarking, and linking on teacher websites.

Teachers generally found information for their teaching using a combination of physical and digital approaches, however, they did not use resources designated expressly for their use-their school library media centers and digital libraries, relying on their own collections and immediate colleagues instead. An "information heritage" of hand-me-down resources and materials appeared as a common theme in teachers' PIM practice. Retiring teachers leave information behind for their successors. Even teachers' family members who are teachers themselves pass on information and information management artifacts. A major element of teacher PIM is negotiating the physical and spatial constraints of inherited information when teachers begin their careers or move into new teaching spaces. While teachers have the ability to discard the inherited information wholesale, they appear to have some interest in keeping the information, so they manage it by sorting through it, keeping what they consider important (current, relevant, or interesting) and discarding what they do not (outdated,

unrelated, or dull). Often, the inherited information remains untouched in file cabinets and boxes.

Teachers took distinctive approaches to managing the information linked to and designed for their students, employing digital grade books and class websites to manage classroom information. Last, teachers knew the value of backing up their information and placed confidence in the school district's servers to keep their information backed up in the event of data loss. Teachers used numbers assigned to physical spaces to keep track of students' work in designated cubbies for homework submission and return. Since student work remains largely paper-based, the paperless office remains an enigma.

Teacher online information seeking behavior

While teachers have not been the object of PIM studies specifically, there has been research on their online information seeking behavior. Contemporary teachers have a wide variety of electronic venues where they can search for information. Educational digital libraries, search engines, listservs, databases, and discussion forums are just some of the digital places teachers can go to find information to use in their teaching.

Teachers as information seekers are highly variable in several aspects: teachers have a wide range of technological experience and comfort levels (Becker, Ravitz, & Wong, 1999; Levin & Arafeh, 2002), the available workplace technology and technology support varies (Barker, 2009; Khoo, 2006), and educators tend to look for this information in diverging places and use different search approaches (Carlson & Reidy, 2004). Furthermore, teachers don't agree on whether finding and using online resources saves time or takes additional time (Karchmer, 2001; Recker, Dorward, & Nelson, 2004).

Teachers use online resources to supplement textbooks, demonstrate digital libraries to students, increase student engagement with the material, and increase the richness of their instruction (Carlson & Reidy, 2004; Tanni, Sormunen, & Syvänen, 2008). The pedagogical context of teachers' work plays an important role in their searching. Educators teach to different grade levels and have varying areas of focus, requiring different materials and, consequently, different approaches to searching. Some literature suggests that teachers of more linear subjects, such as science and math, use a more linear approach to searching (e.g. Hart, 2008).

An increasing number of teachers learn about information technology and searching for information during their formal schooling; others rely on professional training to get up to speed (Carlson & Reidy, 2004; Gray, Thomas, & Lewis, 2009; Recker et al., 2005). Many teachers, however, learn search techniques informally and remain largely self-taught (Davis, 1987; Wallace, 2004). It is unclear whether the lack of formal training prevents these teachers from finding the materials they need.

Teachers use digital libraries to plan lessons. They seek out student activities, images and visual aids, and handouts. Teachers value digital libraries because of their accessibility, diversity, currency, quality, trustworthiness, and ease of use. Teachers are often unaware of digital libraries or resources in their area, so offering professional development may be necessary for educational libraries to ensure teachers know about their existence (Recker, Dorward, & Nelson, 2004; Recker et al., 2005; Recker et al., 2007).

Teachers are generally overwhelmed with the large amounts of information returned to them when they search (Pattuelli, 2008; Perrault, 2007). System builders need to be aware of this and provide ways to narrow search results using faceted searching or browsing. Advanced search options that allow users to limit their searches (for example, by material type, date, standard, or grade level) also need to be provided. To keep track of their online resources teachers use strategies ranging from printing them out, using bookmarks and other online tools, or storing links on school, department, or class websites.

METHODS

The study employed a qualitative research design. Naturalistic inquiry was best suited to the exploratory nature of this study, especially the need to capture as much of the context of teachers' information management in their personal-professional spaces as possible. Data were collected through interviews with eight elementary school educators, sixteen secondary school educators (seven middle school and nine high school teachers) in their classrooms, during preparatory periods or before or after school. The principal investigator conducted all twenty-four interviews. Five interviews were attended by the second author who asked follow up questions. Interviews were audio-recorded to capture the full discussion and lasted approximately thirty-five minutes each. Interviews have been transcribed by the researchers and one interview by a research assistant. Interview transcripts were reviewed in full and coded thematically by the researchers. After interviews, with teachers' permission, the researchers also observed and took notes on teachers' personal information spaces, photographing particular examples of personal information management or information artifacts.

A subset of the interview questions (based on Barreau, 2008 and Kwasňik, 1991) asked of each teacher are listed below. For a full set of questions please see Diekema & Olsen (2011).

- What information do you have and use in your personal workspace?
- What is the source of this information (where do documents originate)?
- How often, and under what circumstances, do you delete information in your workspace?
- How do you typically go about finding information within your workspace when you need it?

- Can you briefly describe what your work as a teacher involves?
- Can you describe your work again, but now focus on the role of information needed for your teaching?
- How do you typically go about finding information for your teaching when you need it?
- What kinds of digital documents do you look for and use for teaching?
- When you are searching for information online, what makes you decide to save a resource for later?
- What makes you leave a resource without saving it?

Responses to the interview questions were analyzed for PIM and relevance-related features using thematic analysis (Boyatzis, 1998). The researchers reviewed all data and developed a coding scheme based on emergent commonalities and differences among data sources. Future work with this data will focus on further analysis of the interview data codes using NVivo.

Data were collected in 2011 in two phases (Spring and Fall) at three different schools in two school districts in Utah. The elementary school serves 300 students from Kindergarten to fifth grade. The middle school enrolls more than 1,300 students in grades six to eight, and the high school over 1,600 students. Teachers were recruited by e-mail and word of mouth to participate in the study. Initially, for the first five interviews, no incentives were offered; for the second round of interviews $10 gift cards were offered. All teachers were white; twelve were female and twelve were male, and their cumulative years of teaching experience ranged from two years to over 30 years. Their roles at the school ranged from junior teacher to department head. Participants from the elementary school were five elementary school teachers grades 1-5, a school librarian, a technology specialist, and a music specialist. Participants from the middle school were four English/language arts teachers, one language arts/social studies teacher, one social studies/physical education teacher, and a science teacher. Participants from the high school were two fine arts teachers, three English teachers, one science/mathematics teacher, one special education teacher, one mathematics/French teacher, and one physical education/health teacher.

FINDINGS

Notions of relevance that emerge from the interview data are that relevance is often prescriptive for teachers, that is, information needs are driven by curriculum and school policy. Teachers also appear to stack the deck when looking for relevant resources, increasing their chances for finding a good resource fit by drawing on shared experience and information from close colleagues. Resource selection is again curriculum based but also has the interesting feature that teachers are proxies for relevance decisions that affect their students. Anticipated relevance is present in various aspects of teacher PIM such as deciding whether to keep resources for future use, organizing their physical classroom space, and resource housekeeping decisions.

Teaching Preparation: Prescriptive Relevance

A central aspect of teaching and instruction is planning (Yinger, 1979). A number of teachers in this study spoke about their plan books and calendars and how these artifacts play an important role in driving the instructional content and surrounding activities. Planning ranges from the broad (academic year), via the monthly and weekly plans, to the most specific (today or this hour). Educational standards prescribe the curriculum that needs to be taught and as such also prescribe certain relevance decisions during resource selection. The year plan is created before the start of the school year and forms a larger framework within which the finer-grained plans are created. While teachers do not have control over the curriculum itself they can largely decide what will be taught when, as long as all required topics are covered (McAlpine, Weston, Berthiaume, & Fairbank-Roch, 2006). The level of detail in a plan increases as the plan period decreases, that is, the weekly plan has a lot more detail for that week than can be gleaned from the year plan. The lesson plan is perhaps the most specific plan teachers use. Good lesson plans translate educational standards, curriculum requirements, and school policies into learning objectives (tailored to student needs), classroom activities, timing, and possible assessments. While many lesson plans are resources specifically sought out by some teachers they also serve, in combination with weekly and monthly plans, as relevance prescriptions when teachers set out to find more information to teach this particular lesson.

When teachers are preparing for their lessons they look at their plans and decide what information they need to prepare and teach. Teacher #9599 described the process as follows: “I look at my calendar from the previous year. I have a web calendar but I also have a physical calendar that I keep and I re... look at, okay, so there's a unit−and I'm never at 'What am I teaching tomorrow?' You know what I mean? It's always 'Okay, the next three weeks are going to be Standard 2, Objective 1,' and so I fill in for three weeks the activities that I want to do and organize in a way where it's, 'I need to get the kids some information, so they have some background knowledge, and then we need to do an activity so they can understand it physically, and then, we might do some other type of project or exploration where they're actually drawing pictures or defining the words or something…'”

In starting this preparation process many teachers spoke about “pulling” from their own resources first: “probably the first thing I would do is pull out my folder or my binder, depending on what I've switched over, yeah, so I pull that out, go through and order everything” (teacher #1161). As a relevance strategy, this makes sense, especially considering that many of these teachers have their files organized by standard, instructional unit, or textbook chapter, allowing direct access to highly relevant materials. Also, most of the

materials in these personal collections have likely been tried and tested before, allowing for a more informed selection.

Relevance Hedging

As pointed out in the previous section, teachers typically start out using their personal collections. If they feel additional resources or approaches are needed, a common approach is to ask their closest colleagues. While one could certainly argue that this perhaps the least-effort approach, teachers have their reasons for using their colleagues. By doing so they are hedging their chances of getting highly relevant resource recommendations tailored to their specific classroom and students: "I've found, and I'm probably lucky where I'm at here, but I've found my best forum is right here at−at the high school. We have our particular group of students, and um, our particular mix of students, and I find the best resources to be, just, just my colleagues here, so I don't do a lot of that online, but I could see if I was in a high school where I felt isolated that it would be great to go out...and find other stuff, yeah" (teacher #4675).

Teachers in this study generally spoke very enthusiastically about sharing information and both formal and informal structures have been put in place to facilitate it. Several teachers mentioned shared hard drive space for file sharing among their immediate colleagues. Other sharing took place in departmental meetings or during lunch hour. While sharing from the point of view of relevance is most effective between colleagues who teach the same subject and grade levels, one teacher at the elementary school uses information from any of her colleagues: "I like to pop in the different classes and just see what they're doing and see if …we can do something similar" (teacher #2857). This high level of collaboration is facilitated by annual changes in grade-level assignments and curriculum planning activities with grade-level colleagues. Teacher #4703 says about her grade-level colleague: "She's just more up-to-date all the way around. I have some skills she doesn't; she has a lot of skills I don't you know so we're kind of combining our−so she'll get a really good idea and share it with me and then we'll use that and you know and then I'll say 'Oh but this is something I have done in the past that's really worked well,' and I'll pull that out like I've got a poster for first amendment cause she's new to second grade taught sixth grade and I've been here for a bit."

The nice thing about sharing is that a dialogue can take place between the people who are sharing the resource as pointed out by teacher #3620: "The web's great, you know, in a limited capacity. Um, you know, people can put lessons and stuff like that online, but, but I'd rather talk to another person about it." Also, sharing tends to happen on an as-needed basis. Rather than getting information pushed at you as in regular recommender systems, teachers ask for information when they have a specific need to fill: "By and large, I've worked with, I do work with and have worked with other teachers that are very collaborative-minded, and so some stuff we put together on our own, some stuff we just have where we give each other, or we, you know, say, 'I need an idea,' 'Okay, here it is'" (teacher #3620). In cases where the shared information is pushed onto a person, as is often the case with information heritage, the information often languishes as it is too overwhelming do deal with. Recommending in small dosages, by colleagues such as technology specialists and school librarians, is very much appreciated by teachers: "Yeah sometimes I just find things in my faculty mailbox. This is for you [teacher name] I thought you'd like it. That type of thing and she is usually right, she is usually dead on. She is very she's so involved and amazing we're really, really are blessed to have somebody like that here" (teacher #1041).

One teacher (#1674) specifically mentioned the strategy of going to colleagues first before setting out on an Internet search. Searching for educational resources online is another form of sharing between teachers as the contributed resources often come from teacher colleagues located all over the world. However, these shared resources come without the personal touch and with reduced chances of high relevance

Relevance and Resource Selection

Relevance or the decision to keep a resource, either by bookmarking or saving it to their personal collection, was described by teachers in various terms. Teachers #2434 and #4675 consider a resource to be relevant when they anticipate using it repeatedly. Some teachers had additional conditions before considering a resource relevant. For them, resources had to be in a specific format to be compatible with the smart boards used in their classrooms (teacher #1674). In addition to the format requirement this same teacher has additional relevance criteria: "If it looks like it's, like, valid and reliable and I can trust it. And if it--if it's in any way related to something I might use someday, I'd probably save it." Other teachers described recency and a source needing to be up-to-date to replace time sensitive information, such as political candidates in an election year or changing street names for recreational drugs, they had in their existing files. Teacher #4703 describes a relevant resource as "Just anything I feel that I feel like you know fits in." This fit is a curricular fit but also a fit with student ability and interest. When teachers are looking for additional ideas they, too, have to fit in with the topic at hand. Teacher #4703 was teaching the First Amendment when she went online: "then I thought, 'Where do I keep all my first amendment stuff?' So I got that out to plan and then we Googled for more ideas." English teachers who are discussing a certain novel in class look for a similar topical fit. While a topical fit is often required, it is not enough. Teacher #3620 spoke of having to think like an 8th grader to decide whether a resources was going to engage her students and make them really connect to the material she was going to teach. Teacher #1161, too, asks whether a resource applies to her particular student before she considers it for the classroom as does teacher #1672 who teaches health and is very careful about selecting resources

that are appropriate in a public education setting. In a way, teachers end up making a relevance decision for somebody else – relevance by proxy. Another important finding is that relevance doesn't necessarily consider a resource as a whole. It is rare for an online educational resource to provide a perfect fit. Most often teachers are looking for ideas or short activities to support their existing materials: "I've never used one of their lessons or their activities directly as they've had it. …Um, they're either too boring, or they say you can do it in forty-five minutes but you really can't do it in forty-five minutes, and you know, there's no real good way you can split it in half" (teacher #9599).

Anticipated Relevance

While a lot of information seeking by teachers is driven by the curriculum through monthly or weekly planning, some resources are dumped in their laps without being tied to an explicit information need and without any immediacy. Information heritage is where retiring teachers, or teachers who have moved on to teach different grades or subjects, pass on their information to the teacher taking over their classroom. Sometimes this information changes hands for a fee but usually this information is considered a gift. The tendency seems to be for teachers to hold on to this information as it might be relevant in the future. This state of anticipated relevance and the general lack of time prevents most of the inherited information from being integrated into the teacher's personal information space or, more likely, thrown out. Sometimes the teacher who parted with their information is still around and will point the younger teacher to these files when they are asking for help (teacher #5723)

Teachers don't just keep materials for immediate use but also save materials they might be able to use sometime in the future. "If it looks valid and reliable and I can trust it and it is in any way related to what I might want to do someday, I save it" says teacher #1674. A reliable organization system is required to make such long-term keeping decisions for resources whose relevance is anticipated for the future. These resources, often found serendipitously, will be saved in the unit-based or topical file folders that the teacher will pull when the time comes again to teach that unit or lesson. Some teachers also add notes to these files after using it in class to help future relevance assessments: "…cause I make notes of what doesn't work and so then if I'm done teaching a unit or a topic I've already written what order I wanna use certain resources in the lesson ideas over the course of a week to a month and I kinda know where I can pull resources from" (teacher #2857).

Anticipated relevance is also used during housekeeping tasks in digital and physical information environments. Usually these tasks are instigated by system administrators by messages that the teachers is about to run out of disk space or by space constraints in the class rooms when shelves are few and requested file cabinets never arrive (#9599). Large weeding or deacquisitioning efforts also ensue after room changes (#4703) or change in teaching assignment. Teachers tend to use their time off contract during the Summer for these tasks. In anticipating whether a resource should stay in their personal collection teachers often ask whether they have used the resource recently. If they haven't used it in a long time it will be deleted or recycled. Similarly, if an activity didn't work it might get thrown away. Sometimes however, these decisions are met with regret: "The last time I had a student teacher, um, that was my goal, to go through and organize and throw out, and I really did get rid of a lot of the stuff, um, you know, and some of it was good to get rid of: lesson plans from my first year teaching, which, obviously I've not looked at in nineteen years. But then I got rid of some professional literature, I just put it down in the faculty room "Free to a good home," some of it went to the [secondhand store], and just a couple months ago, someone came to me and said, 'Do you have anything like...' and I'm like 'Ohhhhh. I did. It's gone.'" (teacher #3620).

Anticipated relevance is also reflected in the physical organization of information in teachers' work spaces. Highly relevant resources are kept close at hand while inherited information or old text books are stored in cupboards or shelves far away from the teacher's desk: "Anything that I just need real quick to grab. You know, there are other places around the room−bookshelves where I have other resources that I can go to that I don't need, you know, right at the last second. Or, on my podium up front, I have a dictionary, a thesaurus, if I'm up teaching and we're going to use those, I keep those where they'll be right on hand for me, so I can get to them immediately" (teacher #1161).

DISCUSSION

The qualitative design of this study offered exploratory findings, which have significant implications for educational digital libraries and other instructional tools and services that aim to support elementary and secondary education.

Personalized recommendations

This finding already emerged from our previous study but was confirmed in this much larger teacher study. Immediate colleagues (those teachers who teach the same subject and even the same grade levels) are an important source of information for teachers. Teachers share educational resources and ask for recommendations. Chances of finding relevant resources are much higher when using colleagues who are teaching in the same subject area while using the exact same educational standards and serve the same student population. The resources recommended and shared by teacher colleagues have been tried and tested and come with additional background information and the opportunity to discuss the resource in person. Educational digital libraries tend to be severely underutilized by teachers. How

can these libraries incorporate some of the teacher colleague recommender features to increase a relevant resource match (Smeaton & Callan, 2005)? How can digital libraries make their educational resource metadata more personable so that teachers can find and select them more easily? While one teacher in the study mentioned getting personal recommendations from an online bookstore, these automatic recommendations must come a long way before they can compete with teacher colleagues. One reason being that recommendations are pushed on a person while shared resources often result from a request (pull). Perhaps what digital libraries should consider is creating personally tailored search results based on rich metadata that has been contributed by fellow teachers.

Relevance by proxy

Teachers that search information to use in their classrooms often have to put on their "student hats" and imagine what resource would suit their students well and aid in their learning. Educational digital libraries typically do not provide metadata or background information for their resources to facilitate this type of relevance assessments. What is missing from educational digital libraries and other services that support teacher practice is that they do not readily allow for a more direct connection between the curriculum and other educational factors that make up a teacher's context, such as their students, making these resources potentially less useful than they could be.

Educational units

Much of the information stored in educational digital libraries and their brick and mortar counterparts are completely developed items. While teachers can certainly use this information to get ideas from, it might be that smaller information units suits teacher information seekers better. This is especially true for lesson plans as it is rare that there is an exact match between an existing lesson plan and the relevance parameters that teachers work within. Perhaps more granular ways of searching or granular resources should be included in libraries that serve teachers.

PIM tools for teachers

Given the combination of paper and digital information in a teacher's information space, PIM software tools might not be very effective (Boardman, 2004; Soloway, 1996). However, based on this study's findings PIM tools should probably combine the notion of curriclum-based organization with curriculum-based relevance and not only pay attention to the information keeping and finding (in the existing information space), but also focus on teachers seeking new information driven by the information and information organization of their information environments.

CONCLUSION

The researchers interviewed 24 secondary school teachers to examine their PIM practices. Given the small sample size it is not possible to generalize these findings to a larger population, but the rich data provided good insights in the notions of relevance that are specific to teacher personal information management and other information behaviors. Typically, in-context studies like this one are not generalizable beyond their original setting (Fidel, 2012b). That said, this paper's findings applied to teachers across all levels of K-12 education: elementary, middle, and high schools. This might provide some indication of this work's applicability to the K-12 teacher population in general.

The notions of relevance that emerged from the data were prescriptive relevance, relevance hedging, relevance criteria for resource selection, anticipated relevance, and relevance by proxy. Clearly, a teacher' context has a big impact on their information behavior and accompanying notions of relevance. After all "relevance cannot be considered without a context" (Saracevic, 2007a). To improve information systems and services for teachers we need to take an ecological approach and carry out a cognitive work analysis as advocated by Fidel (2012a).

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