The Wiki as Knowledge Repository:

Using a Wiki in a Community of Practice to Strengthen K-12 Education

By Geoffrey Sheehy

The concept of managing an organization's knowledge has caught on in recent years (Sallis & Jones, 2002). Dubbed knowledge management, the field has grown as it addresses key characteristics of knowledge, like the concept that knowledge cannot be separated from a knower (Hilsop, 2002; Sallis & Jones, 2002) and the idea that there are two types of knowledge: tacit, which is intangible know-how, and explicit, which is objective and formal knowledge that can be communicated easily (Sallis & Jones, 2002). One of the great challenges of the knowledge management field is sharing tacit knowledge in a way that passes it along to others or even converts it into something like explicit knowledge (Carroll et al., 2003; Santo, 2005).

Sallis and Jones (2002) and Santo (2005) note that education has not been quick to adopt techniques of knowledge management. While addressing the reason is well beyond the scope of this paper, it is worth mentioning that the slow adoption is not for lack of need.

With high stakes testing and high pressure for improvement burdening schools—especially those in K-12 public education—educators have a need to use the knowledge that resides in their local communities as strategically as possible. They also have a need to create new knowledge that will launch innovative approaches to their local and specific concerns (Carroll et al., 2003; Coakes & Smith, 2007). Strategic use of knowledge management should ultimately help these schools improve in tangible ways. Santo (2005) suggests that an "accumulation of both explicit and tacit knowledge can contribute to data-driven decision making" and an organization's effectiveness (p. 45), a characteristic few school administrators would overlook.

Attempting even a small knowledge management effort, however, needs to be an intentional effort. There is no reason to assume that employees will seek to share their knowledge (Hilsop, 2002), particularly teachers, who can be protective of their work (Parr & Ward, 2006). To succeed, an environment conducive to knowledge sharing is a must—a culture of trust where incentives and rewards exist for sharing knowledge instead of hoarding it (Hilsop, 2002; Foon Hew, & Hara, 2007; Parr & Ward, 2006).

Creating such an environment is a difficult task, and implementers of knowledge management must recognize characteristics of knowledge and of the individuals under their influence. If knowledge resides in people, knowledge management cannot be controlled or distributed by a few administrators or executives. An organization's knowledge is spread throughout the organization, which means when one seeks to harness, distribute, and create knowledge and innovation, one must con-

sider the entire scope of people in the organization—for a school, this means the staff as well as the faculty (Carroll et al., 2003; Santo, 2005).

Teachers share knowledge for various reasons in various contexts. Foon Hew and Hara (2007) found that teachers shared knowledge because they sensed they would gain something from it personally—whether it be a stronger understanding of an idea or a better reputation—and because they felt an obligation to their community—whether the obligation arose from a sense of principle or compassion. Schlager and Fusco (2003) observed that teachers also share this knowledge most often within their specific areas of work, with their immediate colleagues, or in response to the real difficulties of their working day—as opposed to sharing it within special in-services or professional development programs. Such a situation is not surprising when one considers that the very knowledge they are sharing is so intimately tied to the environment where it is used and the manner in which it is used (Hilsop, 2002).

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Knowledge management efforts in education should therefore spread their fingers into all parts of the school and its existing organizational boundaries, growing an environment where sharing within the daily routine is encouraged and nurtured.

Communities of Practice

The most obvious strategy for managing knowledge in the educational context would be nurturing communities of practice. Communities of practice, as defined by Wenger (1998), are the communities in which there exists "the sustained pursuit of shared enterprise" (p. 45). In these communities, knowledge sharing is actually a by-product of the engagement that regularly exists (Carroll et al., 2003; Wenger, 1998). Hilsop (2002) points out that the community of practice attains such a high level of common language and assumptions that sharing knowledge becomes a "relatively straightforward" process (p. 173).

Straightforward maybe, but setting up the context for that exchange is not an easy task. Parr and Ward (2006) observed that a common state in schools is for teachers to engage in only a partial collaboration, where independence is respected so highly that members of a community do not probe deeply into professional issues with one another. Thus, the teacher is generally isolated from colleagues, working in a separate classroom with separate students teaching separate lessons, often totally unaware of what any other teacher is doing (Carroll et al., 2003). Where collaboration does occur, it occurs on a voluntary basis, which at best creates pockets of innovation that do not penetrate beyond the volunteers' reach (Parr & Ward, 2006). Ironically, all the teachers—not just the pockets of collaborators—are working toward the same goal; but they work essentially separately from one another, creating a dynamic Weick (1976) dubbed "loose coupling" (as cited in Parr & Ward, 2006, p. 783).

The independence and isolation is magnified by the touchy nature of the teaching business. Teaching is a deeply personal pursuit and when one critiques the teacher's practice, one is critiquing that person (Santo, 2005). Thus, a teacher might not share with colleagues for fear of the vulnerability involved—what they share could be determined not good enough (Parr & Ward, 2006; Foon Hew & Hara, 2007) and admitted weaknesses or observed failures could be used against them by administrators (Carroll et al., 2003).

Despite the obstacles, the community of practice model can work in education for a number of reasons. For one, the bottom-up feel to the creation of knowledge eliminates some of the fear teachers may have when sharing knowledge under the direct observation of an administrator (Carroll et al., 2003; Parr & Ward, 2006; Santo, 2005; Schlager & Fusco, 2003).The bottom-up aspect asserts itself when the community of practice is encouraged to capitalize on social interactions. Social interactions cannot be overlooked. Though commonly dismissed as "water cooler talk," these exchanges are necessary for building the trust required to express a genuine vulnerability—to admit that one needs new knowledge (Santo, 2005). When opportunities to build trust are supplied, it becomes easier, even for independent-minded teachers—to submit to the interdependent nature of a community of practice and to adopt a collective responsibility for the actions of the group (Hartnell-Young, 2006; Wagner, 2006).

In fact, Hilsop (2002) warns explicitly that if these social factors of knowledge-exchange and communities of practice are ignored, a knowledge management plan is at risk of collapse. Additionally, the community of practice transfers the acquisition of knowledge to the point of need (Schlager & Fusco, 2003). Tacit knowledge is most often passed along through conversation

(Wagner, 2006) and stories of personal experience (Yi, 2006), and these stories tend to surface when the subject is most appropriate—in conversation with those closest to the situation and most trusted by the seeker of knowledge (Hilsop, 2002; Schlager, Fusco, & Schank, 1998; Wagner, 2006). Granger, Morbey, Lotherington, Owston, and Wideman (2002) found this "just in time learning" to be the preferred method of knowledge acquisition for teachers, a finding that meshes well with the propositions of Schlager, Fusco, and Schank (1998) and Schlager and Fusco (2003) that teacher professional development is most effective when delivered in the context of practice instead of in separate professional development opportunities. Thus, key characteristics of a community of practice—its root at the point of practice and its dependence upon social interactions—specifically address some of the traditional obstacles of K-12 teachers' practice.

Technology

One obstacle a community of practice cannot easily overcome is the issue of timing and logistics: *when* are teachers to interact beyond basic levels of polite social exchange? Carroll et al. (2003) suggested that online tools could be a suitable medium for connecting teachers when face-to-face interactions are not feasible, and the growing power of such tools in the wider culture draws attention to their potential application for connecting professionals. As a research base on such use of technology has grown, it has created a number of guidelines for when technology can help a community of practice and when its reaches are more limited. First among these guidelines is that an online format for sharing operates best when it is paired with an existing face-to-face community (Hilsop, 2002). There, the technology can actually deepen the existing relationships and foster collaboration (Carroll et al., 2003; Hartnell-Young, 2006;Wheatley, 2001).

Perhaps the reason technology works well to deepen relationships is in the kind of sharing most typically done with it. In studies done by Foon Hew and Hara (2007) and Yi (2006), the dominant types of information exchanged were personal knowledge and stories. When paired with a community of practice, the online environment can work more appropriately as a compliment to knowledge exchange rather than as a primary mode. The most tacit knowledge, which is difficult even to articulate, can be left to its most appropriate point of sharing—face-to-face interaction—and the tools of technology can fill in and complement that which remains (Hilsop, 2002).

Knowing how well an informal community of practice works can also inform the shaping of the online environment. Schlager and Fusco (2003) contended that the online environment should represent ideal physical spaces and cast off the formal structures of content management systems like WebCT that are so dominant in educational online environments. Hartnell-Young (2006) agreed, observing that a formal online environment can squash spontaneous sharing.

Knowledge Repository

Such was my understanding as I conceived a way to use technology to complement the existing community of practice in my department. I teach in a large high school in South Dakota and am one of 17 teachers in the language arts department. The faculty is stocked with veteran teachers but the school's test scores have not reached NCLB standards. Teachers in the department share a close bond; an openness to sharing resources has existed for years. Thus, a functioning community of practice is present, but the obstacles of K-12 schools stated earlier clearly exist. I saw in this environment an opportunity to create a mechanism for extending the sharing of knowledge—knowledge of students, of curriculum, and of content. The existing community of practice removed the need for me to establish an environment of trust, as it was already present within the department. I was therefore free to design an online resource that required such camaraderie in order to function.

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The mechanism I chose to pursue was a knowledge repository. Carroll et al. (2003) described a knowledge repository as a database of "knowledge assets that are systematically organized to facilitate searching and retrieval" (p. 45). Such a tool would fill in the blanks of teacher interaction in our community of practice. Exchanges occur face-to-face, but with teachers' remaining isolated from one another, opportunity for observation or exchange of strategy and resources was limited. A repository would provide an online location where teachers could locate tips, materials, and ideas from members of the department with whom they would otherwise not likely interact on a regular basis.

The value of the tool would derive directly from the variety and value of its contributions. Thus I knew from the outset that for the reposi-

tory to succeed, the technology would have to be simple in order to allow our department to build the repository through a bazaar method of development—through team work, ongoing conversation, and maintenance done by many (King, 2007; Wagner, 2006, p. 72).

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The technology best fitted for such a tool was a wiki—a tool that has often been used to support a knowledge management system (Engstrom & Jewett, 2005). I chose a wiki for a number of reasons, but the primary characteristic setting the wiki above other options was its collaborative character, which supported the concepts that I thought central to good knowledge management—creating knowledge through conversation within communities of practice. The wiki allowed multiple contributors and required no particular person to be in charge, which best fit the bazaar method of development and allowed other teachers to assume leadership roles when particular contexts arose (Schlager & Fusco, 2003).

Other features that made the wiki a nice choice were the speed and convenience of editing (it can be edited in seconds from any Internet browser), its ease of use for non-code web users (most wikis now have What-You-See-Is-What-You-Get editors), and the growing development of the medium, which could lead to many features and uses that one cannot foresee today.

While wiki providers are various and competitive, I chose an online provider and host—Wikispaces—because it enabled me (and our teachers) to focus attention upon the communication instead of the headaches of servers, installation, and support. Additionally, the online service was appropriate since our communication and postings to it would not be confidential in nature, and by making those available openly on the web, the resource could potentially reach beyond its original audience (Carroll et al., 2003). I also admit that my choice of Wikispaces in particular had much to do with loyalty and personal comfort; I had used Wikispace for my own classroom for two years and had always been impressed with their customer service, product development, and, in particular, their commitment to K-12 educators.

The wiki held up well to the standards demanded by researchers of technology in knowledge management and communities of practice. The online aspect allowed teachers to work anytime they liked and even synchronously on the site (if they were working on separate pages) (Welsh, 2007). It enabled teachers to become the authors and editors of the plans, goals, and content shared within the environment, a characteristic that could be crucial if the repository became a dominant medium of exchange within the building (Carroll et al., 2003). It also provided an informal and customizable environment, with discussion boards attached to each wiki page and the style and content of the wiki left up to the whim of the creators—characteristics that extended the possibilities of conversation and left open the possible uses teachers might develop for the site (Carroll et al., 2003; Schlager & Fusco, 2003). Additionally important for the future, it would be easy to access and organize (through hyperlinks and tags that could be applied to each page), as well as search (Santo, 2005).

Beyond these basic characteristics, I sought to design our knowledge-sharing wiki to cater to other observations noted in research. For example, Carroll et al. (2003) stressed the importance of context when teachers share resources. Often, they pointed out, teachers sharing through technology amounts to the creation (and neglect) of static lists of unchanging resources. Rarely is any context given with such a list, and the resources shortly become outdated and irrelevant. A mark of high-level knowledge sharing, Carroll et al. (2003) continued, is when teachers share not only the resources but the contexts, plans, and "prototypes in use" (p. 49), which allow recipients to adjust materials to their current needs. To avoid static lists and to attempt to build context into each resource posted, I used the wiki to create a series of templates for pages teachers might produce: Activities or Lesson Sharing, Unit Page, and Reading Recommendation. By filling in the categories listed on each template, teachers thereby created a snapshot of when and why they produced the resource they were posting. An inquiring teacher could then evaluate the relative usefulness of the resource before even looking at the artifact.

Additionally, that process of describing the artifact's context would potentially communicate some of the tacit knowledge a teacher may not have realized was present, as Carroll et al. (2003) observed:

> It is possible that capturing an activity as a plan will facilitate…reuse…. [A] plan may capture tacit knowledge about the goals and implementation of the activity that would be invisible if its…resources were simply posted to a database (p. 49).

Even if teachers ignored most of the categories on the template, however, the existence of the template would help them avoid the intimidation of a blank screen (Welsh, 2007).

Implementation

The implementation of the wiki faced one particularly large obstacle. In teaching faculty to use it, I was seeking to diffuse two innovations through my department—the wiki technology and the knowledge management repository. Diffusion of any innovation is a challenge, and while I recognized this obstacle as a great one, I was careful to apply the research of innovation experts like Rogers (1983). Particularly helpful was his description of the five typical adopter-types: innovators, early adopters, early majority, late majority, and laggards (p. 262).

By labeling the members of my department I was able to craft the implementation to their characteristics. Foremost for me to realize was that my colleagues were almost entirely non-innovators in areas of technology, which meant that if they were to adopt its use I needed to provide them with more guidance, modeling, and observation of the wiki than I would require. I approached this by setting up a series of one hour training sessions after the school day. Within a month span, teachers could come to two sessions whenever they were able, though I encouraged them to attend training with a colleague with whom they work closely so as to maximize the community of practice influence. To further motivate them, I was able to obtain a grant to pay each teacher in our department for two hours of time spent training.

Further applying Rogers's (1983) concepts, I focused particular attention on recruiting and catering to teachers I felt were early adopters and opinion leaders, so as to attach my innovations to their networks of influence and eventually spread them through the department (Coakes & Smith, 2007; Rogers, 1983). I particularly hoped this method would help convince the veteran teachers to attempt the wiki, since Foon Hew and Hara (2007) found these to be the most likely employees to share knowledge. I recognized early on that I possessed a limited influence in diffusing any technical innovation, as in this area I was clearly seen as an innovator.

Results

Twelve teachers attended at least one hour of training, and when that did not use up the available grant three teachers seized my offer of a third hour of paid training. By the end of training a number of teachers' interest transferred away from the knowledge sharing wiki to their own classroom wikis, which they eagerly created and implemented once trained on how to use them. Thus, the diffusion of the one innovation, the wiki, seemed to have reached a point of taking off, where it might have been "impossible to stop the further diffusion…even if one wished to do so" (Rogers, 1983, p. 259).

Though the diffusion of the second innovation—the knowledge repository—appeared to have been a possible casualty of the enthusiastic focus on the wiki technology, teachers responded positively in a survey to their exposure to the knowledge-sharing wiki and to the potential it held for the department. Of the nine teachers who responded to the survey, seven (78%) agreed that the knowledge-sharing wiki was "very helpful." All nine projected that they would post materials to the wiki at least once a year, with eight (67%) of those predicting at least four times a year. An obstacle continued to be time, as six teachers expressed interest in special time being allocated to post to the repository.

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Obstacles

Schlager and Fusco (2003) warned that a slow approach to the introduction of new tools in professional development is important (p. 216), and their advice appears sage when one considers the number of obstacles that exist as the knowledge sharing wiki is established. While many teachers are comfortable turning to the web to find resources (Parr & Ward, 2006), posting to a wiki can be a more complicated task. For a project working with wikis and other online tools, Engstrom and Jewett (2005) provided teachers with eight to ten hours of hands-on training on wikis in particular. The three hours of training I provided to teachers is a paltry sum in comparison. This is a greater concern when one realizes that barriers to technical issues can crush knowledge management efforts, and that if potential new adopters cannot observe and try the wikis without thorough training, their chances of adoption sink (Foon Hew & Hara, 2007; Rogers, 1983, p. 251; Schlager et al., 1988). Additionally, as the repository grows, there exists a potential for it becoming a "maintenance trap" (Wagner, 2006, p. 72) that would require someone like me to keep it neat and in good order—potentially converting me into a workhorse (Parr & Ward, 2006, p. 781).

Additional obstacles are more social than technical in nature, which is another common occurrence with wikis and social software (Bowden, 2005). If teachers have no compelling reason to go to the wiki, they will not go

(Schlager et al., 1998), and if teachers are not clear about and sold on the concept of knowledge management, they may not see any way it can benefit them (Santo, 2005, p. 46)—a particular concern when the benefit to the originator of knowledge is less clear (Carroll et al., 2003). Most frightening, however, are the words of Carroll et al. (2003)—words that rang so much like prophecy that I posted them as a banner to our department's knowledge-sharing wiki:

> In schools, the key obstacles to effective knowledge management derive from the "tragedy of the commons," in which people fail to appreciate the importance of their own contributions to the development and conservancy of shared resources (p. 48).

Conclusion

Despite the obstacles, the possibilities for success are too clear and tangible for me to recant my effort to incorporate a knowledge-management strategy that capitalizes on communities of practice by utilizing an online, collaborative knowledge repository. Approximately one week before launching the training of the knowledge wiki in my department, a colleague inquired about a poetry project I assigned to my students. I shared a little about it and then turned to the wiki, posting a full description and quick tutorial for a piece of software I had used with my students. I then sent the links to my colleague, who successfully assigned the project to her own students.

Within the following two months, two other teachers utilized parts of the same tutorial and project description, taking what they needed from mine and adapting it to their own. They did so while I was in my classroom teaching my students because they were able to read the plans and described context I had posted to the wiki. The knowledge was there, ready to be shared. All that was required was a medium of communication that fit the social dynamic imposed upon us in K-12 schools. The wiki was that medium.

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References

Bowden, T. (2005, June 1). Understanding nothing: The wiki chasm. Retrieved February 18, 2008, from http://nothing.tmtm.com/archives/1959

Carroll, J. M., Choo, C. W., Dunlap, D. R., Isenhour, P. L., Kerr, S. T., MacLean, A., et al. (2003). Knowledge management support for teachers. *Educational Technology, Research and Development*, *51*(4), 42-64.

Coakes, E., & Smith, P. A. (2007). Supporting innovation: Communities of practice and change. *Journal of Knowledge Management Practice*, *8*(S1 1). Retrieved February 10, 2008, from http://www.tlainc.com/articlsi3.htm

Engstrom, M. E., & Jewett, D. (2005). Collaborative learning the wiki way. *TechTrends*, *49*(6), 12-16.

Foon Hew, K., & Hara, N. (2007). Empirical study of motivators and barriers of teacher online knowledge sharing. *Educational Technology, Research and Development*, *55*(6), 573-595.

Granger, C., Morbey, M., Lotherington, H., Owston, R., & Wideman, H. (2002). Factors contributing to teachers' successful implementation of IT. *Journal of Computer Assisted Learning*, *18*, 480-488.

Hartnell-Young, E. (2006). Teachers' roles and professional learning in communities of practices supported by technology in schools. *Journal of Technology and Teacher Education*, *14*(3), 461-480.

Hilsop, D. (2002). Mission impossible? Communicating and sharing knowledge via information technology. *Journal of Information Technology*, *17*, 165-177.

King, W. (2007). IT strategy and innovation: Recent innovations in knowledge management. *Information Systems Management*, *24*(1), 91.

Parr, J., & Ward, L. (2006). Building on foundations: Creating an online community. *Journal of Technology and Teacher Education*, *14*(4), 775-793.

Rogers, E. M. (1983). *Diffusion of innovations* (4th ed.). New York: The Free Press.

Sallis, E., & Jones, G. (2002). *Knowledge management in education*. London: Kogan Page.

Santo, S. A. (2005). Knowledge management: An imperative for schools of education. *TechTrends*, *49*(6), 42-49.

Schlager, M., Fusco, J., & Schank, P. (1998). Cornerstones for on line community of ed professionals. *IEEE Technology and Society Magazine*, Winter, 15-21.

Schlager, M. S., & Fusco, J. (2003). Teacher professional development, technology, and communities of practice: Are we putting the cart before the horse? *The Information Society*, *19*, 203-220.

Wagner, C. (2006). Breaking the knowledge acquisition bottleneck through conversational knowledge management. *Information Resources Management Journal*, *19*(1), 70-83.

Welsh, A. (2007). Internal wikis for procedures and training: From tacit knowledge to self-guided learning. *Online*, *31*(6), 26.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge: Cambridge University Press.

Wheatley, M. (2001). The real work of knowledge management. *Margaret Wheatley*. Retrieved April 11, 2008, from http://www.margaretwheatley.com/articles/management.html

Yi, J. (2006). Externalization of tacit knowledge in online environments. *International Journal on ELearning*, *5*(4), 663.