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University Faculty Development: a KMS approach to learning in the information age,
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The shift from industrial organizations to Knowledge organizations will require employees to have a wider, more generalized skill set. In the industrial organization, workers were hired or trained to perform specific tasks over the course of a career. In an information-based organization employees are no longer laboring to produce goods; they are creating, analyzing, synthesizing, inferring or manipulating information. More specifically, they are harvesting their tacit knowledge into explicit knowledge through sense making, knowledge creation, and decision making (Choo, 1997). Castells (1996) writes, “The new economy is based on the growth of productivity through knowledge and innovation as well as in the ability to increase our capacity of knowledge-creation” (p 82). The shift from the industrial to the information economy will require a worker with flexible skill sets able to excel in globally diverse teams situated in networked environments, and able to communicate with an array of electronic media. This paper will focus on how knowledge management systems can be used in a higher education setting in order to teach university faculty how to transformation their instruction from a teacher-centered to a student-centered environment in order to provide the skills needed by their students to be become successful knowledge workers.

From an industrial to an Information worker

In the industrial economy, goods were produced from raw materials that were sold, finished-off and then consumed. The materials, minerals for instance would be mined, shipped, produced into goods, then finally sold. Labor consisted of mining, physical production of materials and distribution. In an information economy, “production is derived from the application of knowledge and from the practice of innovation: productivity growth is the actual source of wealth” (Bates, p. 156). The raw material in this case becomes the tacit knowledge of
the information worker. The information worker becomes a vital asset of the company, not just a cog in the corporate machine. The essence of raw material is the tacit knowledge of the worker and in their ability to create explicit knowledge from it. As Bates explains, “The new economy is based on the growth of productivity through knowledge and innovation as well as in the ability to increase our capacity of knowledge-creation” (p. 158).

In order to increase capacity for knowledge creation companies will need to continually improve and educate their knowledge workforce. Companies must attract talent and keep highly skilled labor in order to perpetuate productivity growth. A companies’ key resource will be “self-programmable and generic-labor” (Bates, 158), employees with the ability to self-regulate their work and the knowledge and skills to adapt to new circumstances. Since information cannot be depleted or used, at least not in the sense of a good in the industrial age, a worker’s skill is in their ability to create an innovative use out of existing information, thus increasing the value of the information. Castells (1996) explains, “The value of the information is influenced by the degree to which it is used, both by the individual and others. (p. 82)

For information-based organizations to maximize their profits, they must make a commitment to organizational learning (Zuboff, 1988), “the informed organization is a learning institution, and one of its principle purposes is the expansion of knowledge (p. 319). Learning in contrast to training is especially relevant in the information economy. Traditionally, companies provided “training” for their employees, which stressed new ways of performing a task or how to handle a particular situation. Training consist of low-level cognitive skills within Bloom’s taxonomy, while learning on the other hand, centers on higher-level skills within Bloom’s taxonomy such as analysis, synthesis, and evaluation. Zuboff (1988) writes, “Learning is the heart of productive activity. To put it simply, learning is the new form of labor” (p. 319).
Instructional design models have been developed to teach the skills information workers will need when they enter the workforce. Instructional design models consist of both teacher-centered and student-centered models. In a teacher-centered model the responsibility of information dissemination is placed on the teacher. The teacher is responsible for writing educational goals and objectives measurable by the students’ successful completion of an exam. The instruction is a series of information sessions divided and sequenced allowing students to “chunk” information. In higher education the typical teacher-centered class consists of three unit-tests and one comprehensive final examination.

In a student-centered learning environment the teacher acts as a facilitator or coach allowing students to interact with or construct their own understanding of material. An instructor may give a general assignment but the outcome and techniques used by the student to achieve a solution are flexible. The relationship between a manager and employee in the information society is consistent with the student-teacher relationship in a student-centered learning environment. Corte (2000) describes the learning process within a student-centered model as “a constructive, cumulative, self-regulated, goal-orientated, situated, collaborative, and individually different process of knowledge building and meaning construction” (p. 254).

The interaction between teacher and student in a student-centered model is similar in the workforce when a project sponsor constructs a team, provides a general timeline, allocates resources, and then leaves the team to work out the details of the project. The project sponsor, like a coach, may check in at various times to ensure success, but the overall performance is up to the team. As Drucker states (1989) “The knowledge worker is thus a colleague and an associate rather than a subordinate (p 180). In an information-based organization, “People who
once did as they were instructed now make choices on their own” (Hammer, p 65). Both models require students or workers to be self-regulated.

The changing economy requires a work force with different skill sets than the previous generation. Information or knowledge workers need to be able to collaborate, search, find, evaluate and create new information. The current higher education system is based on an agrarian calendar, organized like an industrial age bureaucracy; with a majority of faculty teaching industrial aged skills. If academia is to educate a populace of knowledge workers, significant changes in the curriculum will need to take place. While many scholars have been arguing for a change from teacher-centered to student-centered learning environments (Gardner, 1999) (Glaser, 2000) (Corte, 2000) (Shank, 1999) (Reigeluth, 1999), few if any have provided a blueprint for changing long held beliefs about the teaching and learning process. A significant organizational learning campaign needs to be developed if the shift to student-centered learning is to happen.

**Developing Faculty to teach future Knowledge Workers**

Universities cannot possibly teach all of the skills knowledge-workers will need over the course of a career, but they can teach them how to think about learning. Faculty within higher learning institutions will have to incorporate strategies that prepare people to learn over the course of their lifetimes. As Drucker (1990) states, “there is no such thing as a “finished degree” in a knowledge society” (p 243).

Reigeluth (1999), an educational psychologist and leading instructional design theorist, suggests “the reorganization of businesses and the reduction of midlevel management jobs are creating a need for employees to have more autonomy” (p. 16). Hammer (1993) agrees with Reigeluth’s assessment and adds, “as management invest teams with the responsibilities of
completing an entire process, it must also give them the authority to make the decisions needed to get it done” (p 70). Reigeluth explains that employees in the information age need to be able to work in teams, think about and solve problems from diverse areas, and communicate effectively. In Reigeluth's opinion, instructional design models must integrate the skills needed for students to succeed in the information age (1999).

Centers for teaching and learning have emerged across the country and around the globe in response to pedagogical needs in institutions of higher education. Originally, centers such as the Center for Teaching Effectiveness at the University of Texas were intended to create a place on campus that provided inexperienced faculty a place to learn about college teaching techniques and to support experienced faculty as their teaching styles evolved. Often times, doctoral students graduate as experts in their field of study and in research methodologies but with little knowledge of learning theory, instructional design, or educational psychology. Yet, as they move from being doctoral students to faculty members, they are expected to teach courses and often times feel unprepared for some aspects of teaching whether that be grading, designing courses, lecturing, or writing test (Kalivoda, Broder, and Jackson, 2003).

Traditionally, Centers for Teaching Effectiveness (CTEs) would consult individually with new faculty members or match them with faculty mentors within a related discipline. The relationships would lead to experienced faculty sharing their tacit knowledge about teaching where a discussion would take place leading to the new faculty learning the tacit knowledge. The strength of CTEs as a knowledge management resource is that they can provide faculty with a common language about the teaching and learning process. Davenport (1998) emphasizes the importance of employees having a shared language as a key component of knowledge transfer. People attending the same training sessions, learning the same vocabulary, and having common
methodologies will be able to communicate more effectively when reacting to new environmental stimuli. A shared language will aid organizational sense making since communication will have less ambiguity (Choo, 1998).

The relationship between CTE consultants, experienced faculty and new faculty is linear. The organizational knowledge of CTE consultants is shared with faculty at all levels but once received it is rarely passed on to others. The same linear relationship is evident with experienced faculty sharing knowledge with new faculty. Once the initial mentoring relationship ends, any new knowledge that is created is rarely shared with other members of the university community. To alleviate this problem a range of knowledge management systems can be used in order to create communities of practice, best practices, expert systems, and just-in-time learning resources.

**CTEs as Learning Organizations**

A Learning Organization or a Knowing Organization is a an organization that possess and generates knowledge in such a way as to learn from its success and failures, transforms tacit knowledge into explicit knowledge, and problem solves in a systematic way (Bauman 2005), (Choo 1998) (Zrahal et al 2004) (Garvin, 1993). Learning organizations are self-analyzing and reflective, flat, and practice sense-making as an organization. Organization Learning plays an important role in improving institutional performance and is thus an important aspect in the process of Higher education preparing future knowledge workers. Since Centers for Teaching Effectiveness will play a central organizational role in preparing faculty to teach future knowledge workers, several lessons can be learned from the Learning Organizations literature.

Mullholland, Zdrahal, and Domingue (2004) emphasize that organizational learning is driven by both top-down (high-level) and bottom-up (low-level) approaches. If organizational
leaders identify a gap in the skills and knowledge of their employees they may want to create a professional development program to fill the knowledge gap, Zrahal et al (2004) consider this a top-down approach to organizational learning. In contrast, an example of a bottom-up approach is evident when a worker encounters a new problem, solves the problem, reflects on the steps needed to overcome the problem then chooses to share the information with coworkers. If the worker shares the new information the organization learns, if the worker does not share the information it becomes part of the tacit knowledge of the company. Organizational learning relies on both high-level and low-level support.

Zrahal et al (2004) acknowledges that discrepancies frequently exist between the high-level organizational perspective and the lower-level team perspective. To align team and organizational perspectives Zrahal et al (2004) make four recommendations. The first is to understand that high-level strategies are necessary because they can increase the transmission speed of a message, allocate the necessary resources for change, and provide organizational support to new ideas. The second recommendation is to allow local autonomy for teams to decide how they will work and to allow them to customize their final projects created by their efforts. Interfacing strategic initiatives with local autonomy is the third recommendation.

Organizational efforts on the high-end may want to recruit low-ranking employees into the planning process of new learning initiatives. Including lower level employees may lead to teams being more likely to accept organizational goals when they know the ideas of one of their own are being represented. The last recommendation is that organizations must address issues of generality and operability. If a new concept is learned from an outside community the organization must be able to decontextualize the concept and apply it directly to its goals. Further, each low-level team must be able to specialize the new concepts directly to their work
experiences, otherwise the new concept will suffer from generality and the new concept might be seen as a fad.

In a study of working groups in organizations, Bauman (2005) identifies three characteristics possessed by high-level learning groups: the presence of new ideas, the cultivation of doubt, and the development and transfer of knowledge among institutional actors. In his study, Bauman reviewed the work of fourteen committees located at different universities all assigned to the Diversity Scorecard project. The project examines the state of equality in Higher Education of African American and Latino students through the use of factual institutional data such as dropout rates, selected majors, GPA, transfer rate and so on. Bauman (2005) identified two types of groups, low-learning and high-learning groups.

Low-learning groups over-relied on the knowledge of experts and rarely questioned or moved beyond what the experts presented as facts. In most cases, an expert would present information to a group or a group would ask a question of the expert and the answer would be received as objective fact. Low-learning groups acted as a committee of individuals rather than as a collaborative team. Each individual expert only reported on their area of expertise and group members rarely offered alternative perspectives on each other’s content area.

The high-learning groups frequently interacted and interpreted data as a group rather than as individuals. Experts would discuss data with their groups and would provide copies of all charts and figures to each group member. This allowed groups an opportunity to piece together their own interpretations of phenomena based on institutional data. High-learning group members would question assertions made by others and challenge each other to back up their statements with facts. If facts couldn’t be found, the groups would go back to the data and try to make new questions. Bauman (2004) found that groups who interacted and attempted to
frequently interpret data together, discovered new information and uncovered new perspectives at a much higher rate than groups who relied on one person’s expertise.

In an article titled *Building a Learning Organization* David Garvin (1993) writes “in the absence of learning, companies – and individuals – simply repeat old practices. Changes remain cosmetic, and improvements are either fortuitous or short-lived” (p. 78). In his article Garvin identifies five build blocks for organizational learning, 1) systematic problem solving, 2) experimentation, 3) learning from past experience, 4) learning from others and 5) transferring knowledge.

Systematic problem solving encourages organizations to have a set of standard question and operating procedures when trying to solve a problem. Similar to the scientific method, systematic problem solving insist on data, not assumptions. Workers would be encouraged to use statistics, Pareto tables and graphical displays of data to present findings. Organizations that are not systematic in their inquiry will remain “a prisoner of “gut facts” and sloppy reasoning, and learning will be stifled” (p. 82). Along with systematic problem solving, learning organizations should encourage experimentation.

While similar to systematic problem solving, Garvin (1993) distinguishes experimentation by linking it with expanding opportunities rather than solving current difficulties. Much like Zrahal et al’s (2004) finding that low-level team members must feel as though they had input in top-down initiatives, Garvin (1993) suggest “employees must feel that the benefits of experimentation exceed the cost otherwise they will not participate” (p. 83). Experimentation takes two forms, ongoing programs and demonstration projects. Ongoing programs are the most common and low risk examples of experimentation. An example would be a chef trying a different combination of spices in a sauce to see if it taste better.
Demonstration projects are large-scale experiments with higher risk involving system-wide changes introduced at a single site. Leaders in a demonstration site must be metacognitively aware that they are setting precedents for future company endeavors, creating organizational knowledge, and they must be thinking of how they can generalize their results so that other sites can implement their ideas. An example would a restaurant deciding to use a conveyer belt oven rather than conventional ovens to bake bread.

Garvin (1993) states learning organizations learn from past experiences, learn from others, and transfer their knowledge throughout an organization. Garvin recommends organizations record their experiments in a manner so that employees can easily access the data and base future decisions on previous experiences. Organizations should keep records of both successful and unsuccessful endeavors and should reflect on the process and outcomes of each. Organizations must also be willing to learn from people outside the organization including competitors, organizations in different markets, and their customers or clients. As organizations learn they must also be willing to transfer knowledge throughout the company. Transferring knowledge can be done through reports, site visits and training programs.

**Using KMS to develop university faculty**

It is naïve to think universities have not made attempts at knowledge management or curriculum change in the past. To date, several attempts have been made at using communities of practice and knowledge management systems for faculty professional development (Stevenson, et al, 2005) (King, 2002) (Gillespie, 1997) (Sherer, et al, 2003). This next section will present two case studies as examples of the types of programs in which KMS tools are being implemented for faculty development.
The University of Georgia (UGA) created a faculty development program to teach faculty about new instructional technologies and how to use them effectively in their courses (Gillespie, 1998). UGA chose to use WebCT as their online platform because of its ability to provide chat, document storage, file sharing, threaded discussion, messaging and small group work areas. In their pilot program UGA used the tools within WebCT to meet five objectives,

1. Participants would experience instruction with online components
2. Participants would be able to continue communication with their peers while outside of the set meeting times
3. Faculty developers would use WebCT as a quasi copyright protection system
4. Allow participants to create group projects with others located on different campuses
5. Use WebCT to pass on logistical information such as announcements, maps, and directions.

UGA’s program implemented a variety of KMS applications but designed the learning community from a top down perspective. In this case, UGA not only choose the software package for the faculty to use, but they also decided ahead of time how the participants should incorporate each aspect of the tool before the group was able to create their own understanding or interpretation of the tool. For example, UGA planned to have participants collaborate online through WebCT without considering whether or not a web based email system or instant messaging software system may have been a better choice. Zrahal et al (2004) note that learning organizations should mix both organization as well as team-based approaches to Knowledge Management and a balance needs to be found between the two for organizational learning to occur. Following their advice, the faculty may have been served by allowing them to choose how online collaboration would take place. In this case, the organizational top-down approach would inform a the team that they will be expected to collaborate online but would have yielded to the team-based decision on what kind of online communication protocol to use.
In fact, Gillespie (1998) explains that faculty in the UGA program missed several announcements posted in WebCT because they did not check-in everyday. Gillespie (1998) writes, “in this respect, using the participant’s home campus email address is more effective than posting to a WebCT bulletin board because most of the participants check their home email daily”(p. 82). Along the same lines, the author mentions that some of the participants did not have access to WebCT at their universities and those participants were less enthusiastic and felt like outsiders in the program because of it (Gillespie, 1998).

Sherer, Shea, and Kristen (2003) found that knowledge management systems could enhance faculty-learning communities in a university setting. In the study, Sherer et al observed the work of a committee of statistic professors from different departments and colleges located on the same university campus. The committee was provided with a variety of online tools (KMS), listserves, email, threaded discussions, and chats sessions, to enhance their communication. Over the course of nine months, the faculty members used the tools to share their experiences with new statistical software packages, proposed panel sessions for conferences, and wrote a joint article for an online newsletter. The unforeseen product of the community was a written record of the dialogues and brainstorming sessions that transpired online. Over the course of several months, the professors had written and created several statistical problem sets that were later shared with other universities.

The use of knowledge management systems created additional opportunities for faculty to collaborate by providing an off-site asynchronous space to collaborate. The systems also provided an opportunity for faculty to get information from other experts as they needed it, a just-in-time opportunity. For the first time faculty had a support group from which to bounce ideas off of or to receive additional opinions about how to handle difficult situations. By the end
of year through thread-discussion, the faculty had created a question and answer service, a
digital library of research-based teaching practices, a lessons learned area, and a section for best

Sherer et al (2003) provides an example of an effective learning community. In her
example, the community was built by identifying prospective faculty members than asking them
to invite up to five additional colleagues whom may be interested in solving a pedagogical
problem. The learning community was built on its own, an example of bottom-up organization
Zrahal et al (2004), and consisted of statistics faculty from political science, business,
psychology, education, and mathematics. After a successful first year of meeting face-to-face
with web-based communication in-between meetings, the community listed two major benefits,
the opportunity to meet new colleagues and the opportunity to enhance their knowledge of
teaching through mutual growth.

In this case, the knowledge of the group was far greater than the knowledge of any
individuals. The interactions within the learning community are consistent with Choo’s (1998)
description of sense making. The committee members interpreted the news about the
environment by negotiating a group goal for the semester. Next the members choose what was
significant based on their tacit knowledge and on their understanding of the organization or
university goals. By the time the faculty members began creating problem sets they had
negotiated a common language and exchange views on how to teach particular concepts. The
initial drafts of the problem sets can be viewed as analogies created by members to articulate
their inherent knowledge.

The group was able to create innovation as they transformed their individual tacit
knowledge into explicit knowledge. As a result of using Knowledge management systems, the
committee created new artifacts; in this case it was problem sets that could be shared with other faculty within the university or with other colleagues at different locations.

Cases such as UGA and the statistics community of practice are examples of how faculty developers in higher education can incorporate ideas from learning organizations, knowledge management, and organizational learning to better serve their faculty clients. While educational psychology provides scientific data on group dynamics, motivation, social learning, instructional design, and learning environments, an incorporation of knowledge management techniques into the current practice of faculty development may increase the efficiency of training, reduce the low return on investment from one-on-one consulting, increase the transformation of tacit to explicit knowledge and prepare faculty to teach information workers of the future.

If a university wide knowledge management system is to be developed for use in faculty development, I recommend the following:

1. Development of an expert system – To aid in the transfer of tacit to explicit knowledge, a searchable database of pedagogical strategies and practices can be created by video recording interviews with senior faculty giving advice to new faculty about everything from writing a syllabus, creating test, grading papers, etcetera. Additionally, innovative faculty can be recorded telling of their experiences with a new instructional technology or a new approach to teaching a difficult subject. The system would be searchable by discipline i.e. biology or history, teaching strategy i.e. collaborative work or Socratic method, or assessment, i.e. portfolio or project based learning.

Three key ideas will impact the use of the system. First, the system should be a mix of ideas from the organizational and team perspectives (Mullholand et al, 2004). The expert system will be created at the organizational level but the faculty should develop the content, categories and metadata with assistance from university staff. Faculty as users of the system are in a better position to determine what information would be useful to their colleagues at different stages of their career.

The second is that the information presented should be based on successful and unsuccessful
implementation of teaching strategies based on the past experiences of university faculty. By sharing analogies and stories from their past experiences the tacit knowledge being shared by faculty will have relevancy and will be viewed as authentic (Bandura, 2001) (Garvin, 1993). The third is to include examples of unsuccessful attempts at student-centered learning, allowing both successful and unsuccessful video clips will allow users of the system to weigh the merits and demerits of the information and will aid in making a decision to try a new idea or not (Choo, 1998).

2. Threaded discussion of current classroom experiences – An online discussion board will provide faculty with a place to discuss classroom issues as they occur allowing for just-in-time learning. Faculty should be allowed to define the scope and topics allowed to be discussed on the discussion board. Users should also be encouraged to question each other’s methods and practices in order to create a culture of doubt (Bauman, 2005). As faculty question each other’s methods they have more of an opportunity to make sense of the data and interpret the information in such a way as to make it relevant to them.

4. Create interdisciplinary communities of practice – Following the model proposed by Sherer et al (2004), faculty learning communities can be sponsored by the university to discuss pedagogy from an interdisciplinary view. Communities of practice can be created for instructors of mega-classes, research methods and capstone programs. Each community of practice would be asked to contemplate a pedagogical problem and propose solutions over one academic year. Along with face-to-face meetings, KMS would be used allowing them to share documents, participate in threaded discussion and post possible solution.

5. Create and reinforce training programs- Training programs should be created with input from both experienced and new faculty. Training content should not only introduce new concepts but should also help to transform tacit knowledge into explicit knowledge. To supplement face-to-face training, KMS should be used to keep attendees in contact with each other to continue the learning process beyond a two-hour workshop.

As Zuboff stated (1988), “learning is the new form of labor” (p. 319). Industry needs a continuous crop of knowledge workers with a skill set that can be harvested by engaging in student-
centered learning environments at the university level. Though the economy and society has arguably shifted to knowledge, information, or networked age, higher education at the classroom level has not. For universities to continue to be successful at creating a professional, white-collar class, faculty must provide their students with skills often linked to knowledge workers. Within universities, Centers for Teaching Effectiveness are at a unique place to offer opportunities for faculty to develop proficiency in student-centered learning. Through the use of Knowledge Management Systems CTEs can aid in the transfer of experienced faculty tacit knowledge to explicit knowledge. CTEs can take advantage of their position as a learning organization to increase the skill set of their faculty, thus impacting the future knowledge work force.
Works Cited


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