

A Community of Information Security Faculty: An Innovative Approach to Continuous Course Development in Community

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Abstract

Northern Virginia Community College (NVCC) started an Information Security program in August 2001 that became a local, regional, and national model. During this process, NVCC and the Virginia Community College System Institute of Excellence for Information Technology (VCCS IE-IT) cultivated a community of information security faculty in Virginia using portal technology and email. This community works and collaborates on curriculum, including lecture notes and labs, and has become a model for how to get faculty across colleges within a state to share knowledge and collaborate. This paper will discuss the application of community of practice theory to Virginia's information security community by reviewing communities of practice theory, history of the community, stages of this community's development, and the technology used by the community for communication and collaboration.

Introduction

Research on applications of community-of-practice theory exists in apprenticeship contexts of midwives, tailors, quartermasters, butchers, and alcoholics (Lave & Wenger, 1991); in business contexts of the value of communities in knowledge management (Wenger, McDermott, & Snyder, 2002), in education contexts of preservice teacher training and professional development.(Barab, Barnett, & Squire, 2002) There is very little research on co-curricular development in communities of practice in higher education contexts. Over the last three-and-a-half years, information security faculty at four community colleges in Virginia participated in a virtual community of practice that co-develops and co-updates information security lecture and lab content and assisted new information security faculty in launching a

program at their own community college. This is innovative community of practice began with a small grant of \$248,000 that was awarded to Northern Virginia Community College (NVCC) in December 2000. This grant launched a seven-course certificate in August 2001. The Virginia Community College System Institute of Excellence for Information Technology (VCCS IE-IT) approached NVCC in summer of 2001 to plan the launch of this program to Virginia's 23 community colleges statewide. This partnership led to a cultivation of a community of practice of information security faculty that has become a regional and national model. This was the first community of its kind in Virginia that took a community approach to developing programs across multiple community colleges. Typically, you have 23 individual community colleges independently developing 23 different programs, which require 23 different sets of resources to solve the same problem. This community used the same set of resources in four community colleges to co-develop lectures and labs in information security which all faculty agreed to use in their courses. The purpose of this paper is to investigate the application of community-of-practice theory to the community of information security faculty in Virginia. This paper will discuss communities of practice, review the history of this particular community, investigate the stages of this community's development, and examine the technology used to facilitate communication and collaboration.

A Communities of Practice

“Communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis” (Wenger et al., 2002, p. 4). “A community of practice is a unique combination of three fundamental elements: a domain of knowledge, which defines a set of issues; a community of people who care about this domain; and the shared practice that they are

developing to be effective in their domain” (Wenger et al., 2002, p. 27). A shared practice, as Dr. Linda Polin of Pepperdine University defines it, “is a full-blown domain of expertise; it has a productive value. The following are practices: architecture, professional French Horn, oral surgery, health insurance processing, Pokemon trainer, scriptwriter” and others. Each of these practices belongs to a social community, which is called a “community of practice”.

The community decides the competence of its members through participation and changes in member identity. Members in a community of practice exist at different levels of participation. The newcomers sit on the periphery in the beginning (“legitimate peripheral participation”) and start moving towards full participation as they change their identity. (Lave & Wenger, 1991) Participation in activities of a community is the way of learning for members. Members construct knowledge of the practice through experience and dialogue.

A leading researcher in learning, John Seely Brown (2000) from the Xerox Palo Alto Research Center (PARC), states:

Because if you look at knowledge, and look at least two dimensions of knowledge, the explicit dimension and the tacit dimension, the explicit dimension probably represents a tiny fraction of what we really do know, the explicit being the concepts, facts, the theories, the explicit things that live in our head. And the tacit turns out to be much more the practices that we actually use to get things done with...In fact, we need to think about the brilliant distinction that Bruner created some time ago called ‘learning to be’. It’s easy to learn about something. The tacit is learning to be. There is a tremendous difference between reading a physics book and knowing the laws of physics. It is something else to be a physicist. And learning to be is what we are talking about when we are talking about this tacit game (p. 3).

Through participation in the community’s activities, members pick up the tacit knowledge of the practice in the community from older members through imitation, observation, and dialogue. Older members of the community of practice provide newcomers with models of performance for newcomers to replicate. Communities of practice have reproduction cycles in

which newcomers enter the community of practice and become full participants, and eventually “old timers”, through their changing identity in the practice. As members participate together, communities create a history and culture all its own. Communities also produce artifacts through the participation, communication, and collaboration of its members.

Historical Overview

On June 20, 2000, the *Washington Post* ran an article entitled “Reno Urges Better Cyber-Security” that cautioned the need for better cybersecurity in government and business. (Schwartz, 2000) From this article and others that appeared in the *Washington Post*, and after a series of meetings, NVCC, the second largest community college in the country and the largest institution of higher education in Virginia, decided to submit a grant proposal to the Northern Virginia Regional Partnership (NVRP), a partnership between business, government, and education institutions in Northern Virginia.

NVRP awarded NVCC the grant in December 2000. NVCC recruited a small team of two full-time and one adjunct faculty. The team decided that NVCC’s niche in this area would be to focus on the frontline network and system administrators and that any program developed would balance teaching the concepts and teaching the skills needed by an information security technician. The team gathered competencies through a Developing a Curriculum (DACUM) process from a panel of information security experts from Northern Virginia.

After a year of course and curriculum development, the outcomes of the grant were a seven-course certificate program, lecture notes as PowerPoint slides, and lab materials. The network security certificate program required as prerequisites a two-year degree in networking or considerable work experience. The certificate was approved in Spring 2001 and NVCC starting offering the program in August 2001. Full-time and adjunct faculty at NVCC agreed to use the

same books, lecture notes, and lab materials, which was one of the major accomplishments of the grant. This was one of the first information security programs launched at the community college level nationally. The core faculty team and the high-quality artifacts from this grant allowed NVCC to help launch similar programs in other community colleges in Virginia and nationally.

Stages of This Community's Development

According to Wenger, McDermott, and Snyder (2002), communities grow organically through stages of “potential”, “coalescing”, “maturing”, “stewardship”, and “transformation”. The “potential” stage is planning the community and what the domain, practice, and community will look like. The “coalescing” stage is the official launching of the community. Community-building activities are crucial to building trust and the relationships needed to be successful and to building value for people to participate. The “maturing” stage is when the issues of the community are clarified and the community starts to grow with newcomers and peripheral participants. The “stewardship” phase is to rejuvenate the community, keeping the community alive, and recruiting new members. The final stage, “transformation”, is when the community either transforms its practice or dies. Table 1 summarizes the stages of this community's development. The following sections show the different stages of the community of information security faculty in Virginia from conception to the present state.

Table 1. Stages of Community of Information Security Faculty's Development

Stages	Description
Potential	Initial planning of community in Summer 2001 which included researching, purchasing, and prototyping a portal.
Coalescing	Initial meeting on February 18, 2002 which included all 23 VA community colleges. Goal was to introduce NVCC's program and request for participation from other colleges. IE-IT Executive director cultivated community with follow-up meetings, trainings, and other interactions. Lab and lecture materials start to be developed in the community.
Maturing	Lecture and lab materials continue to be developed and changed. Leaders of the community present on the national level. Community colleges nationally want to start participating in the community. The community starts training other states.
Transformation	Leaders present to NVCC's president and other leaders in Fall 2003 and Spring 2004 of a new national initiative. NVCC approves initiative in the summer and launches national community of practice in Fall 2004.

Potential and Coalescing

The VCCS IE-IT held a statewide meeting on information security on February 18, 2002, at Piedmont Valley Community College in Charlottesville, VA. The goal of the meeting was to introduce all 23 community colleges in Virginia to the information security program designed at

NVCC. The meeting was a success; the presentations and other information (relevant to deciding on and implementing their own program) were posted to a portal utilizing Microsoft Sharepoint Team Services™ for anyone in Virginia to use (see website, <http://www.ieitportal.com/>). Within three days, two colleges decided to implement a program, followed in a few months by several others. Several other VCCS colleges expressed interest and developed plans to implement the information security program from NVCC. The value of cultivating this community was set and response was impressive from other colleges in Virginia. The VCCS IE-IT provided seed funds, which included money for the security lab and professional development funds for training faculty to teach this new program. The seeds of the community were in place.

After the February 18, 2002, meeting, the VCCS IE-IT's Executive Director took on the job of cultivating the community of information security faculty in the VCCS and became the community coordinator. Wenger, McDermott, and Snyder (2002) talk about the importance of a community coordinator. "Community coordinators and thought leaders are key to community success" (p. 78). Through emails, the portal, and face-to-face meetings, as coordinated by the community coordinator, relationships blossomed among a core group of faculty from Tidewater Community College, J. Sergeant Reynolds Community College, New River Community College, and NVCC. A lot of distrust had built up over the years and needed to be overcome before these relationships blossomed. The core NVCC team acted as mentors to other faculty in Virginia and became the "old timers" of the community.

As discussed in the community-of-practice section, a community of practice has three essential elements: a domain of knowledge, a community of people, and a practice. As this community of practiced developed, the domain of knowledge was information security technicians; all information technology faculty in Virginia interested in information security was

the community; and the practice was the art of teaching information security. As the faculty met on many occasions, plans were developed from the original set of lectures and lab activities from NVCC. Work was distributed among the faculty on target lectures and lab activities, as negotiated by the community.

The community informally adopted the following phases in co-curriculum development: plan, develop, review, and revise. The planning phase is useful to develop a plan for faculty, so that they know what their responsibilities are and what the suggested due dates are. The due dates are just suggestions; we found that no one stuck to them because updates were done continuously. The faculty held themselves accountable to delivering their lectures and labs. The community coordinator would periodically touch base with the community to make sure that everything was okay. The faculty developed their lectures / labs, posted them to the portal, and emailed everyone about the update. Then, the faculty reviewed the content and revised the content, if necessary. Constant communication by email occurred throughout this process. A continuous improvement cycle was an outcome of these collaborations, which still exist today and which have become a part of the culture of the community.

Along with the planning meeting, other face-to-face meetings were held in Northern Virginia to go over the practices and tacit knowledge developed in teaching information security, including how to setup the lab, what kind of training faculty needed, and how to teach the content and activities to students. Some faculty attended formal training to learn the information security content. New faculty imitated and modeled their lab setups and environment from the older faculty members of the community. Over time, these faculty started changing their lab setups and have taught the old timers some new innovations. This illustrates the reproducing and

transforming nature of this community. All members are willing to change, if it will benefit the students in the program.

Change is constant in this community. One reason is that information security as a profession rapidly changes and changes to the lectures and labs are an ongoing process. The faculty communicates and collaborates together on new tools and content they are learning every day, which translates into new lectures and labs or updates to existing labs and lectures. These changes push the practice of the community forward and keep the community alive.

Maturing and Transformation

As the information security community matured, the key leaders of the community did national presentations at the League of Innovations conference in the winter and Fall of 2002 and for the National Science Foundation in the Summer of 2002. Other community colleges around the country started calling and wanting to become members of our Virginia community. One of the community's faculty provided training to North Carolina and Texas in 2003. The community decided that it was time to transform from a local community to a national community of practice. In late 2003 and early 2004, the community leaders briefed NVCC's president. Other leaders asked about the ideas of the new initiative. NVCC's Administrative Council approved the new initiative in late summer of 2003 and the national community launched in fall of 2003 (see website, <http://www.national-cybersecurity.org/>).

The Community's Technology Infrastructure

As mentioned above and through the phases of this community's development, the community used Microsoft Sharepoint Team Services™ to store the actual lectures and lab activities to be reviewed and updated. The portal has separate subwebs to host each course in the certificate program. The portal contains two document libraries for lectures and lab activities. A

key success was the ability to rapidly change the Sharepoint environment to meet the changing needs of the community.

Another key success factor was the low cost to implement and maintain the site, allowing for a gradual building of users in the community without the burden of high overhead costs. The community coordinator also used the portal for all significant communications and used email just to update the community on what was going on. For the information security community, the portal was transparent to overall communication and collaboration. Over time, the portal became the virtual co-curriculum development site for not only information security, but also for all other Information Technology programs in Virginia.

Conclusions

In September of 2003, the Information Technology Association of America (ITAA) released a survey that stated “while 43% percent say job candidates lack sufficient hands-on experience, 54% say the companies themselves find it difficult to quantify technical skills and one-third say they lack standards to measure candidates and responsibilities” (Cohen, 2003). Almost three years before the release of this survey in December 2000, NVCC was awarded a \$248,000 grant from the Northern Virginia Regional Partnership to address this issue. NVCC developed and launched in August 2001 a network security certificate to help meet the need for information security technicians. This led, with the help of the VCCS IE-IT, to a community of practice of information security faculty in Virginia.

Cultivating a community in the Virginia to continuously develop more effective lectures and labs and revise old ones was not an easy task. The community required an active community coordinator who provided facilitation, coaching, advising, and counseling to the participating faculty. In this community, there are full members of the community who do the development

and redevelopment of content. There are also peripheral members of the community who provide input occasionally and review content. The original core NVCC team, which mentored the faculty throughout Virginia, was able to watch the growth of the faculty from newcomers to full participants in a couple of years. There are three faculty members in Virginia that now act in mentoring and training roles for other community colleges in the country. All of this took place through participation in the community of information security faculty and through learning the tacit knowledge of teaching information security from the old timers in the community through imitation, observation, and dialogue.

The author found that the successful development of a community of practice is all about relationships and the development of trust among the faculty in the community and not about the technology. Without the relationships and trust, this community would not be the self-organizing, informal community it is today. The community coordinator was key to maintaining the connectivity of the community.

All the processes of the community must be driven through the portal and periodic email updates are needed to keep people in the loop on what is going on. The technology used in this community was a tool to facilitate the virtual collaboration among members of the community. The community used the portal to post the lectures and labs and used email to send out courtesy notes and to communicate among members. This paper showed how a community of practice in Virginia developed organically, the stages of this community's development, and the technology used to facilitate co-curriculum development.

Contributors

[Keith Morneau](#) is a core faculty member in the School of Undergraduate Studies at Capella University. Professor Morneau was the Project Director of the CyberSecurity Office at Northern Virginia Community College (NVCC), where he was cultivating a community of cybersecurity educators across the country and working with the National CyberSecurity Consortium. Mr. Morneau assists the Virginia Community College System Institute of Excellence for Information Technology on Information Technology education issues that affect the K-20 educational system in Virginia. Mr. Morneau also works with learning theory and learning technology issues, such as pedagogy, communities of practice, problem-based learning, and story-centered curriculum. He works with DeAnza College's experimental learning project and also the Case Files project at Nashville State Community College. He is currently working on his doctorate in Educational Technology at Pepperdine University.

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