Learning Communities and Directions For Their Sustainability

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Abstract

Knowledge societies and new information and communication technologies (NICT) are contributing to many changes in organizations. Communities often expect NICTs to enhance communication and learning. However, it has become apparent that providing electronic infrastructures supports but does not ensure the emergence of social activity. This paper investigates methods for enhancing the sustainability of learning communities. The cumulative findings will suggest theories and practices that can be applied from pedagogy, social science, as well as other domains to the design of ICT learning communities.

Introduction

New information and communication technologies (NICT) are causing immense changes throughout organizations. 'Knowledge Societies' are interactive groups that facilitate the sharing of knowledge with others through new information and communication technologies (UNESCO 2004). As UNESCO states in their virtual exhibition on knowledge societies presented at the World Summit on the Information Society, "these technologies, whose horizons are still largely unknown, are a tool for creating, transmitting and sharing, while at the same time preserving, both new and traditional knowledge." Despite its popularity at the discussion level, there is little research and analysis into the structure of these new technologies.

The Knowledge Society Network (KSN) is an extended learning community that uses new media to facilitate knowledge growth and support knowledge resources. It was established at the Institute for Knowledge Innovation and Technology (IKIT) at the University of Toronto. The learning community is a collaborative network of institutions including schools, workplaces, and community and health care organizations. Together, they act as researchers, participants, and contributors. When describing the knowledge society, the KSN site states,

"there is urgent need for design experiments aimed at exploring challenges and implications. The KSN helps to define a vision of a knowledge society."

In order to define a vision of a knowledge society, the KSN has established the first cross-sector, longitudinal data set for research on the knowledge creation process. The KSN also hosts a suite of activities. Broadly speaking, these include virtual meetings, workshops, seminars, practica, tours, and other events. In tandem with these activities, the KSN provides structure for these activities primarily through new knowledge media called the Knowledge Forum.

Knowledge Forum is a computer-supported intentional learning environment. The software has specialized functions based on the theory of knowledge building and expertise development. These functions support the development of innovation, problem solving, reflection and inquiry. Knowledge Forum is designed to be used in cross-sector environments such as in education, health care, and public organizations. Results from research indicate that the system enhances learning, specifically in terms of literacy, depth of inquiry, maturity of knowledge processes, and collaboration (Scardamalia, Bereiter, and Lamon, 1994). How might the structures and activities of the KSN compare with similar organizations?

Learning Communities

Many different knowledge societies and learning communities operate today. They exist in diametrical contexts, such as various environments, conditions, and motives. Most are structured around a central domain or community such as an educational community, an organizational community, or a political community. The following sections list and compare learning communities, briefly outlining their structures and activities.

Typical academic based learning communities include the ENT (Education with New Technologies 2004) at Harvard and the INK (Information Networks and Knowledge research center 2004) from the University of Sussex. The ENT is an online community linking people with resources and tools. Its projects use the 'Teaching for Understanding' framework, a teacher-centric system, and enables educators to develop, implement and assess NICTs. Membership is open to anyone who would like to register. The INK community investigates the design and implementation of NICTs for building knowledge-based societies. The group

activities are research-based, and focus on the application of NICTs in businesses and organizations. Membership in this community is limited to the INK research group.

Several learning communities are based at the UIAH (University of Art and Design Helsinki) including ITCOLE (the Learning Environments group Innovative Technology for Collaborative Learning and Knowledge Building, ITCOLE 2004) as well as InterMedia (2004). InterMedia is a multidisciplinary meeting place for researchers interested in ICT-based information and knowledge dissemination and learning. Both UIAH based communities conduct research focussed activities and their membership is limited to the research team. Both are also associated with the Learning Environments group. The Learning environment research group has developed a web-based learning environment called Fle3 (2004). Fle3 is designed to support learner and group centred work that concentrates on creating and developing knowledge artefacts. The environment is design-oriented and is based on the social constructivist learning theory.

Many learning communities on the web offer resources for members such as teaching curriculums or connections to other communities (i.e. classrooms, etc.). The "Building Learning Communities" site offers a prototypical list of educationally based learning communities (http://www.anovember.com/communities/index.html). These communities focus on students and educators, the Internet as a learning tool, and establishing connections with worldwide learning communities. Few communities integrate their learning space with the technology. Their information communication technologies (ICTs) are seldom novel or more advanced than conventional web pages and CD ROMS.

Government based learning communities include the CSSE (Canadian Society for the study of education), who represent themselves as "the voice of Canada's educational research community (CSSE 2004). This umbrella society provides discourse, promotes exchanges, and fosters partnerships. The society supports journals, conferences, and policymaking. The OKNL (Ontario Knowledge Network for Learning) is a government-organized project in Ontario Canada (OKNL 2004). Its mission is to develop and implement a provincial approach to using ICT to enhance learning, improve student achievement and increase opportunities for parents to be involved in their children's education. It includes ongoing projects, forums, partnerships, symposiums and reports. The projects include the use of ICTs such as the

Knowledge Forum software. The OKNL organization has *partners* (from the private and public sectors) and *stakeholders* (from the educational communities) as opposed to *members*.

Another community with partners and stakeholders, as opposed to members, is the International Institute for Communication and Development (IICD 2004). The IICD assists developing countries facilitate sustainable development by using ICTs. The IICD supports a networked communication tool called Learning Circles. The tool promotes interactive, project-based partnerships among worldwide schools. The Learning Circles employ a "task force structure" in which students publish their work and then circulate their publishing's to other students. The IICD also supports a cross sector knowledge-sharing platform called iConnect (http://www.iconnect-online.org/). iConnect is promoted as a collection and dissemination of best practices and lessons learned. Its primary focus is to track the use of ICT and knowledge for sustainable development in the global south. The communication activities at iConnect include a web site, research, publishing's, news reports, online discussions, workshops, conferences, and more.

Corporate knowledge management tools are prevalent in businesses and organizations. Included in these tools are document management systems, knowledge managements systems, data mining tools, collaboration tools, and training systems. A review of popular tools can be found at www-eurisco.onecert.fr/Wise/Publication/WISEReviewKMtoolsVA4.pdf.

A table outlining some of the key differences among the major learning communities is given below.

Table 1: Variations Among Learning Communities

Learning Community / Institution	Domain	Can anyone be a member of the learning community?	ICT used in the community
KSN / IKIT	Education	No	Knowledge Forum
ENT / Harvard	Education	Yes	The Web
INK / U of Sussex	Corporate	No	The Web
ITCOLE / UIAH	Education	No	Fle3
InterMedia / UIAH	Education	No	Fle3
CSSE / Government of Canada	Government	Yes	The Web
OKNL / Government of Ontario	Government/Education	Yes	Knowledge Forum
IICD / Independant	International Organiz.	Yes	Learning Circles

As mentioned, learning communities often originate from a specific community. In addition to varied domains, they also differ in terms of primary stakeholders. For example, one educational learning community may focus on educators, while another community may focus on the learners. Learning communities also conduct their activities via various structures and media. The communication may be face-to-face or long distance. The media can vary anywhere from traditional methods such as meetings and conferences to various NICT tools such as the Knowledge Forum or Fle3. Some learning communities are formally structured or research based, while others are ad-hoc and unrestrained. As well, some communities have restricted membership (e.g. laboratories and classrooms), while other communities are open to the public (such as the ENT community). Membership in some communities is tied to responsibilities to the group, while in other cases formal membership is not integral. Another difference of interest is funding resources as well as private vs. public sector communities. As we can see, learning communities have very diverse environments, contexts and conditions. The paper will now investigate conditions that may increase the sustainability of learning communities.

The Sustainability of Learning Communities

Various research on the sustainability of learning communities follows. Evidence indicates that NICTs provide new opportunities for people to interact (Baym 1993, Kraut et al. 1996). For example, NICTs such as online communities have been shown to provide opportunities to develop alternative forms of social relations (Resnick 2002, Sarwar et al. 2001). The application of educational ICTs in Ontario schools, according to the Ontario Knowledge Network for Learning, is said to allow outcomes such as "High achievement for all" and "Citizenship in the knowledge-based economy" (OKNL 2000). The expectations of the value of ICTs are widely publicized. However, it has also become apparent that providing electronic infrastructures supports but does not ensure the emergence of social activity (Butler 2001).

How do you ensure successful implementation of an NICT in a learning community? Many researchers claim that sustainability is a strong indication of successful NICT implementation (Scardamalia et al. 1989, Van Melle & Cimellaro 2003). Sustainability is the ability to maintain an NICT project over the long term. Time is a key variable in ensuring successful outcomes of NICT in teaching and learning because the long-term impact of the NICT will be more apparent and measurable (Scardamalia et al. 1989, Van Melle & Cimellaro 2003).

Researchers also claim that the ability to maintain a project over time depends on the ability to provide benefits to members over time. As Moreland and Levine state, social structures are sustainable when they are able to provide benefits that outweigh the costs of membership (1982).

What factors affect the sustainability of NICTs? Studies on the sustainability of online communities have shown that the use of computer-mediated communication infrastructures is not likely to fundamentally change the problems underlying the development of sustainable social structures (Butler 2001, see below). Therefore we may find value in considering issues that are common to the sustainability of general, non-technological communities. Research on learning ICT communities also suggests additional specific learning elements that are essential to the sustainability of the community. As a result, this paper will consider issues related to general communities, issues related to ICT communities, as well as issues related to learning communities. The cumulative findings will suggest theories and practices that can be applied from pedagogy, social science, as well as other domains to the design of ICT learning communities.

To facilitate the sustainability of online social structures, Butler suggests a resource-based approach (Butler 2001). In order to be sustainable, whether considering a traditional or online social structure, the structure must "maintain access to a pool of resources and support the social processes that convert those resources into valued benefits for the participants" (Butler 2001). The benefits will then attract and retain members over time.

The work presents a resource-based model, in which the community needs to have the appropriate balance of resources and benefits for members. The resource model is based on communication and feedback. The following factors affect the resources and benefits: membership size, membership costs, and communication activity. As in non-technological communities, these factors can have both positive and negative effects. For example, larger communities are better able to attract members but are less likely to retain them. According to Butler the balance of these factors remains a fundamental problem underlying the development of sustainable online social structures (2001).

Figure 1 A Resource Based Model of Sustainable Social Structures (from Butler 2001)
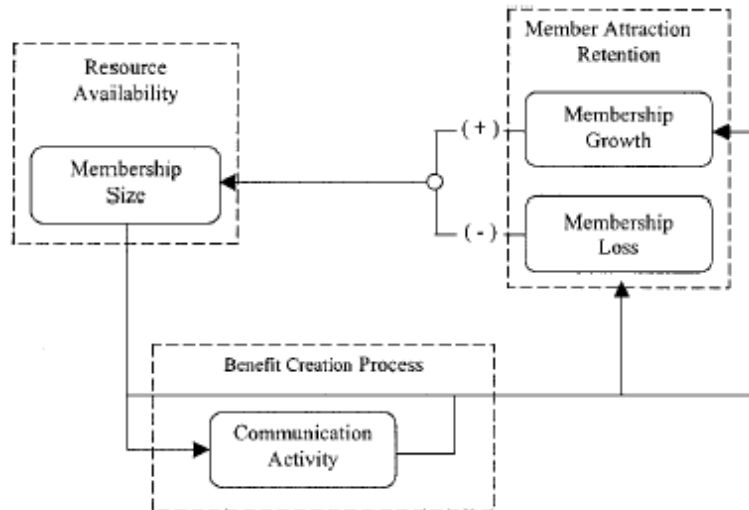
According to this model, community sustainability is enforced through the balance of resources and benefits. Resources are affected by factors such as membership size and benefits are affected by factors such as communication activity. Membership costs are minimized and the potential gains for each member are maximized.

The factors mentioned thus far are found through general studies on communities and NICTs. What features specifically define a *learning* community? As opposed to a resource based approach, Wilson et al. consider a communication based approach. The authors state that learning communities can be fostered through communication, attention to differences, shared culture, adaptation, dialogue, and access to information resources (Wilson et al. 2004). Based on Ludwig-Hardman's (2003) comprehensive review of the learning-community literature, Wilson et al. (2004) identified seven features that define a learning community:

(1) Shared goals,
(2) Safe and supportive conditions,
(3) Collective identity,
(4) Collaboration,
(5) Respectful inclusion,
(6) Progressive discourse toward knowledge building, and
(7) Mutual appropriation.

In order to capitalize on these features, Wilson et al. developed strategies for leading, supporting, and facilitating effective learning community membership. In their analysis, the community was a formal learning course.

Table 2: Strategies for Effective Learning Community Membership (from Wilson et al. 2004)

Feature	Facilitating Strategies
Shared goals	Build course around projects and challenges that are authentic and meaningful to learners. Ask each learner to share her/his goals for the learning experience. As a community, have the learners determine commonalities and differences across goals, determine which goals can be addressed by the community, prioritize those goals, create action plans for fulfilling the goals, and offer suggestions for fulfilling individual goals not embraced by the community. Have learners develop assessment rubrics for community work based on shared goals.
Safe and supporting conditions	Allow private subgroups and private discussions. Post private profiles and appropriate personal information. Model community participation skills including turn-taking, etiquette, thoughtful responses to peers' posts, and organization and facilitation of community events or chat. Actively monitor the community discussions early on to answer questions, provide feedback, resolve conflicts, and guide discussion as needed. Train students to serve the monitoring role in discussions, then transfer leadership to them. Establish a contingency plan to deal with technical challenges. Have learners formally set "rules of engagement" for the community. Encourage learners to engage in the community by posting low-risk questions that stimulate discussion.
Community identity	Have learners: • Create a promotional campaign used to encourage others to join the community. • Develop a community logo and motto to be used on all community materials (e.g., website, reports). • Create personal profiles and a community profile. • Establish cyclical events that encourage ongoing learner participation. Generate email reminders or updates to be sent to learners based on their preferences. The emails could notify learners to new postings to the community, upcoming events or guest speakers, deadlines, etc. Continually add fresh content to the environment and embed scaffolding to guide learners to the resources.
Collaboration	Provide adequate tools for communication and self-presentation. Allow (or assign) learners to develop subgroups to focus on tasks and projects. Provide for different learner roles within teams and within the community. Train learners in specific team roles. Utilize open-ended topics that encourage members to identify multiple solution options.

	Have learners work as a community on authentic problems of practice. Provide (or have learners develop) a rubric for assessing effective collaborative contributions. Develop a reward system that targets collaborative work.
Respectful inclusion	Have learners share stories on a particular theme (e.g., most valuable learning experience, most important role model) and then look for commonalities and differences across stories. Have each learner create a virtual field trip or scavenger hunt that the other learners complete to gain a better understanding of what each individual values. Have learners interview each other and have each learner: • Collect as many different perspectives/opinions on a topic as possible. • Write a story about the interviewee and share it with the community. • Write a reflective statement about how her/his views on a topic differ from the views of the interviewee/s. Have learners collaborate on projects that require multiple perspectives, roles, and solution options to encourage the sharing of diverse experiences and viewpoints. Provide specific methods for giving constructive peer feedback, then monitor exchanges to ensure respectful interactions. Train teams to negotiate differences, resolve disagreements, and assure full participation. Establish and follow rules for ensuring full participation in discussions, e.g., self-monitoring appropriate participation, round-robin contributions, responding to peers, etc.
Progressive discourse toward knowledge building	Have learners assign "karma points" to community colleagues based on the value of their contributions. Each week, have a different learner summarize the previous week's discourse and bring forward the key points, action items, unanswered questions, etc. Involve learners in a progressive writing or product building project. Each learner adds something to the story or product and passes it on to the next learner. When completed, have learners reflect on various passages or aspects and describe the author's/contributor's perspective, assumptions, expertise, background, etc. Involve learners in debates and role-plays where learners have to take positions opposite of their own. Invite experts to the community to share ideas and facilitate discussion.
Mutual appropriation	Assign each learner to be a mentor to another community colleague for a particular topic. Every learner has an opportunity to be a mentor and a mentee. Engage learners in a jigsaw activity. Each small group develops expertise in a particular area, and then expertise group members are dispersed to new groups in which each group member has unique expertise. These new groups work on compelling problems of practice, bringing their expertise to bear on the problem and teaching the other group members in the process. Have learners share or rotate leadership roles within groups.

According to these features the overall goal of the learning community can be summarized as having active, global participation and collaboration. A major factor that affects this includes having clear, meaningful goals for both individual stakeholders as well as the entire community. Other factors include participation, feedback, rewards, support, and connectedness. In many of the learning communities discussed thus far, these factors are essential to the communication activity, which is often facilitated through the structure of an ICT tool.

In comparison with the resource based model, the majority of these features fall under "Communication Activity". In this analysis, less emphasis is placed on membership benefits, membership costs, and resource availability. Similar to the resource based model, maximizing the communication activities listed above will ideally lead to enhanced membership benefits, or more effective learning community membership. However, in order to maximize the sustainability, learning communities can employ theories from social science such as Butlers resource based model, to identify a more extensive list of features.

The learning community can isolate the membership benefits, membership costs, and membership resources by answering the following questions:

Table 3: Extended Instrument for Assessing Levels of Community

Feature	Assessment Guidelines
Membership Benefits	Discuss and promote the benefits for each community stakeholder
Membership Costs	Discuss and promote the responsibilities of each community stakeholder
Community Resources	Plan and organize the source and flow of resources in the community, including finances, administration, and technology.

Given that the factors that affect sustainability are identified, how do community leaders measure the sustainability other than through the test of time? A measure of community is not always obvious or apparent, even if the communicate is structured through an ICT. The representation of the learning community through their ICT may be an objective representation of the community. A member's subjective view of their community is not always visible. For example, a website may state the community's goals but do the community members explicitly know these goals?

Wilson et al. extend their conceptual model of the seven features with a concise instrument for assessing levels of community within their environment. As mentioned, the environment in this example is a formal course, however the language for extending this instrument to other learning communities has been appended in square brackets.

Table 4: Instrument for Assessing Levels of Community (adapted from Wilson et al. 2004)

Feature	Assessment Guidelines
Shared goals	Students in this class [Members of this community] are focused on certain goals we have in common. Projects and activities give us a sense of working together for something worthwhile.
Safe and supporting conditions	People feel comfortable expressing their thoughts and ideas. I wouldn't take too many risks in this class [environment]; not a safe environment.
Community identity	We enjoy a sense of connection. There is really a feeling of belonging in this class [environment].
Collaboration	We interact and work together a lot in this class [environment]. There's not much student-to-student [person-to-person] contact in this class.
Respectful inclusion	Differences between people are respected. Not much effort it made to help everyone fit in.
Progressive discourse toward knowledge building	Our questions and discussions help us build knowledge together. I know why I'm working on projects—to learn better!
Mutual appropriation	We teach each other a lot in this class [environment], not just relying on the teacher. There's room for everyone in this class [environment].

In terms of expanding the above elements to encompass the resource based model, we can include the following additions:

Table 5: Extended Instrument for Assessing Levels of Community

Feature	Assessment Guidelines
Membership Benefits	I am aware of the benefits of belonging to this learning community.
Membership Costs	I am aware of my resposibilites in belonging to this learning community.
Community Resources	I have never had concerns regarding issues in areas such as finances, technology, and administration. My needs are always met in terms of resources.

According to the researchers, having access to a measure of community is critical for leaders, if they are to make iterative improvements in their projects. An instrument such as this can serve as a powerful tool for assessing member's subjective views of their community (or, in the case of KSN and other large communities, component communities). The above chart can

be employed guideline for an interview or questionnaire protocol in an experimental design. Any results that indicate negative responses may indicate weaknesses in the community that need to be enhanced. A remaining challenge is to determine how community leaders might implement changes.

Directions For Enhancing the Sustainability of Learning Communities

The paper has reviewed a range of learning communities, pointing out the variations in their activities and structures. In order to increase the sustainability of the learning community, leaders can isolate specific elements depending on their particular environment. There may be a tendency for learning communities to focus on communication activities. However, other aspects presented in the resource based model are important as well, such as resources, membership costs, and membership benefits. In addition, it is important to assess the level of community, in terms of the actual member views. Once specific weaknesses are isolated, how can the community make improvements?

One option is to implement design features that support sustainable learning communities. Recall that Butler's resource based model of sustainable social structures correlates communication activity with membership benefits. In Ludford et al., the researchers employ this model, along with social science theories, to study communication activity as a means of enhancing sustainability (Ludford et al. 2004). The research considers social theories that suggest methods to spark positive community participation. The researchers carried out a field experiment that manipulated two social theory factors: (1) *similarity and* (2) *uniqueness.* In both cases, members were explicitly informed how similar or unique their interests were to other group members. That is, designers intervened with the typical communication design by contributing non-obvious details. The study found that both factors positively influenced participation. These results are an example of a successful application of social science theory to the design of sustainable NICT communities.

Future work in this area may wish to explore other methodologies for increasing KSN community sustainability. Research, such as in Ludford et al., focuses on communication activities. However, other aspects presented in the resource based model can be researched as well. This includes experimental design studies on enhancing resources and membership

attraction. For example, future work may wish to explore the question of finding an optimal community size, or an optimal balance between membership costs and membership benefits.

Conclusions

This paper has described a process for increasing the sustainability of learning communities. It incorporates theories from social science with theories on learning communities. Although the structures and activities of learning communities are very different, certain elements can be isolated as integral for community sustainability. From a distance, it's apparent that some community activities and structures have the potential to support sustainability. Whether or not they succeed depends on the community interactions and their specific social and technical environment. For example, if the community is structured around an NICT, the design of the NICT technology will impact the potential for sustainability. An assessment of the critical elements will allow community designers to isolate weaknesses and implement changes. A significant research question is the details of the specific changes in the community design. As discussed, the communication design can be modified to support sustainability. However, other elements that affect sustainability can be tested and modified as well.

For example, based on a preliminary assessment of the structure and context of the KSN communities, there is reason to believe that the perspectives and instruments discussed here can lead to the discovery of interventions that may increase sustainability. One good starting point would be to catalogue the membership costs and benefits for different groups of KSN participants. This may point out imbalances in some particular communities that could be handed back as problems to those communities for resolution via the KSN processes. As we can see the prospect for research and design experiments in the domain of learning communities has great potential.

Appendix

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