

# **A Literature Review of K-12 Virtual Learning Communities**

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February 16, 2008

## **Abstract**

The purpose of this literature review was to provide a comprehensive examination of the literature pertaining to formal virtual learning communities (VLCs) at the K-12 level. Growth and interest in this area is rapidly developing. While there have been significant contributions to literature in the K-12 sector, research is limited. Of significant interest in this paper are theoretical underpinnings, instructional design elements, emerging communications technologies, changing roles for teachers and students, and implications for pedagogy and research. An overview of the field of K-12 virtual learning communities is provided in this review of the literature. (Keywords: K-12, virtual learning communities, web-based communication, multi-user virtual environments or MUVes).

# **A Literature Review of K-12 Virtual Learning Communities**

Virtual learning environments, often referred to as online learning or e-learning, have proliferated both at the K-12 and the adult levels. Formal virtual learning communities (VLCs) at the K-12 level however, are relatively new phenomena. Traditionally, literature regarding online learning has focused largely on technology and learner-computer interaction. These isolated computer-mediated environments where the need for community and human interaction remains unchanged and unchallenged stand in contrast with face-to-face environments where community has traditionally been created and fostered. The emergence of communities in virtual learning environments provides challenges and opportunities to develop interactive, collaborative communities. This field is growing and expanding rapidly, inviting innovation, enthusiasm and the attention of researchers and practitioners. Associated literature is expanding and the need for further research has been noted (Nippard & Murphy, 2007). While there have been significant

contributions to research in this area, the sparseness of literature reveals a need for further investigation. For this review a comprehensive search of the literature was conducted although research on VLCs in higher education is more abundant than research at the k-12 level.

## Overview of the Field

Research on the formative elements of VLC, both formal and informal is extensive, especially as it pertains to the adult population. Sadik (2003) and Downs and Moller (1999) note the need for research to address the younger generation of online learners and specifically the topic of socialization at the high school level. The paucity of literature at the K-12 level is largely attributable to the fact that the field is in the early stages of development and as such, concepts are not clearly defined. Research has suggested that educational and online communities are underdeveloped and in their infancy (Coffman, 2004; Downes, 1998; Gordin, Gomez, Pea, & Fishman, 1996).

The technological revolution in education, rooted in philosophy, theory and pedagogy, has radically affected traditional, alternative and distance education pedagogy. Of significant interest for this review are theoretical underpinnings, instructional design elements, emerging communications technologies, changing roles for teachers and students, and implications for pedagogy and research.

## Definitions and Contexts

There is no clear definition for or understanding of VLC terminology. Even the term virtual schooling can have different meanings for different people (Barbour, 2008). Definitions of VLCs are as varied as those of traditional face-to-face learning communities. Unstable terminology leads to confusion and a lack of clarity, but can be expected in an emergent and formative area of practice (Pea, 2002; Barbour; 2008).

According to Pea (2002), meaning is derived from examining the three component parts separately: virtual, learning and community. The term virtual indicates that the medium for communication and community formation are computer and related web-based technologies. The term learning identifies the objective of activity in this context. Learning can be defined in many ways and is context dependent (Schwier, 2007). The term community refers to a group of participants who have something in common. At the heart of any community is a shared sense of purpose for being together which sets the tone for, and delineates parameters of the community (Schwier, 2007). Stuckey and Barab (2007) mentioned that community can be different to different people and that, as a concept, it is gaining popularity. Together the three concepts are associated with collaboration, interaction, shared goals, exploration, reflection, knowledge creation, knowledge sharing and common interests (Coffman, 2004).

VLCs, as an emerging trend in education take many shapes and forms. They differ in purpose and scope using both asynchronous and synchronous communication methods. They can be found in various contexts including traditional classrooms, online courses and distance education programs. Perspectives on K-12 VLCs vary. While Stuckey and Barab (2007) emphasized the importance of web-supported communities (virtual communities in traditional classroom settings), Murphy (2005) noted the cultural and practical advantages of broadband enabled virtual learning, in distance education contexts.

Broadband tools include video and audio conferencing. Murphy also noted that in distance education contexts, new technologies enable students in remote geographical communities to access high quality learning environments and experiences (Murphy, 2005; Murphy & Coffin, 2003). Stuckey and Barab (2007) and Murphy (2005) agreed that VLCs can provide access to mentors and content area specialists. Distance education is closely associated with VLCs in the literature, particularly as learner-centred approaches have gained popularity in these environments. Palloff and Pratt (1999) and Beldarrain (2006)

indicated the central function of VLCs in distance learning and the potential for improved distance education with the development of new technologies. For example emerging social software promotes constructivist learning by facilitating a high degree of communication, collaboration and learner-learner interaction not typically afforded by traditional synchronous and asynchronous tools, and interaction is fundamentally important in distance education (Murphy & Coffin, 2003).

Multi-user Virtual Environments (MUVES), as unique VLC contexts are characterized by 3-D virtual environments that engage learners from around the globe and simulate real world objects and interactions. They also provide synchronous and asynchronous communication and collaboration opportunities. MUVES promote engagement through student autonomy and interactivity by allowing the students to participate actively rather than observe passively. Potential benefits listed by Blaisdell (2006) include: better attendance at school, increased ability to concentrate, relevant learning and skill development. He also stated that the primary objective for video games is entertainment while the primary goal for MUVES is learning. Quest Atlantis (QA) is a MUVE developed specifically for students aged 9 to 12 where educational quests and narrative story lines are central to the environment. The developers promote a holistic approach to VLC development in advocating and designing a comprehensive system that can be integrated into existing classroom communities. Students communicate with each other and teachers using communication tools such as chat and email that are housed in the QA world and used in the context of the back story, associated missions and quests. QA is implemented primarily in traditional classroom environments. Technology in this case supports a larger vision for K-12 VLCs that includes physical world learning communities (Stuckey & Barab, 2007).

## **Theoretical Foundations**

Although technology itself is relatively new, some of the distinct features of VLCs have their roots in learning theory. The work of Dewey, Piaget, Vygotsky, Bruner and Gardner, among others, has influenced current theoretical approaches to technology-mediated learning and specifically VLCs. Social constructivism, situated cognition and learner-centredness surface as important theories within VLC literature. Together they provide theoretical homes for technology. Learning occurs collaboratively and interactively in a relevant context that focuses on learner needs. Brown and Adler (2008) claim that perceptions about education and how people learn are fundamentally changing from Cartesian "*I think therefore I am,*" to social "*We participate, therefore we are*" (para 9). From this new perspective, community and learning are inseparable.

Learner-centredness can be fostered in community-centredness contexts to provide cooperative and collaborative learning environments (Uribe, Undated). Individually both are gaining popularity as philosophical perspectives. Murphy (undated) illustrated the benefits of learner-centred technology mediated learning while Stuckey and Barab (2007) focus on a community-focused approach to design. Emerging technologies may facilitate integration of different theories to improve learning experiences. (Beldarrain, 2006).

## **Instructional Design Elements**

K-12 VLCs are emergent rather than prescriptive in nature because they differ so vastly in purpose, content, context, learner age and ability levels and in the real space contexts in which they reside (Stuckey & Barab 2007). These environments should be socially responsive, value-sensitive, and participatory by design and should account for characteristic tensions (Barab et al, 2007; Stuckey & Barab 2007). McCombs (2003), in her discussion of learner-centredness also identified the emergent nature of teaching and learning in such a context.

Social presence is a core element of K-12 VLCs that can be equivocated with visual and non-verbal indicators typically exhibited in face-to-face learning communities. It is not synonymous with interaction which can simply be the completion of a task and does not indicate socio-emotional attitudes (Nippard & Murphy, 2007). Garrison (1997) defined social presence as “the degree individuals project themselves through the medium” (p.6). Effective VLCs encourage the emergence of social presence with the underlying assumption that there is a connection between learning and relationship building. Turvey (2006) corroborated this by stating that authentic learning, identity building and socialization are inextricably connected. Nippard and Murphy (2007) conducted a single case study to examine social presence, as exhibited by teachers and students, in a virtual secondary classroom. Findings indicated that teachers and students differed in their preference for communication tools when manifesting social presence and student manifestations of social presence typically occurred in digression from curricular topics. This finding has significant implications for VLC design as providing opportunities for informal communication could serve to promote and sustain manifestations of social presence.

Interactivity is an important element in successful K-12 VLCs. Four kinds of interaction typify these learning environments: student-student, student-teacher, student-content and student-tool (Moore as cited in Murphy & Coffin, 2003; Murphy & Coffin, 2003). Successful VLCs are interactive, engaging, and provide ample opportunities for communication and collaboration. VLCs should provide opportunities for peer interaction apart from large group interaction (Stuckey & Barab, 2007). The challenge is to foster and facilitate interaction among learners and not just between learners and technology (Barab, MaKinster, & Moore, 2001).

K-12 VLCs should be engaging for the learner, providing ample opportunities for communication and collaboration. Murphy and Coffin (2003) made a distinction between interaction and collaboration, stating that collaboration is “more than interaction” (p. 1). Murphy (2004) defined collaboration as sharing goals and production of shared artefacts. She delineated how collaboration is achieved and manifested by identifying a seven stage continuum from interaction to collaboration. An associated element is the fostering of problem-solving skills. To promote collaboration and problem solving skills, higher level processes should be explained, employed and appropriate scaffolds put in place.

Engagement also surfaces as an important element in K-12 VLCs. Herrington, Oliver & Reeves (2003) stated that “learner engagement is paramount to learning success” (p. 9).

Successful K-12 VLCs have appropriate boundaries, allow and plan for digression, are well facilitated, manage communication (particularly as complications arise), and promote a level of commitment. They are inclusive, accessible, and flexible. These virtual communities are also extensible in that they extend into the real space communities in which they reside. As well, VLC designers plan for technology, manage tools and harness technology to serve the community. (Murphy, 2005; Murphy & Coffin, 2003; Nippard & Murphy, 2007; Ravitz, 1997; Stuckey & Barab, 2007).

## **Pedagogical Implications**

Clarke and Dede (2005) made predictions about the nature of future online learning:

Over the next decade, three complementary interfaces will influence people’s learning styles and how people learn...*The familiar “world- to- the- desktop” interface...* “*Alice-in-Wonderland” multi-user virtual environments (MUVE) interfaces...*[and]...*Interfaces for “ubiquitous computing”* (p.2).

The design and implementation of these interfaces carries implications for pedagogy. Mcloughlin (Undated) asserted that K-12 VLCs should be learner-centred and promote increased levels of learner involvement and control. Research-validated learner-centred psychological principles can provide a “framework and foundation for transformed practice at K-20 levels of our educational system” (McCombs, 2003, p.11). Consistent with participatory learning environments, learners should have

significant input into their learning environments. “As technology becomes an integral part of our classrooms and schools, educators can look to the students...to help make the shift to more student-centered learning (Tapscott, D. 1999).

The need for social interaction and online connectivity is driving the development of new approaches to teaching. These approaches need to take into consideration increased mobility among learners. (Beldarrain, 2006). Childress and Braswell (2006) suggested that as Massively Multiplayer Online Role Playing Games (MMORPGs) improve they will inspire new teaching models that will focus on social problem solving approaches. A new model for global collaboration and problem solving that promotes a “Natural” versus a more traditional “Scripted” approach, where teachers work as connectors or facilitators in global learning communities” (Burell 2008).

Prensky (2001b) and Squire (2002) commented on the need to investigate the educational potential of computer games due to enthusiasm and motivation on the part of children. Barab et al. (2007) affirmed this view, “digital video games provide an important experiential space for supporting meaningful learning, and....it might behoove educators to understand and leverage this powerful medium” (p.26).

## **Changing Roles for Teachers and Students**

Emerging learning theories combined with the emergence of VLCs provide challenges to the traditional role of the teacher. Traditional relationships between teachers and students are changing and will continue to change as VLCs become focal points for learning and educational interaction. Tapscott (1999) stated that “...a whole generation of teachers need to learn new tools, new approaches, and new skills.” (p.6). Prensky (2001a) suggested that educators change their methodology and content to address the needs of the new generation of students. Instructional approaches are shifting from teacher-centric to learner-centric due largely to the introduction of learner-centred principles McLoughlin (Undated).

The literature reiterates the central and crucial role of the teacher in successful VLCs (Murphy & Coffin, 2003; Nippard & Murphy, 2007; Turvey, 2006). The primary role of the teacher in a VLC is to build, sustain and set the climate for the community. Included in this community design role is promoting and modeling engagement, collaboration and interactivity among learners, as well as selecting and managing communication tools. As well, in traditional classrooms the teacher integrates the VLC experience into the real space community.

MUVEs require that the teacher become more involved as a guide in the process of inquiry, in facilitating discussions and in creating collaborative learning groups. Research in this area indicates that teachers who prepare their students ahead of time better prepare their students for success and engagement (Lim, 2006). Teachers will likely find students increasingly combining leisure and school related virtual activities (Blaisdell, 2006). If this holds true, this trend will significantly impact traditional perceptions of teacher and student roles.

## **Communication Tools**

The primary goal in web-based communication tools is to maximize affordances and minimize constraints (Murphy & Coffin, 2003). First generation web-based communication tools emphasized the individual and their experience and interaction with content whereas second generation tools, often referred to as Web 2.0 are combined in various ways to form social network services which cater to the user and support social learning. Associated tools are characterized by their ability to foster and facilitate online social networks that are dynamic and interactive, providing unprecedented opportunities for virtual collaboration and community building.

Web 2.0 offers a wide variety of social software tools that provide novel communication environments.

Virtual community building tools such as MUVES, Wikis, Ning, Twitter, as well as other open source technologies, both synchronous and asynchronous hold promise for the development of effective VLCs (Beldarrain, 2006). Wikis are interactive, collaborative websites that allow users to edit content. Twitter is a social networking service that employs instant messaging features, allowing “live” and interactive communication anytime, anywhere. Ning is a platform that allows users to create their own social networks on any topic. Users can combine options such as blogs, photos and forums to create and customize virtual learning communities.

Practical applications of Web 2.0 technologies in the K-12 community are numerous. Davis (2008), a high school computer science teacher explains how she incorporates communication tools into her classroom, creating a VLC within a traditional learning environment. She uses wikis both to organize class creations such as blogs, podcasts, wikis, vodcasts and videos and to distribute content such as lesson summaries, peer reviews, collaborative efforts, introduction of concepts and student project submissions. “Blogmeister” Kathy Cassidy (2008), maintains a daily blog with her Grade 1 class using tools and techniques that foster a virtual community which serves to enhance her traditional classroom community. She employs the use of tools such as vodcasts, sketchcasts, podcasts, and has her students partner virtually (and sometimes in real space) with university students as “blogging buddies”. A high school in Craik, Sask. has embraced technology in the classroom, launching a pilot project in which cell phones were used as vehicles for teaching and learning. Students were involved in program development and phones were initially used to submit audio and video responses. Use grew to include various organizational applications such as agenda planning and according to the classroom teacher results have been positive. Challenges include the fact that one third of the students did not have cell phones (Mario, 2008). These are just a few examples of how various communication technologies are being employed in K-12 settings to include students in participatory approaches to VLCs.

Communication tools for VLCs are varied and may include broadband tools such as video and audio conferencing. Communication and management tools may be combined in a variety of ways. Tool selection will be influenced by the purpose and type of VLC. Variables affecting selection of tools are accessibility, expertise, and affordability. The primary consideration should be whether they help learners to achieve their goals (Murphy & Coffin, 2003).

Downes (1998) argued that although the field is constantly and rapidly evolving, trends can be identified and future implications derived. While much of his speculation has indeed come to pass in the adult sector, the formal K-12 sector remains largely unchanged. Organizations are obliged to support teachers in becoming more adept and knowledgeable about emerging technologies. Professional development, particularly in the form of VLCs is suggested to help teachers manage the transition and their changing roles (Coffman, 2004). As the locus of control shifts, teachers need to be supported to take on their new roles, leading to improved practice and enhanced student learning.

## **Research Implications**

While there have been significant studies, there is also growing recognition of the need for further research at the K-12 level. Opportunities for research in this area are numerous. Research at the adult level can inform and provide a context for research at the K-12 level. Studies such as the one Murphy (2004) conducted with adults regarding collaboration in VLCs could be adapted and replicated within K-12 VLCs. Schwier’s (2007) work on catalysts, emphases and elements with respect to adult VLCs could inform and provide a context for studying characteristics of K-12 VLCs. Additionally, action or design based research should be conducted within K-12 learning environments to improve quality of learning.

Many issues surface in the area of K-12 VLC design. Computer mediated communication is different

from face-to-face communication, and there are indications that adult VLCs are and will be different from K-12 VLCs. Studies show that certain cognitive functions may be altered through gaming (Crawford, 2006). Nippard and Murphy (2007) indicated that social presence impacts students' perception of learning, might serve to increase student satisfaction in their experiences online, and may promote emotional satisfaction for students. Research regarding how social presence is manifested, effective use of communication tools and integration of curricular goals could serve to enhance student learning. The difference in tool preference between teachers and students is also worthy of further consideration (Nippard & Murphy, 2007). With the independence afforded by new technologies in the context of K-12 VLCs, Turvey (2006) raised the question of assessing student responsibility. These issues and insights precipitate careful consideration and investigation into effective design of VLCs at the K-12 level.

An area that deserves further investigation is how non-formal K-12 VLCs impact formal VLC communication and interaction. The tendency for students to manifest social presence primarily when digressing from curricular topics using communication "conventions transferred from informal social contexts of instant messaging such as ICQ and MSN" (Nippard & Murphy, 2007, p.1) could mean that elements of non-formal K-12 VLCs can be harnessed to improve learning in formal VLCs. Research could also examine the impact of non-formal and formal K-12 VLCs in non-traditional school environments such as distance education. Levin & Arafah (2002) pointed out the fact that "Many schools and teachers have not yet recognized - much less responded to - the new ways students communicate and access information over the Internet" (p. iii). It would also be valuable for research to be conducted solely in the context of informal K-12 VLCs, identify defining among others, characteristics of social presence, voluntary membership, engagement, and collaboration.

The digital divide was evident in the Craik, Saskatchewan pilot project as not all students had equal access to pertinent technologies. Investigation into system support for disadvantaged students would be appropriate.

Research into the nature and effects of VLCs in alternative and home-school learning environments could yield interesting results. How do these contexts impact the nature of community that can develop? What are some opportunities for developing learning communities to support social learning? What are the opportunities and challenges for crossing traditional school and home-school boundaries? Further research on integration of broadband into teaching and learning could focus on cross-cultural communication and interaction, related learner challenges and coping strategies. Murphy (2005) proposed questions for further research into broadband enabled learning (BEL): How will teachers and learners cope or manage broadband tools? How will this impact the process of teaching and learning? How will the lack of boundaries affect student behaviour and interaction and attitudes? What challenges will students face? What are the learning benefits from BEL? Can BEL impact innovation in practice? Questions arise in QA surrounding the relationship between complexity, educational nature of Quest design and levels of student engagement (Lim, 2006). Barab et al (2005) identified a need for further investigation at to "how complex and 'educational' these academic Quests can be while still engaging students" (p.6).

## **Discussion**

The area of K-12 VLCs is large in scope, ranging from formal to informal contexts. There is lack of cohesiveness in understanding in this field. Many additional questions arise that can act as fodder for further investigation. Research is limited but is rapidly expanding to include many issues that have arisen pertaining to theory, definition, characteristics, value and pedagogy. This review was limited by the availability of formal relevant literature and so informal and unpublished literature was used to paint

a comprehensive picture. Expansion of descriptors may have allowed access to other literature that could lend further explanation to this paper.

Although there are defining features of K-12 VLCs, there is a lack of unity in understanding this phenomenon. Some suggest development of standards in this entire area in the form of online learning program frameworks while others suggest development of glossaries to promote common understanding and shared meaning.

K-12 virtual community development is characterized by various elements. Suggestions are made in the literature regarding what elements constitute successful VLCs. Referring to VLCs at the adult level, Schwier (2007) made some pedagogical suggestions for “nurturing the conditions under which (successful characteristics) can be realized” (p.17). The elements he defines could be adapted to findings at the K-12 level with corresponding suggestions for pedagogy. Traditional roles are changing quickly but practise is not reflecting this reality. This has important implications for pedagogy.

It is important to recognize that not only is communication in a virtual context different from communication in a face-to-face context, adult communication differs from communication at the K-12 level. These distinctions will impact the valuing, formation and sustenance of K-12 VLCs. Research also indicates a need to include the examination of non-formal K-12 VLCs as they come to bear on formal K-12 VLCs.

Debates rage (Sharesky 2008) over how to effectively incorporate technology into educational settings as attempts are made to use VLCs to positively effect change in education. Optimism abounds in the literature about the exciting opportunities and transformational possibilities for K-12 VLCs. Stuckey & Barab (2007) alluded to the transforming power of web-supported communities. K-12 VLCs can be used for developing communication skills, sharing ideas and enhancing the development of identity in a world permeated by communication technology. It is evident that technology and learning theory are constantly evolving and can compliment one another in ways that have the potential to inform, influence and transform educational practice.

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