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curriculum, technology & transformation for an unknown future

olpc – messages for a community approach in education

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Within the theme of "Curriculum, technology and transformation for an unknown future" it seems appropriate to present an image of seeing and doing things differently that comes from outside of formal education. The context for this story comes from working as part of the NGO one laptop per child (olpc) community in New Zealand. The impact of the global olpc movement has been widely accepted as transformative in its mission to enable children's agency in learning and participation in knowledge building communities. It is a vision that frames future learning within highly fluid and unstable spaces. In this paper the focus will be on a local community network that supports this project. Members of the NZ olpc volunteer community largely learn through informal means. Their learning spaces are both physical and virtual. They are spread across New Zealand and are connected to diverse global networks, where they can access "mentors" and co-learners using Web 2.0 internet based technologies.

Using narrative inquiry (Clandinin and Connelly, 2000) we invite readers to draw parallels between the community of practice described, with its rich experiential and informal learning features, to pedagogical possibilities for formal tertiary settings. Roles for teachers and learners are examined with particular emphasis paid to the learner as maker and designer in both the lived physical reality and in the constructivist sense of meaning-making. This raises questions about the nature of knowledge and its relationship to pedagogy. In addition the recount draws attention to sociocultural and co-constructed dimensions, where learning is distributed across the community and knowledge is seen as stretched across the activities and members of the community (Scardemalia, 2004).

Keywords: community of practice, constructionism, authentic learning, narrative inquiry.

Introduction

In writing this paper the authors share Tabitha's story as a founding volunteer in the New Zealand olpc community that is part of the global one laptop per child (olpc) movement. Helping to inform Tabitha's narrative information comes from anecdotes of olpc events, as well as historic evidence from olpc and Sugar Labs wiki pages, websites and mailing lists. The second author John has some experience of olpc gatherings in the context of his work as a researcher in the field of elearning, distributed leadership and curriculum in both early childhood and tertiary settings.

The paper begins with a scenario that gives a flavour of the community in action. To help follow, the olpc laptop is known as the XO and uses a linux based operating system known as the Sugar learning platform. The aim is not to understand all of the detail of this vignette, but to sense some of the richness of the discursive practices. Questions are then asked as to what tertiary settings might learn from communities such as olpc. To help make these connections the overall narrative turns to a historical perspective of the constructionist theoretical foundations underpinning olpc.

Armed with this background we return to the New Zealand story, this time to where it all started. Drawing upon this experience allows for some reflection and provocation on what the narrative offers in the border spaces between formal and informal learning. Throughout there will be discussion around the themes of the paper: learning through rich experience; within an authentic community of practice; looking for what is transformed if learners are empowered whilst in highly fluid and unstable spaces.

Scenario

This narrative begins with a scenario set in Wellington's "The Cross" on a Saturday morning where olpc volunteers are testing Sugar on the olpc laptops. The nature of the discourse is immediately apparent.

> We received a request from olpc Australia asking us to test a build an activity bundle for a deployment of 500 laptops; details to be coordinated through R S of olpc Australia: "This is great, thank you for the follow-up. Please find attached: an XO matrix we have been using... We are using 802 with the latest firmware."

The olpc NZ volunteers are presented with a new challenge. Contact has been established with the test requester and there is an air of excitement. Engagement has begun. The volunteer community looks at the task and works out how each member can assist. Most members are experienced with the XO and work in education or technology fields. The term Matrix refers to a spreadsheet listing activities (i.e. software) to be installed on the XO. The 802 refers to the Sugar build number. The matrix provides a frame for making decisions on which activities are to be included in the deployment build. As such, the matrix is a catalyst for negotiating shared meanings about technology, learning and cultural practice like children's play, which is central to the pedagogical ethos. The volunteers review the matrix together and discuss what the components might mean; there is a need to clarify so they consult olpc Australia online by explaining their interpretation of the components. Both communities have been collaborating and learning from the exchange and the matrix undergoes redesign. Within the NZ volunteers an education lead and a technical lead emerge for this task and the testing begins. As further testing is carried out there are many exchanges between the community members locally, the test requester, and the wider olpc community. To an outsider it appears that these adults are playing games on a little green laptop. If one gets closer it becomes apparent that there is more going on. It could be asked if these adults are learning through play themselves. A sense of how new members are inducted into the olpc Sugar community will become evident further on in the narrative. First we ask the question "What has olpc got to do with tertiary education?"

Connecting olpc and tertiary

In our scenario the NZ volunteer community are engaged in learning 'for real', as in 'real world' and with 'real purposes'. This is learning that is not simply a simulation, but is genuinely authentic. It may not always be possible to satisfy that degree of authenticity and connection to the 'reality' external to the institution. However there have been some developments in formal education around authentic activity within online learning environments. Herrington & Oliver (2003) identified ten characteristics of authentic learning activities, which include:

- Authentic activities have real-world relevance: Activities match as nearly as possible the real-world tasks of professionals in practice rather than decontextualised or classroom-based tasks…
- Authentic activities comprise complex tasks to be investigated by students over a sustained period of time…
- Authentic activities provide the opportunity for students to examine the task from different perspectives, using a variety of resources…
- Authentic activities provide the opportunity to collaborate…
- Authentic activities provide the opportunity to reflect: Activities need to enable learners to make

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choices and reflect on their learning both individually and socially. (2003, p. 70-71).

The olpc community provides evidence of these dimensions and how learning is distributed across the community in both its people and in the activities that define the community purpose. There has been a recognition of the centrality of experience and embodiment in learning since John Dewey (1938). In contemporary times however, new opportunities for learning through experience are afforded by trends in openness, networked connections, and the tools that enable richer forms of informal learning community in both physical and virtual spaces. Further questions that can be asked could explore the nature of constructionism manifested in the olpc experience, what the informal open exchange of information affords to formal learning, and what underlying conditions are needed as suggested by Herrington and Oliver's characteristics for authentic learning for supporting new educational communities of practice. How did olpc develop these features?

A brief history of olpc and sugar

MIT Media Labs and Nicholas Negroponte birthed the olpc foundation based on Seymour Papert's constructionism learning theories, and Alan Kay's concept of the Dynabook children's computer. Constructionism can be thought of most simply as "learning by making" although this is somewhat of a simplification. Papert and Harel (1991) argue this represents shifts in "the balance between transfer of knowledge to students (whether via book, teacher, or tutorial program is essentially irrelevant) and the production of knowledge by students." (para. 27).

The learner is more than a passive consumer of 'knowledge' but is an an active agent in the 'making' and producing of knowledge and is transformed through experience. Taken into the educational realm this leads to questions about the nature of knowledge and its relationship to pedagogy. Does it have more to do with 'knowing' as embodied thinking-in-action rather than content a learner is expected to know? One of Papert's longtime colleagues and a regular contributor to olpc is Marvin Minsky who argues that:

> The 'playfulness' of childhood is the most demanding teacher that one could have; it makes us explore our world to see what's there, to try to explain what all those structures are, and to imagine what else could possibly be. Exploring, explaining and learning must be among a child's most obstinate drives—and never again in those children's lives will anything push them to work so hard. (Minsky, 2008)

In his book "The children's machine" written pre-millenium, Papert challenges us to rethink schooling in the age of the computer (Papert, 1993). This raises the question of the role of the teacher and what image we have of learners and of learning. Is to learn also to make and to explain and to teach? In many classrooms the making of ideas and the explaining of them is left to those who are designated with the title teacher. Traditional education has promoted a vision of formalised learning, set content and outcomes, and looks for the most efficient means to optimise and support the prescribed curriculum. To introduce the notion that problem-solving and creative endeavour may involve playfulness would be anathema to our formal education systems.

In developing his notion of constructionism, Papert and his students worked on the interface between software design, technological development and spaces for informal learning. Papert's research provided some of the earliest insights into the the potential affordances of computers for an emancipatory futures oriented curriculum. One well known output was the development of Logo, a programming language designed for learners to construct their own programmes and learn in the making through conceiving, testing and debugging (Papert, 1980). This work was a reaction to a growing view that computers would teach the child and in effect control what is learned. In contrast, children make computers do what they want to do. This important principle is now evident in olpc where the learners are seen as competent makers and designers in the digital world.

olpc began with the concept of the children's machine bringing digital education opportunities to children in developing nations. With Sugar as its learning platform, the XO laptop extends the constructionist model and emphasises the importance of connection to others while learning. Walter Bender, an MIT researcher who was originally olpc's President of Software and Content, went on to found Sugar Labs to support the development and maintenance of the Sugar learning platform, enabling Sugar to be used on other hardware. It is worth noting that Sugar Labs has no paid employees yet has a very large software development and contributors community. As an indicator there is

ongoing translation of Sugar in more than one hundred languages.

Figure 1: XO displaying Neighbourhood view

Figure 2: Volunteers testing Sugar

On starting the XO laptop the user is faced with a learner-centred design based on constructionist and socio-cultural theories, with the laptop looking for ways to connect to other laptops and other users. As an example, the XO wireless antennae connect children automatically to the network and each other in a democratised way that avoids hierarchies. In figure 1 we see the neighbourhood view, showing students learning collaboratively. Figure 2 shows volunteers testing the Sugar activities. Returning to the narrative provides further 'images' of how meaning-making develops within these community networks.

olpc and Sugar in New Zealand - Tabitha's story

> A friend started teaching me Spanish using a memory game on a little green laptop that he told me was an olpc laptop. He told me about the olpc mission. We invited friends to join us in testing Sugar activities (applications) on the olpc XO laptop on Saturdays at "The Cross" in Wellington.

> We (now a growing community of olpc volunteers) were given a "smoke test" (a check that crucial functions in software are working) and we worked out what an activity was supposed to do by talking to each other and looking at the wiki pages for support. Many wiki pages were incomplete and we were asked to edit them. Together we decided if something was broken and learned how to submit bug reports to olpc. We had to figure it all out together as this was not familiar software to any of us.

When thinking of how learning is socially constructed, what becomes evident from this story is how the community has constructed meaning together both in the face to face environment and in the online communal space. This is not new to researchers in educational computing, see for example computer mediated communication or CMC (Koschman, 1996). The olpc volunteers needed access to the olpc wiki and to the open source code of the software to find the possible origin of any bugs. Making these contributions began to create a sense of community.

> I joined mailing lists to keep up with new developments and test requests. When I started asking questions on the lists I shared what I learned from the software developers with the other volunteers. Developers started to notice us and send us test requests for their activities.

> After using the smoke test we wanted a more thorough test case that was easy for new testers to learn about testing from, but we couldn't find a suitable test on the wiki so asked on mailing lists. It was then that we found out we were the testing centre for olpc. Together we designed a few different testing plans in different systems and submitted them back to the wider olpc community to gather feedback on their fit for purpose. The process helped us identify what to test and how, what makes a test valid, how we should record findings, and how we could distribute the test results to the right people.

This is evidence of a community that fosters the creation and continual improvement of artifacts and communal knowledge. Scardemalia (2004) in their work on the CSILE project has argued that this kind of computer supported activity affords learning opportunities as an integrative framework for

knowledge building pedagogies, practices, and environments.

Within the discursive practices of the olpc community, learners are designers and problem solvers. There are synergies between the learning practices of this community and the constructionism based pedagogy used by olpc and Sugar. In questioning the traditional relationship between learner and knowledge McWilliam (2005) challenges us as to whether we need a pedagogy of learning, or more a pedagogy of unlearning. What is it that needs to be unlearned; teachers' scripts and well-rehearsed habits which reflect the dominant assumptions and traditional structures of education McWilliam would argue. "By re-enacting such pedagogical habits, we make a culture of teaching and learning that parallels a predictable and regular social world." (p.1). McWilliam addresses seven deadly habits of pedagogical thinking that she believes are particularly timely for unlearning given current fluidity in contemporary digital society. As a taste of these, we are asked to dispute the notion that the curriculum is prescribed and needs to be known in advance, or that the teacher leads, students follow. In its place McWilliam argues for the cultural importance of learning as design work, where ICT presents possibilities for a curriculum of making and remixing. Our story also suggests as Castell (2000) has argued that our relationship to information in the digital age has changed. A consequence of being immersed in a rapidly magnifying sea of information and potential connections is that we become either overwhelmed or we adapt. John Seely Brown (2000) when discussing the theme of growing up digital and how the web changes education and the ways people learn, makes the comment that we will need to develop navigation literacies in which we learn to locate ourselves in the depths of information available digitally, and in the broader connections available to us. Roder and Brown (2009) provide a review of literature that aligns these trends to the emerging notions of the personal leaning environment (PLE) and the personal leanring network (PLN). Just what PLE refers to is contested, but it usually carries the sense of a personal hub that connects the individual to a milieu of tools, content and social networks. Most significantly it reflects what the learner decides is useful as channels for their learning. Whatever is chosen from the wider digtial landscape reflects constructions of their own making, carrying with it the affordances for both informal learning and risks in respect to over abundance and criticality.

> As we grew, the more experienced volunteers taught the new volunteers the ropes, either face to face or online. It wasn't long though before a new volunteer could contribute in their own unique way and the experienced learned from the new volunteers. New members would offer different view points, skill sets and backgrounds that led to different approaches in engaging in the community. Although there are cross overs in what members offer, none would be the sole source of support for a request, but they may be the voice that the community channelled through.

> With each new member there is a subtle change in what we do for olpc and Sugar Labs. Initially the NZ volunteers just tested software on the olpc hardware but now we have a much wider purpose. We mentor other testers, we advise the quality assurance centre in Sri Lanka during weekly online discussions, we create and edit wikis, and contribute to other online dialogue. We test Sugar independently of olpc hardware now. We showcase Sugar and olpc at a variety of events both local and international. We engage in more education communities as opposed to the technical communities now.

As our narrative evolves it reveals how it is the situatedness of learning that contributes to the forming of a community of practice (Lave & Wenger 1991). In defining communities of practice, Wenger (2006) tells us three characteristics are crucial: the domain, the community, the practice. Referring to the domain, "communities of practice are formed by people who engage in a process of collective learning in a shared domain of human endeavour" (para.6). Referring to the community, "they build relationships that enable them to learn from each other" (para.7). Referring to the practice, "members of a community of practice are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems - in short a shared practice" (para.8). Wenger and Trayner (2010) also tell us that practitioners need a community to: help each other solve problems; hear each others stories, keep up with change, avoid local blindness; find synergy across structures; keep up with change; reflect on their practice and improve it; build shared understanding; cooperate on innovation; find a voice; and gain strategic influence.

Another element in Lave & Wenger's original work on communities of practice is the notion of legitimate peripheral participation in which the new community inductees develop their knowledge and skills through interaction with more experienced members. In the olpc setting experienced volunteers

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who were once the learners are now acting in the role of the teacher, consolidating their own knowledge, but the new volunteers are becoming teachers and in the process provide fresh perspectives. It is the collected knowledge and experience of all the volunteers that sustain the community. Although some of this is face to face, it is the social affordances of Web 2.0 that allow the community to operate. Put simply no connectivity translates to no community. "Web 2.0 tools are not about accessing information, but about social connectivity and participation in networked communities where there is collaborative knowledge construction." (McLoughlin & Lee, 2008). Furthermore Roder and Hunt (2008) argue that Web 2.0 technologies not only create a new imperative for education in a non linear and networked society but they also potentially provide a means for addressing this imperative.

> There are a number of supporters for the olpc NZ community who follow our mailing list and keep up to date with olpc and sugar news. We don't often see them at testing, but we see them in other forums engaging with schools, government, and other FOSS communities. We see the result of their efforts when we are contacted by people who heard about us through these supporters. These supporters provide us with relevant information and knowledge.

People on the periphery of a digital community are commonly referred to as lurkers. Wenger, White & Smith (2009) tell us that lurking can also be considered as 'legitimate peripheral participation', the central concept in Lave and Wenger's seminal work on situated learning in communities of practice (1991). The notion of 'legitimate' refers to how potential members of a community have a place even though they may be unqualified in the practices of that community. The periphery is the border of edge of the community and participation is connected with knowledge in the making and doing. It is a crucial border space in which connections to learning are abundant. This also sits well with the distributive views of knowledge introduced earlier. The lurker role can also be very passive and as such is not always valued in traditional educational settings. However the olpc volunteers have recognised a significant potential of lurkers on the periphery of their community. Accepting 'the lurker' allows the volunteers to learn from other communities that those lurking participate in, and grow from these connections provided by the lurkers. In short lurkers add to the connectedness of a community and offer chances for bi-directional exchange. In a tertiary setting there are many instances where learners on the edge of communities are learning from the activity of the community without becoming fully engaged members. The challenge from an institutional perspective is to legitimise this connectivity and enable richer forms of lurking and connectivity between communities.

> Sugar on a Stick (SoaS) brought new options for the volunteers with the ability to share Sugar with everyone. We could see potential for NZ schools. We could give our friends, family, and colleagues SoaS to use on their laptops, no need for an XO, children can now carry Sugar in their pocket on a USB stick. We gave out SoaS at events like Software Freedom Day and Linux.conf.au. If we had an endless supply of free USB sticks we would give them to every child in NZ.

> Although initially it was a challenge to get SoaS to work, we figured it out by helping each other and using our contacts in the global Sugar community. We still find some scenarios where we can't get it to work, but these offer opportunities for our more technical volunteers to problem solve and then write up instructions on the olpc wiki or send improvement suggestions to the developers.

Learning how to create a portable version of Sugar opens possibilities for learning outside the classroom, with benefits to the recipients of Sugar and to the volunteers in working with Sugar using any computer anywhere. Children can make anywhere. In the first global PLE conference that took place in Barcelona in July of this year Serenelli and Mangiatordi (2010) suggest that the olpc XO and Sugar can be seen as a PLE. Using actor network theory they argue for a concpet beyond hardware and software they term borderware. Their ideas are beyond the scope of this paper but it can be seen how developments in Sugar open up questions around mobility and a learner's access to their network connections.

Tangney, Fitzgibbon, Save, Mehan and Holmes (2001) state that in communal constructivism "students not only construct their own knowledge (constructivism) as a result of interacting with their environment (social constructivism), but are also actively engaged in the process of constructing knowledge for their learning community". The community knowledge and nature of this situated

practice extends beyond what is possible through individual prior knowledge. Another challenge we will need to overcome in formal education, unlearn as it were, will come from how we respond to the view that learning and knowing are largely individualistic constructs. In a connected Web 2.0 world, learning and knowing will be as much about 'we' as about 'I'. Education has often been highly competitive. The dominance of exams, individual assessment regimes, what counts as plagiarism, and what counts as originality, may all need scrutiny.

Questions for the future

Looking back over the olpc narrative, we see opportunities for tertiary education that address authentic learning in an unknown and highly fluid future. If we take up the challenge laid by McWilliam, what would an emergent non-prescriptive curriculum look like? If we pursue a pedagogy of unlearning how do we avoid filling the void with new orthodoxies. Taking the constructionist view, the learning is in the making and designing, which suggests we should not undervalue this in the design of our curriculum. Nor should we miss the benefit of learning which involves transformation within communities of practice. Our story suggests that it is not good enough to simply learn about community, nor should it be how to 'do' community in an instrumental manner removed from the experience of authentic community. We see the social dimension of Web 2.0 as providing numerous pedagogical affordances for community. There is evidence that this is "where to next" for many tertiary institutions. In both of the authors' institutitions, elearning strategies have been developed that aspire to these forms of transformations.

Although this paper does not explore openness and the connections between open source software and education, these are also features of the olpc and Sugar community initiatives. The volunteers demonstrate the open culture that is often seen in open source communities and is gradually becoming more common in education. Where to next for olpc in New Zealand includes ongoing support for open education through iniatitives like Software Freedom Day. There is also the sense of openness where communities give to enable transformation. The olpc community in New Zealand are currently supporting Pacific deployments, with two volunteers recently visiting Samoa. They are assisting in translation into local languages and continue to test Sugar, with an emphasis on the software images for South America. Perhaps open culture in all its forms will provide further avenues for authentic engagement and informal learning.

In conclusion, this paper has presented an image of seeing and doing things differently that comes from outside of formal education. The message has been that learning happens in communities that cross boundaries between formal and informal spaces. A key to knowledge production in the highly fluid spaces of today's diverse global networks has been access to mentors and co-learners using Web 2.0 internet based technologies. In addition the recount has drawn attention to sociocultural and co-constructed dimensions of learning, where the learning is complexified and distributed across the community. Similarly, knowledge is no longer seen as residing in the lone individual, but can be conceived as stretched across the activities and members of the community. We believe this olpc narrative highlights the blurring of roles for teachers and learners in these emerging communities. As a final thought, we feel it is this blurring of roles that challenges our passive didactic modes of teaching, and provides the primary call to action for tertiary educators facing the imperatives inherent in the theme of this conference "Curriculum, technology and transformation for an unknown future".

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John Roder

John works in teacher education. He leads courses in critical reflection, inclusive education, adult learning and educational leadership. Around half of what he teaches is offered online. The rest fall into what is now being called blended learning. John's recent research interests lie in the nexus of Web 2.0 and curriculum, e-portfolios and the PLE or personal learning environment.

He examines future visions of technology and enhanced learning through a critical lens. John also explores the notions of complexity, connectedness, curriculum emergence and the distributed nature of knowledge in online communities. Expertise and leadership frameworks that are adopted in his work attempt to favour distributed social networks. John's focus is on communities that empower individuals through the conscious development of loosely coupled connections between group members. This has raised questions about the difference between networks and communities.

Tabitha Roder

Tabitha works in elearning academic development. She supports teachers in creatively using VLEs to engage students in learning using a social constructivist model. She helps teachers to familiarise, choose and effectively use ICT tools to provide a learning centred approach with their students, developing digital literacy whilst creating a sense of connectedness.

Tabitha contributes to one laptop per child (olpc) and SugarLabs, volunteering at Pacific deployments and coordinating the efforts of the volunteer testing community in New Zealand since mid 2008. Her involvement stems from her interest in creating opportunities for learners to take a lead in their own education as active, empowered participants in richer forms of learning community. Tabitha is also interested in openness and its potential to encourage learners to be both creators and consumers in knowledge production.

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