greenhouse: An Integrated Knowledge System for Teachers
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ABSTRACT

This paper outlines the development in Western Australia of an environment for sharing knowledge about teaching students experiencing difficulties with learning. Systems design was employed to build an online environment integrating tiers of knowledge of increasing complexity, and to provide learning opportunities for teachers in peer learning environments that support the rapid spread of good practice built on evidence-based knowledge. Since 2004 the project has utilised a Federal grant to address the professional development needs of both public and parochial teachers in a state of Australia the geographic size of most countries. This environment for professional learning and innovation is called greenhouse and has created a climate for communities of practice and currently has over one thousand five hundred members.

Traditional educational institutions are under pressure to be more responsive, efficient, and to deliver a higher quality of teaching. Current systems of education were developed over many years to respond appropriately to a world that is now fast disappearing. Teachers are increasingly required to adapt to meet changing external conditions, administrative complexity and to respond to individual student's needs. In addition to developing, maintaining and disseminating subject expertise, teachers now take on the role of facilitator of learning. Thus developing teachers' skills becomes a broad endeavour, as individualised as the programs that teachers may design for their students.

In 2003 the project partners, the Catholic Education Office, the Department of Education and Training and the Association of Independent Schools of Western Australia put forth a proposal from Western Australia for funding under the Australian Government, Department of Education, Science and Training (DEST) National Literacy and Numeracy Strategies and Projects Program. The aim of the proposal was to develop an online resource (named *greenhouse*) to provide teacher development on up to date information on learning difficulties related to literacy.

The first author wrote the proposal for the DEST funding and applied a systemic philosophy to the project proposal. Once the funds were received a wide cross section of educators from all sectors of education in Western Australia became involved in the program's implementation committee. KT Studio, a design team led by the second author, was contracted to design and build the online system. The second author has a background in cybernetics and his team integrates systemic thinking into their web engineering. The match between the web engineering and the project design allowed for a new system's approach to teacher professional development being devised. To achieve this the authors accepted the challenge to the education technology community set by Bathany and Jenlink (2004):

- We must transcend the constraints and limits of the means and methods of instructional technology.
- We must develop open systems thinking, acquire a systems view, and develop competence in systems design.
- We must create programs and resources that enable our larger educational community to develop systems thinking, a systems view and competence in systems design.

- We must assist our communities across the nation to engage in the design and development of their systems of learning and human development.
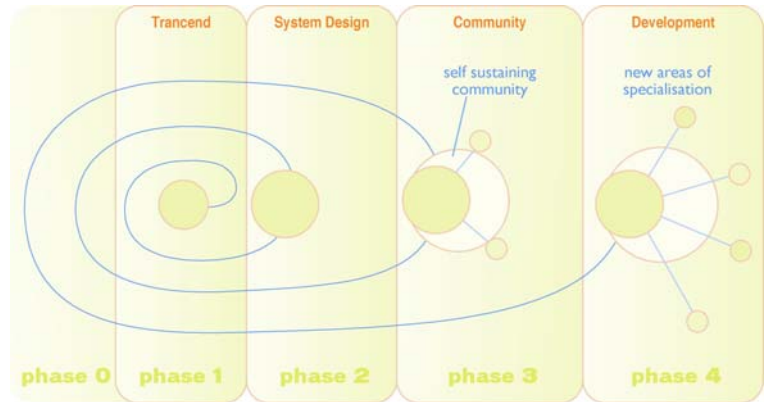

Transcending.

Models for enabling transformation are emerging in many fields, and new approaches have led to significant advancements in adapting to the new needs of our society. In the area of computer software development, for example, by releasing the operating system Linux as open source i.e. available free-of-charge to anyone, open source communities have sprung up world wide to share, collaborate and operate as communities of interest. These communities and the way in which they work have completely transformed the computer software industry

In creating an education system that transcends current instructional technology it is important to recognise that trying to

improve the system incrementally from the top down yields decreasing returns:

- Changes imposed by management or government strategy often do not work as planned.

- Teachers providing a content laden curriculum rather than facilitating the learning needs of students leads to disengaged students failing to learn the basics.

- Education systems imposing professional development on teachers that does not allow "just in time" access and self-paced learning, has meant teachers only participate when it is mandated and fail to engage in innovative practice.
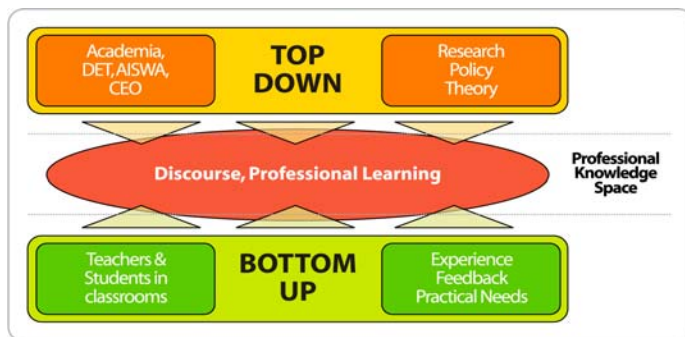
greenhouse was designed to be built from the bottom up utilising ideas and knowledge contributed by teachers from their practice . "For teachers by teachers" was the motto of the implementation team. It was only once this layer of the system was in place that the latest research, policy and theory, synthesised by academics for teachers, was added to the environment. Even then, as depicted in the diagram left, the top down material supplied was primarily provided to create a tension with the top down knowledge so that the true professional development needs of teachers were uncovered. Once these needs were discovered the implementation team contracted top down and bottom up practitioners to work together to provide interactive modules of professional learning to small groups of enrolled teachers.

TRIGGER QUESTION

In creating an education system that is relevant to the modern world and one that is responsive to change and innovation, it is important to recognise that trying to improve the system solely from the top down yields decreasing returns. In education systems where change from the bottom up is often discouraged how can new responses be encouraged?

Systems design.

As discussed the aim of *greenhouse* is to bridge the gap between that which a teacher recognises as a professional knowledge need, and the wealth of resources available, including peer expertise and academic (tacit) knowledge. In *greenhouse*, teachers both access and provide information to the

knowledge resource, and participate in a learning community. Thus the *greenhouse* environment also responds to the need that many teachers experience – the need for, collaboration. The design of the environment allows for the development of open systems thinking by supporting the dynamic creation, development and maintenance of communities of practice. Even when a teacher knows that what they are doing is good practice, the means of sharing this with other teachers and other schools can be limited. Through *greenhouse* the teacher readily receives feedback to keep the system of knowledge creation open.

greenhouse offers an environment in which teachers can build secure, trusting relationships. This is essential so that they are prepared to interact, take risks and learn from occasional failure. As a profession, teachers lack the opportunity or the support systems to leverage innovation across the profession in ways that other professions (such as medicine) have demonstrated. *greenhouse* has proven that teachers will interact with peers and others if a shared interest is identified and they are in a secure environment. This occurs where discussions and outcomes are documented in topic-specific based forums which are regularly moderated by a professional who has been

trained in the importance of maintaining a system's boundary but allowing the right amount of permeable knowledge. This training and subsequent success in moderation became the method by which competence in systems design was tested by the project.

TRIGGER QUESTION
There is evidence from research (Bourne and Moore, 2005) into online teaching and learning that illustrates that considerable effort is often required to get individuals, particularly those over 30 years of age, to voluntarily engage in online group communication. How then can we design education systems that encourage teachers to utilise such technology especially where it requires them to expose, in their view, their ignorance about a topic or issue?

Community.
Education systems make considerable investment into the professional development of teachers, and *greenhouse* provides an example of instructional technology in which teachers can 'value-add' to that investment, whether it is by participating in a discussion stream to clarify and challenge, or by contributing expert knowledge. The *greenhouse* environment was designed to provide a sustainable level

of materials, so that 'just-in-time' learning is a natural expectation for members of the community. Teachers and other users do need to attend training in matters that are not relevant to their practice at that time, but when the need arises, they participate in *greenhouse* to discover the knowledge, resources or support that they require. Being needs-based, this form of knowledge acquisition is economical, focussed, and an effective use of teachers' time as it promotes learning in an ever deeper way.

TRIGGER QUESTION
How can an education system be designed that allows for knowledge to function as an attractor and build nodes of knowledge and activity?

greenhouse aims to supplement, tune and focus resources around the real needs of teachers in the classroom. A highly significant value of greenhouse comes from the capacity to form a community of practice for teachers. Wenger (2004) defines communities of practice (CoP) as 'groups of people who share a passion for something that they know how to do, and who interact regularly in order to learn how to do it better.' Multiple communities of practice have been created within the greenhouse environment. These communities are fluid,

with members joining and leaving. Each coherent and sustainable community drives the energy of the discussion and 'tunes' the relevance of the topics, materials and knowledge available. Depending on the issues that are of priority to a community, the focus will change and new communities of practice are created.
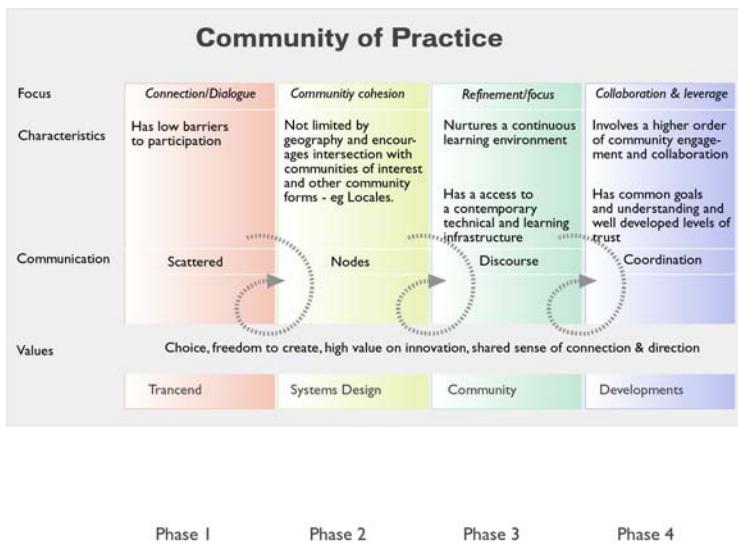
A community of practice may thus be established to focus on almost any area of interest. Its principal objectives (Nickols, 2003) usually are to :

- enable community members to learn from each other through the sharing of lessons learned, problems and their solutions, ideas, etc.,

- share the learning that occurs in the community of practice with others, and to

- generate benefits (e.g. economic, social, environmental, problem solving, etc.) to the organisations and members forming part of the community of practice

Richness in a community of practice is provided by the existence of many different discussion threads. These threads grow around seeds/ideas that have been contributed. Teachers and others who

participate are attracted to the ideas both to initiate debate and to act as catalysts for new ideas. The community itself continually develops new seeds and in this way the teachers participating develop systems thinking through the holistic development of the environment.

Community of Practice

Focus	Connection/Dialogue	Communitiy cohesion	Refinement/focus	Collaboration & leverage
Characteristics	Has low barriers to participation	Not limited by geography and encourages intersection with communities of interest and other community forms - eg Locales.	Nurtures a continuous learning environment Has a access to a contemporary technical and learning infrastructure	Involves a higher order of community engagement and collaboration Has common goals and understanding and well developed levels of trust
Communication	Scattered	Nodes	Discourse	Coordination
Values	Choice, freedom to create, high value on innovation, shared sense of connection & direction			
	Trancend	Systems Design	Community	Developments

| Phase 1 | Phase 2 | Phase 3 | Phase 4 |

Development.

To assist communities to engage in the design and development of systems of learning an evolutionary, iterative model was created. The model allowed for successive development of each phase so that each phase built on the previous phase. The success of *greenhouse* was used to illustrate the viability of systems design so that other online communities could be funded and built. Thus *greenhouse* became a means to grow other sustainable and innovative online environments.

The next online environment was founded around the need for teachers to support students who were gifted and talented. That community was based on the same systems design but commenced as an online conference that spanned the world with its speakers and participants. Following that an online environment for teachers of students with disabilities was created. Thus, new environments were created by KT Studios as the needs of the participants significantly diverged from the previous, although each contained the seed of design from the initial *greenhouse* project. Ultimately the Professional Learning Institute of DET WA employed KT studios to build an encompassing environment for all teachers' professional development In WA that embraces the same systems design as originated with *greenhouse*.

As a federally funded project, *greenhouse* is awaiting formal approval to launch. Despite this it currently has over one thousand five hundred members. Nationwide interest has been generated with the Northern Territory of Australia recognising the potential for *greenhouse* to reach its teachers, whom face even greater geographic isolation than those in Western Australia. Further, the DEST, faced with the roll out of professional development in the area of disability

standards, approached the authors to discuss design aspects for online professional communities. Neither of these projects have come to fruition but the seeds of system design, to transcend the constraints and limits of the means and methods of instructional technology, have been sown.

References.

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Nickols, (2003)

Wenger (2004)

Notes

Feedback

Please provide feedback on this paper to:

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