

Keynote Address

Technogogy: Facilitating the Transformation of Learning

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Abstract

The power of the innovations in computer mediated communication is now in a position to further enhance traditional learning styles, open and distance learning as well as synchronous and asynchronous strategies and environment to a far exciting one enabling and transforming optimal educational transaction impacting all forms of pedagogies. We are now viewing the function of technology from a different angle as the engagement of learning should be tweaked towards the students' preferences, learning activity and practices that technology enables and the transformation of the environment to foster learning that is now termed as technogogy.

Computer-Mediated-Communication

Each major transition in communication media, from speech to print to video to electronic forms has resulted in changes in our means to create, record, store, distribute, access and retrieve information. In a logical and progressive sense, there must be a communication transformation upon a technological breakthrough in education. At the heart of this communication, transformation is the changes in which students and teachers interact.

The whole contention too is the undying mission to capitalise on the deluge of

technological innovations accompanying the cyber world in an effort to establish norms of contact and ideal conditions for learning (and teaching) through the extraordinary delivery and connectivity options afforded by the Internet.

The word **transformation** has been cited in many instances where we were hoping for serious implications in the learning environment and the educational strategies afforded by technology in support of knowledge creation and learning facilitation that can be (effectively?) implemented such as self-directed learning (Knowles, 1985), situated learning (Brown et al, 1989), collaborative constructivist learning (Klemm & Snell, 1996), transformative learning (Saw & Idrus, 1997) and group investigation (Sharan & Sharan, 1992). The learning experience now afforded to the learners in the digital era now can never be matched in the confines of the four walls, should now present, and be organised in a manner to promote exploration, experience, engagement, empowerment, effectiveness and ease of use (Oblinger et al, 2001). In order for technological innovations to make an impact the pedagogy, we must view the shift that can occur and are facilitated by incorporating CMC. Only then can we see or obtain a transformation in the way materials are presented leading to a

change in the learning environment such as the deconstruction of traditional pedagogy (Dwyer, 1994).

The Internet has introduced a whole new paradigm in the educational transaction process. A computer mediated communications paradigm can lead to new definitions to what learning is all about and with it the corresponding research and experimentation regarding it (Hiltz, 2001). According to Harasim (1990), computer-mediated conference can not only greatly amplify human intellect online, but also enhance collaboration and facilitate active knowledge construction. Salmon (2003) talked about the different activities or “e-activities”, as she calls them, needed to be performed by online moderators to allow for greater participation and interaction in an online learning environment.

Then on, many aspects of the computer mediated environment were ventured, whether in a stand alone fashion, online, offline, synchronous, asynchronous, virtual reality or any blended model. Various pertinent issues such as ones relating to the learners where Stephenson (2005) pinpointed the ever pressing relationship between online pedagogy and good eLearning design, modality preferences of the students in a web-based environment (Kaur, 2005), the development and utilisation of learning objects (Jovanovic et al, 2006; Sing, 2005; Sharma, 2002), learning styles such as problem based learning (Bhattacharya, 2006), gender effects (Scott, 2005) as well as works on literacy in the integration of technology in the teaching environment (Jilks-Racine, 2005).

For these reasons, it is imperative that the learning environment of the digital era is developed or the present environment be redesigned so that it is relevant to the power, potential and versatility of the gamut of educational technology available today.

However, this may either solve or add to our problems about learning where the

complexity of learning is the learning process itself as we have trouble defining it. It is also unfortunate that technology has overtaken us in terms of the provision of a transformative learning environment. Learning management systems (LMS) as well as learning activity management systems (LAMS, undated) is now made available to us for immediate use, leaving us to further interject with more transformation in the educational environment to foster learning.

A Matter of Student’s Learning Styles

Instruction begins when you, the teacher, learn from the learner. Put yourself in his place so that you may understand what he learns and the way he understands it.

(Kierkegaard)

This brings us to the ever crucial area of how we educate our students. Put succinctly, teaching and learning do not improve because of improved technology (Jamieson 1999). Specifically, content is meaningless without context. And context is not created by sitting in front of a computer reading content (Downes 2002). Learning is improved when it is grounded in practical learning theory. By itself, more technology will not make education more efficient. For these reasons, it is imperative that the learning environment of the digital era is developed or the present environment be redesigned so that it is relevant to the power, potential and versatility of the gamut of educational technology available today.

Different students have different learning styles and this occurs in a wide variety of ways, including the types of instruction to which they respond best, the ways they approach their individual studies (strategies to studying and learning approaches), and their perception and attitudes about the nature of knowledge and their role in constructing it (cognitive levels).

Students preferentially take in and process information in different ways; by observation and hearing, reflecting and acting, reasoning and deducing logically. Students come to the “classroom” with preconceptions about how the world works.

If their initial understanding is not engaged, they may fail to grasp new concepts and information that are taught, or they may learn them for purposes of a test but revert to their preconceptions outside a classroom. The method of teaching or pedagogy may also vary. The content may be delivered in the manner of a lecture, demonstration, individual or group work and in the very many learning theories (Kearsley, undated).

An objective of education should thus be to help students build their skills in both their preferred and less preferred modes of learning. The learning theories provide good frameworks for designing instruction with the desired breadth. The goal is to make sure that the learning needs of students in each model category are met at least part of the time. When mismatches exist between learning styles of most students in a class and the teaching style of the teacher, the students will ‘disengage’ from the educational environment.

Obviously, there are many approaches that could be employed in designing learning environments that respond more effectively to the needs of different students, although this would be rather demanding in a face-to-face fashion, the infusion of technology and the power of multimedia computing will provide the platform for a pedagogy-rich format. Narrowing to the teacher-learner interaction, there are also many ways to create a better match between students’ learning styles and teacher approaches to instruction.

It is our contention that perhaps we should cease to endure this matching processes as one could never know the learning modalities, preferences and styles of

a student, as much as one could never know the preferences, inclination and approaches of the teacher. Any one research on the learning characteristics of one particular cohort would be rendered useless against the next cohort. We need a different approach where the direction, preferences and development evolves through the facilitation of educational transaction, with technology playing a pivotal function in the integration of the pedagogy, content, teacher and the learner. We need to work on the preferences and strength of the students through a variety of learning models. In this way, the students have the choice to pursue a learning preference while subtly being redirected to a higher level on a natural progression; a maneuver that require an astute pedagogical approach by the teacher.

Technogogy

The transformation of the learning environment is a crucial element in the definition of technogogy as we put it as it signifies the power and function of multimedia computing (technology) and its use in the teaching and learning process. Coming back to the use of technology, we always view the functionality of technology from the standpoint of the student on the pretext of it being learner centred. Together with this notion, we adopt the concept of facilitation and transmission of learning that we contend are not an effective approach as we subsume a lot of the initiative and creative use of technology on the students characteristics (supposedly). There is no concrete direction of encouraging an individual to engage in practices that will result in meaningful learning, due to the incapability of the students to venture beyond what is presented by faculty.

We also contend that the primary benefit of technology is not the focus on the content but the focus on the learning practices and engagement that technology enables. In spite

of the blended approaches that are integrating technology in the teaching and learning processes, it could be an ignorant way of viewing the possibilities and potentialities of technology. In truth, we should not be using technology to duplicate what we can already do, but we should design uses of technology that enables us to participate and engage in teaching and learning practices that we cannot do given our current constraints.

For example, we can create virtual case studies, support communication and collaborations among geographically distanced individuals and groups and create texts or artifacts from the interaction that take place thus fostering more learning. In essence, we are moving from mere infusion or integration (as a natural buy-in) but are approaching the transformation of the learning environment in its entirety

We further contend that students should benefit from all known learning theories and models as well as learning styles and strategies. We should not be the determinant in fixing the recipe for the students as we do not absolutely know how, when and where students learn. This is rather at odds with the definition of pedagogy as forwarded by Conner (2004): “more accurately, pedagogy embodies teacher-focused education.” Further, she suggests that in the pedagogic model, “teachers assume responsibility for making decisions about what will be learned, how it will be learned, and when it will be learned”. We are also not in any position to determine the evolutionary processes of their learning development, pace, capacity, knowledge capture, retention and application as well as the learning skills subsumed in the pedagogies presented.

The power of technology, as portrayed in a convergent mechanism via multimedia computing and the Internet must go beyond presenting facts with more razzmatazz, colour, audio, visual, simulation and animation, but must have the capability to

converge in the educational environment transaction, the function of the teacher, the needs of the students, the learning styles, the learning theories and the various pedagogies.

Based on these premises, we defined technogogy as, “The transformative use of technology to foster learning (Idrus & McComas, 2005; Idrus, 2005). The design and application of technogogy is also based on and subsumes the underlying principles of pedagogy and andragogy (Conner, 2004), heutagogy (Hase & Kenyon, undated), ergonagy (Tanaka & Evers, 1999) and ubuntuogy (Bangura, 2005). Technogogy can incorporate the teaching elements pertinent to the children as well as that of the adult learner towards the transformation of the environment to foster learning.

This conforms very well with the application of strategies that will colour and enhance the transformation of the learning environment that will foster learning for all learners, as the power and flexibility of traditional multimedia and multimedia computing will afford the incorporation of the of format technogogy into any medium.

TECHNOGOGY

Content + Technology + Design of learning environment incorporating multimedia and interactive technologies, modality preferences, learning styles and learning theories associated with pedagogy, andragogy, heutagogy, ergonagy & ubuntuogy.

Implications of Technogogy

The application of technogogy will now witness the presentation of content in a continuum rather than a segmented approach for a specific cohort., each level taking into account the learner characteristics, learning styles and preferences and the production of a variety of appropriate media components to support, complement or for the purpose of teaching and knowledge retention. Further we will now witness the design of (a single)

content for the learning environment that is based on many learning theories such as situated learning, multiple intelligences, experiential learning, constructivist theory, cognitive load theory as well as connectionism (Kearsley, undated), to name a few.

This can be viewed as developing content in a buffet approach to learning. The Ohio State University (OSU) is redesigning their Statistics Concepts, a five-credit course enrolling 3250 students annually. Ohio State's redesign implemented a buffet strategy, offering students an assortment of interchangeable paths that match their individual learning styles, abilities, and tastes to learn each course objective. Like the emporium metaphor, used by Virginia Tech, a buffet suggests a large variety of options that can be customized to fit the needs of the individual learner (Pew, 2001).

Imagine a scenario where a student logs on to the computer and is assessed for his learning style (LdPride, undated; Campaign for Learning, undated) before being directed to the most appropriate learning environment design based on his preferences. There the student is served with a buffet of learning that has been laid out for the student to choose or try in his educational transaction; the logistical difficulties in creating learning experiences to suit every situation and learning style, notwithstanding.

We contend that this will give rise to new paradigm in the design of the learning environment and experiences in technogogy that pivots on technology for the presentation of a pedagogy-rich learning. Among the paradigms and focus that will be in play are (to name a few);

- The use of intelligent and pedagogical agents
- More robust pre- and post test/assessment softwares
- Preparation of learning objects

- Design of artificial intelligence
- Multiple/cross disciplines
- Interoperability of systems
- Sharable/Reusable learning objects
- Resource repositories
- Intelligent tutoring system
- Innovative portal development
- Collaboration softwares
- Data management and data mining

The concept of technogogy can also be illustrated via the characteristics of pedagogy. We gleaned one of the characteristics of the andragogical and pedagogical approaches to teaching-learning as depicted as depicted in Figures 1 & 2 that was retrieved from the Yale University Library (Yale, undated). Figure 1 shows a traditional approach to the use of technology in the presentation of a learning environment. We have in the past been approaching learning design segmentally from separate cohorts. Technogogy views both (in this case) pedagogy and andragogy from the standpoint of enabling technologies and produces design in context in a continuum from pedagogy till andragogy. Given the student autonomy on pace, any student can proceed at their own rate and at the same time have the capacity to look back to a simpler design of instruction constructed along the continuum from pedagogy till andragogy (based on a specific content, say).

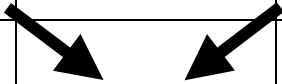
	Pedagogical		Andragogical
The Learner	<ul style="list-style-type: none"> ○ the learner is dependent upon the instructor for all learning. ○ the teacher/instructor assumes full responsibility for what is taught and how it is learned. ○ the teacher/instructor evaluates learning. 	 <p>TECHNOLOGY (as applied separately)</p>	<ul style="list-style-type: none"> ○ the learner is self-directed. ○ the learner is responsible for her own learning. ○ self-evaluation is characteristic of this approach.

Figure 1: Traditional approaches using technology


	Pedagogical		Andragogical
The Learner	<ul style="list-style-type: none"> ○ the learner is dependent upon the instructor for all learning. ○ the teacher/instructor assumes full responsibility for what is taught and how it is learned. ○ the teacher/instructor evaluates learning. 	 <p>TECHNOLOGY (transformative use of technology to foster learning)</p>	<ul style="list-style-type: none"> ○ the learner is self-directed. ○ the learner is responsible for her own learning. ○ self-evaluation is characteristic of this approach.

Figure 2: Learning approaches via Technogogy

To Think About

Stephenson (2001) pinpointed the technical innovations that are likely to push the next generation of online teaching and learning more towards learner managed learning where technogogy fits the bill as the learning support environments will now provide easy access to online support from tutors, mentors or external specialists, open chat facilities, special interest groups, one-to-one exchanges with a personal supervisor, tracking and personal log services and links with other frameworks and activities; altogether a transformation to foster learning. Ally (2005) in his Keynote address at the

18th National Educational Technology Convention in Malaysia (17-20 September 2005) identified among the use of strategies to allow students to process the information at a higher level, include activities for students to transfer the knowledge and skills to new situations, provide opportunities for real life applications and specify activities for constant upgrading.

There are already many endeavours that conform to the concepts of technogogy; a concept that seeks to converge content, pedagogy, learning styles and preferences as well interactive technologies. This idea has been captured to some extent by Harmelan (2006) in his presentation of the personal

learning environment. Assis, et al (2006) investigated optimising instruction via adaptive hypermedia and Bourguet (2006) is testing the prowess of technology with bilingual education in mainstream classroom. There is most definitely an exciting vision ahead in technogogy.

Concluding Remarks

Technogogy is defined as the transformative use of technology to foster learning. The power of multimedia computing makes it possible for technology to cater for the needs of pedagogical elements that can be viewed from the standpoint of technology. Innovations in interactive technologies afford us the luxury through web based delivery the leveling of field in the education of the young and the adult, each benefiting from the elements of the other. Technogogy will allow for a continuum from the young to the adult in a way that addresses both learning needs and activities.

References

- Ally, M. (2005). "Designing Learning Materials for Successful Learning when Using Instructional Technology". In Hanafi Atan et al (Eds.). *Innovations in Instructional Technology in Teaching and Learning*, pp. xxii-xxvi (Keynote Address), Malaysian Educational Technology Association (META) Publishers.
- Assis, A., Danchak, M. and Polhemus, L. (2006). "Optimizing Instruction using Adaptive Hypermedia". In Kinshuk et al (Eds.). *Proceedings of the 6th IEEE International Conference on Advanced Learning Technologies*, IEEE Computer Society, 779-783.
- Bangura, A.K. (2005). "Ubuntugogy: An African Educational Paradigm that Transcends Pedagogy, Andragogy, Ergonagy and Heutagogy". *Journal of Third World Studies*, 22(2), Fall 2005, 13-54.
- Bhattacharya, M. (2006). "Technologically Enhanced PBL Environment for Preparing Lifelong Learners". In Kinshuk et al (Eds.). *Proceedings of the 6th IEEE International Conference on Advanced Learning Technologies*, IEEE Computer Society, 1125-1126
- Bourguet, M.L. (2006). "Introducing Strong Forms of Bilingual Education in the Mainstream Classroom: A Case for Technology". In Kinshuk et al (Eds.). *Proceedings of the 6th IEEE International Conference on Advanced Learning Technologies*, IEEE Computer Society, 642-646.
- Brown, J. S., Collins, A. & Duguid, P. (1989). "Situated Cognition and the Culture of Learning". *Educational Researcher*, 18(1), 32-42.
- Campaign for Learning, Learning Styles. Retrieved 17 July 2006 from: <http://www.campaign-for-learning.org.uk/aboutyourlearning/whatlearning.htm>
- Conner, M. L. (2004). "Andragogy and Pedagogy". *Ageless Learner*, 1997-2004. Retrieved July 15, 2006 from <http://agelesslearner.com/intros/andragogy.html>.
- Downes, S. (2002). The Learning Web, *Stephen's Web*, May 30, 2002 (<http://www.downes.ca/cgi-bin/website/subscribe.cgi>)
- Dwyer, D. (1994). "Apple Classroom of Tomorrow: What We've Learned". *Educational Leadership*, 51(7), 4-10.
- Harasim, L. (1990). "Online education: An environment for collaboration and intellectual amplification". In L. Harasim (Ed.) *Online education: Perspectives on a new environment*, New York: Praeger, 39-64.
- Harmelan. M.V. (2006). "Personal Learning Environments". In Kinshuk et al (Eds.). *Proceedings of the 6th IEEE*

- International Conference on Advanced Learning Technologies*, IEEE Computer Society, 815-816.
- Hase, S. & Kenyon, C. (undated). From Andragogy to Heutagogy. Retrieved 17 July 2006 from: <http://ultibase.rmit.edu.au/Articles/dec00/hase2.htm>
- Hiltz, S.R., Coppola, N., Rotter, N., Turoff, M. (2001). "Measuring The Importance Of Learning for the Effectiveness of ALN: A Multi-Measure, Method Approach", *Journal of Asynchronous Learning Networks*, Vol. 4, Issue 2.
- Idrus, R.M. (2005). "From Facilitation to the Transformation of Learning: From Pedagogy to Technogogy". Keynote Address at the 5th International Educational Technology Conference (IETC2005), 21-23 September, Sakarya, Turkey
- Idrus, R.M. & McComas, K. (2005). Private Communication/Discussion
- Jamieson, P. (1999). "Improving Teaching by Telecommunications Media: Emphasising Pedagogy Rather Than Technology". In B. Collis and R. Oliver (Eds.), *Proceedings of Ed-Media 1999: World Conference on Educational Multimedia, Hypermedia, and Telecommunications*, Seattle, Washington, June 19-24, 1999, pp. 85-90. Charlottesville, VA: Association for the Advancement of Computing In Education.
- Jilks-Racine, J. (2005). "Literacy and Technology Infusion: Multimedia Projects for Teachers and Students". In P. Kommers and G. Richards (Eds.). *Proceedings of the World Conference on Educational Multimedia, Hypermedia & Telecommunications* (Ed-Media 2005), AACE, 241-246
- Jovanovic, J., Knight, C., Gasevic, D. & Richards, G. (2006). "Learning Object Context on the Semantic Web". In Kinshuk et al (Eds.). *Proceedings of the 6th IEEE International Conference on Advanced Learning Technologies*, IEEE Computer Society, 669-673.
- Kaur, P., Atan, H. & Idrus, R.M. (2003). "A Comparison of Student's Achievements between Different Modalities in the Web-Based Learning Environmen". *Malaysian Journal of Educational Technology*, 3(2), 33-40.
- Kearsley, G. (undated). "Explorations in Learning & Instruction: The Theory into Practice Database" - <http://home.sprynet.com/~gkearsley/tip/theories.html>
- Klemn, W.R. and Snell, J.R. (1996) "Integrating the World Wide Web and Non-Web Information in Computer Conferencing". *Proceedings of the Thirteenth International Conference on Technology and Education*, Vol.1, pp. 49-51.
- Knowles, M. (1985) *Self-Directed Learning*. New York, N.Y.: The Adult Education Company, 9-35.
- LAMS. Retrieved 29 September 2005 from: <http://www.lamsinternational.com/>
- LdPride, Learning Styles. Retrieved July 17 2006 from: http://www.ldpride.net/learning_style.html
- Oblinger, D.G., Barone, C.A. & Hawkins, B.L. (2001). *Distributed Education and Its Challenges: An Overview*. American Council on Education/EDUCAUSE, Washington D.C., p. 6.
- Pew (2001). The Pew Learning and Technology Program Newsletter, 3(3), September 2001, Retrieved July 17 2006 from: <http://www.center.rpi.edu/PCR/PewNews/PLTP9.html>
- Salmon, G. (June, 2003). "Information, interaction, participation: Turning the online wheels". *Training Journal*, 34-38.
- Saw K. G. and Idrus, R .M. (1997) "Post-Fordist Distance Education and Transformative Learning".

- International Journal of University Adult Education*, 36(2), 22-35.
- Scott, D.J. (2005). "Gender Differences in Japanese College Students' Participation in a Qualitative Study". In P. Kommers and G. Richards (Eds.). *Proceedings of the World Conference on Educational Multimedia, Hypermedia & Telecommunications* (Ed-Media 2005), AACE, 104-109
- Sharan, Y. and Sharan, S. (1992). *Expanding Cooperative Learning Through Group Investigation*. New York: Columbia University
- Sharma, R.C. (2002). "Learning Objects in Open Learning". *Malaysian Journal of Educational Technology*, 2(1), 71-79.
- Sing, G.O., Fung, C.C., Depickere, A. & Hoe, L.S. (2005). "Object-Based Learning with Concept Mapping Embodied Intelligent Agent", *Proceedings of the Second International Conference on eLearning for Knowledge-Based Society, August 4-7, 2005, Bangkok, Thailand, 30.1-30.7*
- Stephenson, J. (2005). "Putting the Learner First in eLearning". *Malaysian Journal of Educational Technology*, 5(1), 7-18.
- Stephenson, J. (2001). Conference paper delivered to BECTA, November 2001.
- Tanaka, K. & Evers, M. B. (1999). "Ergonagy: It's Relation to Pedagogy and Andragogy". Paper presented at the Annual Comparative and International Education Society (CIES) Conference, 14-18 April, Toronto, Ontario, Canada.
- Yale (undated). Pedagogical And Andragogical Approaches to Teaching and Learning. Retrieved 16 July 2006 from: http://www.library.yale.edu/training/stod/pedagogy_vs__androgogy.html.