

Hypertextual Processing and Institutional Change: Speculations on the Effects of Immersed New Media Users on the Future of Educational Institutions

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Abstract

In an age of cyber literacy and a generation of immersed users of the Web, video games, online social networks, and other interactive electronic environments. This paper speculates that information processing has changed from a linear format, within a chronological progression, to a partially controlled chaotic format, with tracking achieved primarily through hypertextual nodes. This is anathema to the enforced linearity of most institutionally imposed hierarchical learning. This paper speculatively maps the process of how basic schooling methodologies may need to be modified to conform to new learning practices and take advantage of their strengths. Learning on the go through interactive Web immersion, especially with the use of such Web 2.0 applications as Weblogs, information sharing sites such as Yahoo! Answers and wikis, and the use of mobile technology, is a ready source of byte-sized, non-hierarchically scaled items of information, some of it possibly of questionable accuracy. This paper speculates further about the clash between this informal, independent learning and the accreditation that determines formalized learning.

Introduction

Cyber literacy has come of age, and with it we have seen the advent of a generation of immersed users of the Web and other interactive electronic environments, pre-eminently video gaming and social networking, the social and cognitive benefits of which have recently begun to be explored (Salonius-Pasternak & Gelfond, 2005).

Highly representative of the research being carried out about digital natives is this statement from Marsh et al. (2005):

Young children are immersed in practices relating to popular culture, media and new technologies from birth. They are growing up in a digital world and develop a wide range of skills, knowledge and understanding of this world from birth. (p. 75)

Some of the learning in these new environments is as adventitious and haphazard as learning in the real world, with unexpected challenges and feedback. Some of it is more structured and controlled, as in the interlinked networks of a wiki. These environments may take advantage of the learning skills honed in the real world, and they may challenge the structured modes of institutional learning as uninteresting and stultified.

Internet usage in more technologically advanced continents has grown massively as shown in Table 1. There has been a huge usage growth since 2000, and there is a 41% penetration in Europe, 55% in Oceania/Australia, and a massive 70.2% in North America. At least in Europe, 73% of young people aged 16 to 24 use the Internet at least once a week (Eurostat News Release, 2006).

Table 1: Internet Usage and World Population Statistics for September 30, 2007

World Internet Usage and Population Statistics						
Regions	Population	% of World Population	Internet Usage, Latest Data	% Population (Penetration)	Usage % of World	% Usage Growth 2000–2007
Africa	933,448,292	14.2	43,995,700	4.7	3.5	874.6
Asia	3,712,527,624	56.5	459,476,825	12.4	36.9	302.0
Europe	809,624,686	12.3	337,878,613	41.7	27.2	221.5
Middle East	193,452,727	2.9	33,510,500	17.3	2.7	920.2
North America	334,538,018	5.1	234,788,864	70.2	18.9	117.2
Latin America/ Caribbean	556,606,627	8.5	115,759,709	20.8	9.3	540.7
Oceania / Australia	34,468,443	0.5	19,039,390	55.2	1.5	149.9
WORLD TOTAL	6,574,666,417	100.0	1,244,449,601	18.9	100.0	244.7

Source: www.Internetworldstats.com. © 2007, Miniwatts Marketing Group

In the main the majority of researchers agree that the Web permits, among many other intrinsic and extrinsic gains, “learning through frequent interaction and feedback” (Donnerstein, 2002, p. 320). The same applies to video games, which are multi-layered problem-solving experiences in which, for example, identities are assumed that promote intrinsic learning (Gee, 2003). However, some research results are not so positive, indicating the possibility of Internet addiction. For example McKay, Thurlow and Tommey Zimmerman (2005) treat optimistic research about motivation resulting from immersed Internet usage with caution and wonder as to whether young users are becoming little more than “techno slaves.” This goes as far back as Greenfield’s 1999 reference to “netheads [and] cyberfreaks.” Internet addiction seems to be a well-analysed social fear (Chou, Condrón, & Belland, 2005). The same applies to video games, with

research indicating that immersed users' scholastic grades suffer (Anand, 2007) while at the same time admitting that determining whether this is because of time management disruption caused by dependence or because of other, collateral factors is difficult. Time loss through video gaming was considered to have both negative and positive outcomes in research by Wood, Griffiths, and Parke (2007), though the contexts of this research are predominantly social.

The focus in this paper is on processing changes caused by New Media¹ immersion that are more intimately related to cognitive acquisition rather than to Internet-affected social interaction. The negative effects of Internet usage may be exaggerated and sensationalized and may blind researchers to other intrinsic changes that are happening because of the usage.

As a result of this immersion, informal learning — that “vast reservoir of learning possibilities” (Tuschling & Engemann, 2006²) — is gaining an advantage over more formalized, school-based learning. Immersion also leads to deeper change, going beyond content influence and intrusive persuasive manipulation — most likely it is affecting the very structure of information processing, defined by Perry (2003) within a cognitive science, problem-solving context as encoded information which is acted on and transformed in the resolution of a goal held by a cognitive entity. These new informal venues of knowledge acquisition also have a new structure embedded into their architectures — a semi-structured architecture of semantic links that connect related knowledge with immediate access. Experts with these structures may have a fundamentally different approach to information processing.

The architecture of New Media languages has a pervasive effect on the cognitive perceptions and usages — particularly of young immersed users of the media.

An Anecdotal Representation

My son is fifteen, and my daughter thirteen. As I type this, he is in his room working on a school project, linked via MSN and a Webcam to the three school friends with whom he has been assigned to work, and my daughter is chatting with friends on Skype. Sam is watching a YouTube streaming video as he interacts and works, his screen split between the video and the Webcam window.

Both are using computers. Sam a Pentium IV running a recent Windows OS, a hand-me down from his father, and Liza is using my Mac laptop, alas still on older Mac OS X. Both are working on the Internet, even as I am, on my top-of-the-line professional computer, linked to a colleague with whom I am working on a project, using instant messaging to interact in between stops in this writing. My e-mail client pings

¹ For the purposes of this speculative piece, “New Media” refers primarily to multimedia, the World Wide Web, and 3D video gaming.

² Quoting the Commission of the European Union, 2000.

approximately every two or three minutes. Students of mine are working on a project interacting via an e-mail forum that I moderate by skimming every chance I get and giving advice to them through a group hookup.

My children and I are all linked to the net through a wi-fi router/modem, that blankets most of the house in suburban Attard, Malta, and lets us all use the Internet on our different machines, not least my state-of-the-art PDA, the gadget that runs my life.

Sam and Liza have a Net savvy that goes way beyond anything they've learnt in school. They have networks of friends who inform each other through talk and chat, preferring to be online together than, at times, in real life. And each of the members of the networks provides run-of-the-mill, everyday technospeak that has become as common as abbreviations on mobile simple messaging systems and talk of boyfriends and girlfriends and the latest rock offerings.

And when they are not online, they are on their game consoles, grappling with problem-solving exercises that would take teachers a lifetime to conceive for inclusion in their teaching plans.

This anecdotal reconstruction, not being reproduced here as evidence but as an illustration of a concept, is typical of many households in technologically up-to-date areas that house both digital natives and digital immigrants — the first growing with, the second using technologies as an intrinsic part of their lifestyles. This is logically not the case where the digital divide still exists, nor is it the case in the extremities that see immersed online role playing gamers spending days at their terminals, often going without food or sleep and existing on caffeine, absorbed in a virtual reality that excludes actual, physical concerns.

The Premise

The earliest literature on video games has indicated that they have affected cognition, particularly in iconic or analog representation (Greenfield, de Winstanley, Kilpatrick, & Kaye, 1994). Extended immersion provides extensive indications that there is an ongoing transformation of cyber users' cognitive processing capabilities. The result is a change that permits ease of navigation, problematisation of situation and circumstance, and decision-making in environments that have moved architecturally away from the incremental, step-by-step demands made in traditional educational environments.

The essential base providing change is hypertextual in nature. Hypertext itself was deemed to be the fundamental element in the constructivist "textbook of the future" as far back as 1993 (Cunningham, Duffy, & Knuth, 1993).

There is an extensive literature examining Hypertext Assisted Learning (Niederhauser & Shapiro, 2003; Shapiro & Niederhauser, 2004), with its singling out of the main features of hypertext, primarily its non-linear structure, its flexibility of information access, its

bite-sized approach to structuring knowledge, and its greater degree of learner control. Like the real world, it brings distantly related events and constructs into juxtaposition. Like the real world, it lets learners question their own understanding of the events and select aspects to ponder. Unlike the real world, it lets learners explore those connections they find interesting and personally meaningful, and provides a consistent interface and structured avenues for that exploration.

The early literature too found strong differences among learners in the way they used hypertext links. The distinction is made between “self-regulated readers” and “cue-dependent readers” (Balcytiene, 1999), with the second scoring better on content acquisition than the first, but with the first being more independent and exploratory in the way hypertext is read.

A number of theories have explored the need for learners to adjust their cognitive processes in the face of hypertextuality and conceptual complexity and irregularity in knowledge domains, predominantly Cognitive Flexibility Theory (Spiro, Feltovich, Jacobson, & Coulson, 1991).

As in that theory, what is being proposed in this paper also demands adaptability to an irregular stimulus. The metacognitive processes involved put the learner firmly in the centre of the learning in a cyclical process, the medium feeding the learner’s own conscious approaches to the usage and the subsequent learning, with that same usage modifying the mechanisms of perception and application, and reflecting on the actual medium.

Learner control depends extensively on how individuals who use the hypertext use the baggage of prior knowledge they bring with them to the usage and how this affects whether learner control predominates. The indications from the literature (for example, Gail & Hannafin, 1994) are that those with high levels of prior knowledge are more in control than those with low levels of prior knowledge, who prefer more structured program-controlled hypertexts. However, hierarchically-structured texts, so often touted in research on learning from traditional text, are not necessarily indispensable when used by novices using hypertext. Surface information seems to be acquired regardless of structure (Shapiro, 1998), though deeper meaning does benefit from a structured approach. Hierarchies can be built even in unstructured hypertext links, providing they have cues to meaning (Shapiro, 1999).

Interestingly, eye-tracking research about novices learning how to use computer games indicates the preference of a trial-and-error strategy, with little time given to actual teaching hints as they learnt how to use the game (Alkan & Cagiltay, 2007). Documentation was not easily available in the experiment, but none of the participants complained about this, as they immediately began overcoming the obstacles and independently figured their way around the gameplay, the learning of which they deemed to be easy.

Among many learners, strong, independent problem solving seems to be prevalent in self-regulated users' navigation of these media, with metacognitive processes at work creating a schema-driven means of procedural acquisition.

The hypothesis that is being presented here is that the process goes beyond this, and the cognition of the structures reflects the navigational processes in the media. The result is an intrinsic, cognitive and affective move from predominantly linear processing to a more lateral one. In many cases this takes the form of hypertextual leaping. This moves the onus from the singular focus to a more diversified, multi-focus, superficial in content but quite wide in spread, taking advantage of the freedom associated with hypertext that is evident even in the early literature on its use (e.g., Rouet & Levonen, 1996; and George Landow's seminal volume on the topic, now updated, Landow, 2006), and in direct structural links with, for example, the cinema (Mancini, 2005) and literature (Schneider, 2005), and more broadly perhaps with real world exploration.

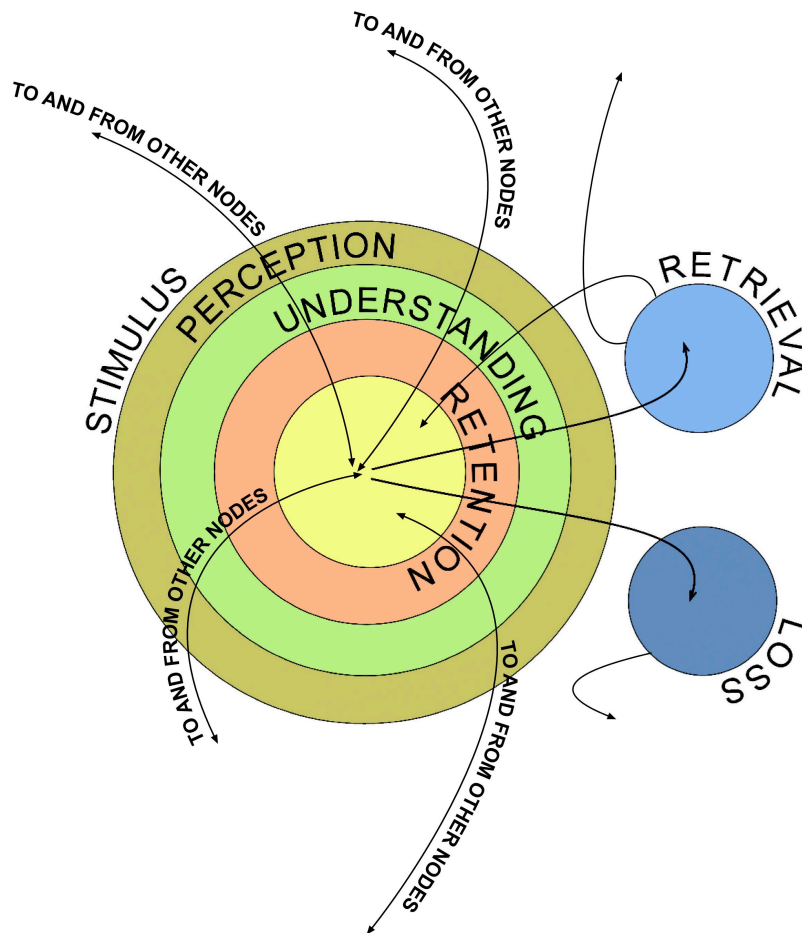
This is a cognitive strategy that has also already found mirroring on such popular stations as MTV with its multi-focal-point announcer presentations and erratic camera movement in sequential narrative, and its use of the fragmented, juxtaposed editing of visuals that interacts with and responds to the rhythm and lyric of the sounds of the music (Williams, 2003).³ Indeed, traces of hypertext-induced influence have been evident for a while in a lot of postmodern works of fiction, film and the visual arts (Gaggi, 1997).

The byte-sized communications revolution, that includes the abbreviated instant text message, Internet chat rooms (that are by themselves changing the nature of language), the quick-flip style of editing in television advertising, not to mention the minutes long television serial sequences in between frequent advertising breaks, and even the short sentence, short chapter mode of novel writing, exemplified by several bestseller *novels*, all contribute directly to corroborate the context and effects of hypertextuality.

Speculatively, the result of persistent immersion is Hypertextual Processing (HTP) which organizes perceived information into an erratic, loosely grouped number of simultaneous focal points resulting in coherent, if sporadic, information gain. This provides a change from a linear format within a chronological progression to a partially-controlled chaotic format, with tracking achieved primarily through hypertextual nodes. Figure 1 is a simplification of one node of processing within HTP. Innumerable nodes of this type typically form the process being described here.

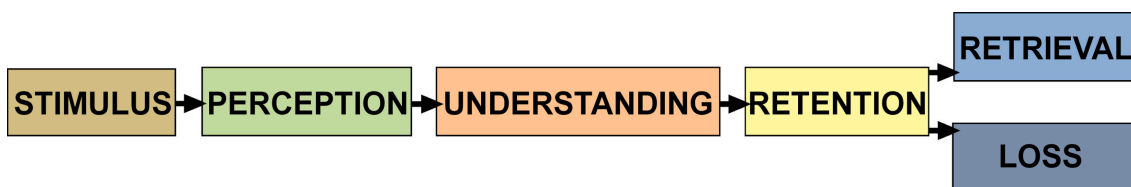
³ Text used here is paraphrased from a review of the book by K. Brittain McKee (2004) in *Journalism and Mass Communication Quarterly*, 81(3), 718–720.

Figure 1: Hypertextual Processing of Information — Simplified Node



In turn, this conflicts with the perceived linear (if stratified) organization of thought processes (of which Figure 2 is a simplified model) on which presumption most traditional school-based pedagogies are built. The conflict makes for a very limited attention span and a resultant lack of follow through.

Figure 2: Linear Processing of Information Simplified Model



Nor does the move towards HTP appear to be limited to certain age groups, though the vulnerability of the young does single them out for particular influence. My belief is that the volume of media immersion creates the processing diversity rather than the age itself. Though I am unaware of any laboratory testing for this particular presumed change specifically, it would be interesting to conduct a diachronic study of similar IQ subjects diversified in media exposure (perhaps on the basis of their past experiences and preferences) – linear/chronological (books, certain tv programmes, radio) and non-linear/saltatory (the Internet and multimedia, including game console software). To date, many of the links posited in the literature between video games and education are quite ephemeral, concentrating more on how gaming can be accepted by teachers and how it can be utilized in a format that integrates with ongoing classroom methodologies (see, for example, Hutchinson, 2007).

HTP affects to varying degrees and is dependent on a number of variables, not least of which are varying cognitive styles (Riding & Rayner, 1998). As well, the individual learning strategies of the immersed user can determine how and in which way hypertextual architecture is perceived and handled (Graff, 2005).

Another important variable is cognitive load (Sweller, van Merriënboer, & Pass, 1998), for which each user has a particular threshold, and for which individual solutions need to be found, including users adopting varying cognitive tools that also determine mind-set and cognitive change (Ozcelik & Yildirim, 2005).

Most of the speculations presented here have derived from an analysis of qualitative data gathered in the main from the following:

- Qualitative observation of in situ subjects — intensive observation of young people aged 13 to 18 playing platform and role-playing games in a self-regulating manner noting timing in the decision-making process, eye-hand coordination speeds and variations, browsing style and ease, hyperlinking frequency and patterns, and navigation through stratification. Each subject showed an evolving grasp of navigation and goal-oriented problem solving. There was a progressive mastery of content, so both substantive and procedural gains were noted.
- Focus groups with young people about media immersion and resultant effects — the ages of participants varied from 18 to 22, in the main University of Malta students. All were New Media users to varying degrees. All participated in online chat (from under 1 to 6 hours a day), all used mobile phones extensively, particularly to send SMS's, and around a third were gamers (from casual to fully immersed). Effects of lengthy immersion in both gaming and online browsing varied, but lack of focus, alienation, and an inability or preference not to follow linear conversations and follow uni-directional lectures were particularly noted.

- Semi-structured interviews with school teachers who recognise a rising lack of rapport between traditional methodologies and student interest — the interviews were for another area of research, but a number of questions were about student interest and motivation, the result of which brought out what they believed to be the collocation between technological immersion and diminishing attention span, corroborated by the noting of increased motivation and focusing when HTP was used as a back up to top-down, class-based teaching.

A number of residual permutations and implications of the possible change to HTP exist. For example, limited qualitative research in a school for lower-achieving students (mostly all illiterates) but who are quite well versed in the use of games consoles has led to experiments regarding how the visual dimension can act as a replacement to symbolic literacy (Mallia, 2003). The link with HTP manifested itself in a mapping of their use of a digital editing suite, in which their sequencing proved quite non-linear, but very intuitively effective. A number of variables may explain this away, but the narrative in each case was relatively clear and complete, with only the intrinsic linearity of sequencing often missing.

The Speculation

One potential direct effect of HTP is the clear pointing out of the lack of most schools' preparedness for coping with students who do not process linearly, as per the traditional approach to hierarchically-structured teaching and text-based resources.

And it might even go further than that. The majority of interviewed teachers who have been in post for over ten years stated that students are finding focusing progressively more difficult. This is predominantly the case in non-technologically aided traditional instruction, but some who supplement their face-to-face teaching with limited e-learning support have indicated that this is also true in formal online learning programmes that lack flexibility and are time constrained. So the indications are that HTP does not affect just formal class-based learning, but also many structured teaching methodological approaches, conveyed through whichever medium permits quantification for accreditation purposes, since that seems to be the intended aim of most institutional teaching and learning.

This brings forth a number of dilemmas within the context of schooling as it stands in a many countries. Often the changes caused as a direct or indirect result of HTP create a huge differentiation in learner approaches within the same learning community. This continues to load difficulty on the demands of inclusive learning environments. Also, currently many teachers come from the generations of either digital semi-literates or digital immigrants, meaning that there is little or no natural affinity with HTP students. This necessitates acquiring a mind set that discerns heightened individual differences and moving to a hyperpedagogy in which "learning can become an endless process of

democratic inquiry wherein essences emerge to fit the purposes of individual students and communities” (Dwight & Garrison, 2003, p. 718).

An understanding of the architecture of HTP change is a necessary base on which to build approaches to methodologies that can be effective with those who will otherwise be incompatible with traditional schooling, and be added to the existing long list of those who are deemed as “unteachables.”

The following elaborations break down what can be deemed to be the cause, effects and possible modifications needed for change. The change can only be implemented if, first of all, some sort of acceptance of the reality of HTP occurs. Once that acceptance is in place, then the change needs to happen in order for learning within a formal environment to conform to HTP. The suggestions presented here are based on my research in schools, exploring the contrast between set methodologies and student reaction; my experience as a teacher within the educational system; and on interviews with teachers, with bases for the submissions corroborated by the observations and focus group data.

Hypertextual Processing Effects

It is the hypothesis of this paper that Hypertextual Processing affects attention, focusing, and cognitive processing. A look at the inferred cause and effect on each of these, and their effect in turn on pedagogical practice, can suggest ways in which that practice can change to accommodate the mutated processing.

On Attention

Cause. Internet users are used to short, quickly accessed information instances that can easily be diversified and are often multi-media based; video-gaming often demands speed of sudden decision making and multiple switching; often instantaneous. Multimedia products also give information in small chunks, interlinked and cohesive, but individually compact.

Effect. Long readings and/or long dedicated explanations are daunting, and attention is lost after the first few paragraphs and/or sentences. Unless there are short, multiple media treatments, there is little to draw attention back to the task at hand; concentrating for longer than an instant on any task defies the need for quick switching between (possibly inter-related) tasks, so often possibility schematic mapping of the longer process is not possible, and the possibility of understanding is quickly lost. This is a perspective Ben Shneiderman championed throughout his career (Shneiderman & Kiersley, 1989).

Present pedagogical practice. Lessons based on pre-planned chunking, each chunk hierarchically or independently listed within a lesson duration scheme of work. Chunks may vary in length, but each covers a topic or activity, and might last as long as a whole lesson.

Suggested pedagogical practice. Schemes of work based on seemingly random short activities, each of which links to the next at different moments, so there can be independent divergence by individual students. All possible outcomes of each activity should cohere to meet the overall pedagogical objectives for the lesson or sequence of lessons.

On Multifocusing

Cause. Many uni- and vari-focal actions occur simultaneously during the playing of videogames. This is also prevalent on some Web pages, with flash adverts and pop-ups vying for (and usually getting) instantaneous attention. This multifocal activity can also be seen in some young people's television programming. Depth of specific information is sacrificed for spread of stimuli and variety.

Effect. Persistent multi-focal reading results in an ability to spread focus on a network of equally attracting focal points. Most often the data input from the spread is relatively superficial, so the multifocusing, as opposed to persistent single focusing, is at the price of input depth.

Present pedagogical practice. Focusing on a single pedagogical objective is the norm, plumbing its depths and exploring its every aspect before moving on to another point to focus. This practice demands constant and dedicated attention by the students, forsaking even less focused distractions. Many of the summative exams emphasise depth of knowledge as opposed to spread, although spread and depth are also demanded in the more exclusive schools.

Suggested pedagogical practice. Breaking down of whole individual activities into short, flexibly accessed actions, researched and discovered by the students, individually and collectively. Actions that need to be taken might be simultaneous, or separate over a short period of time. The teacher can find ways to interlink the activities done over a period of time into a cohesive and coherent whole that further interlinks with other lessons learnt in this way.

On Lateral Processing

Cause. On the Internet, in multimedia and video game playing, is a constant directionally chaotic navigation which has no linear, chronological progression as, for example, exists in the case of books. Hyperlinks can be found anywhere on a page, and hypertextual leaping from one page to another, or one element of the page to another, or even across pages and websites (in the case of the Internet) is constant.

Effect. A result of the use of hyperlinks on Internet sites and in multimedia products and the making of lateral, interlinked strategic movements in video game playing is a move away from linear processing, which is replaced by lateral and/or multi-directional processing. This makes concentrated uni-directional thinking difficult to achieve, and it is often replaced by seemingly chaotic instances of thought, that, however, might be tracked through thematic, stylistic or contextual nodes.

Present pedagogical practice. All teaching is chronologically directed, and this is particularly the case whenever textual resources (such as books) are used. The progression of lessons is hierarchical and the schemas scripted mostly repetitive and formulaic. The result of the learning is usually summative and often tested primarily for cognitive recall in formal exams.

Suggested pedagogical practice. Flexible classroom learning in which computer and other media aided teaching can be used in individual projects determined by the students themselves against a backdrop of loose curricular structuring should be practiced. Work should be self- or ad hoc group-paced and planned to link to flexible classroom teaching through hypertextual modules that can link at any step in the development of each project or module.

What is being suggested here is not the adoption of actual resources such as specially authored didactic games or the inclusion of, for example, blogging within a formal, quantifiable instructional design. While social software coming to the attention of instructional designers is laudable (e.g., Beldarrain, 2006), many of the focus group participants said that they find very difficult engaging with anything that subverts for didactic ends what they normally use purely for entertainment or non-directed informal knowledge gathering. What is suggested here is the adoption of techniques that duplicate to some extent the pacing and syntax of main sources of HTP stimulation used as a base for a total restructuring of classroom and other learning routines.

Informal, Independent Learning

The social reality surrounding technology-heavy environments in which immersed users thrive, however, is that even with an HTP-friendly methodological approach, informal, independent, flexible learning is much more in line with the new random processing. Research shows social software's effectiveness in this regard, both as reinforcement of existing learning and as a motivational instigator of learning all by itself (see, for example, Milheim, 2007; Selwyn, Gorard, & Furlong, 2006).

Cross- and inter-active Web 2.0 applications such as Weblogs and wikis and such user-addictive phenomena as YouTube and peer-to-peer audio sharing, as well as online fora and chat environments, are proving a ready source of byte-sized, non-hierarchically scaled items of information. These resources cumulatively build into a library attuned to this new kind of HTP learning, but this library does not necessarily have an institutionally accepted focus. Mobile technology also contributes directly to "learning-on-the-go" — creating a perpetual chain of information through technology. All of this is beginning to be used tentatively in schools (Sang Hyun, Holmes, & Mims, 2005).

A lot has been written about how the blog has created an invaluable vehicle for vociferous self-expression. Can the blog itself be a means to producing feedback from independent learning? "Could blogging be the needle that sews together what is now a lot of learning in isolation with no real connection among the disciplines?" (Richardson,

2004). Certainly the use of blogging and beyond — the immersion into the interactive multiverse that links together so many different users/feeders of knowledge and opinion, is providing an enormous amount of learning ‘on the run’. The “e is for everything” concept spearheaded by Katz and Oblinger (2000) and interpreted by Wheeler (2007) as “extended learning,” “enhanced learning,” and “everywhere learning,” emphasizes the all-encompassing presence of the learning source, and the persistent, erratic, but ubiquitous learning that is totally learner directed and informal.

But informal learning may defy institutionalization. While “assessment should be a vehicle for educational improvement,” and “lecturers may need to provide different but equivalent assessment activities” (Cummings, 2003), the main problem with the new independence and flexibility in learning is not acceptance, it is that no formalized way of accrediting information is gained through Web interaction or direct individual research, in spite of some National Qualification Frameworks’ statement to the opposite (Young, 2007). The problems for the formalization of what is essentially the most informal of all ways of accessing information are legion, and very few fit in with the quantifiable assessment practices in use today in most universities. This is particularly true of the more traditional universities, and in spite of the fact that “wider inclusion in a learning society may come more easily from greater recognition of tacit knowledge than from more participation” (Gorard, Fevère, & Rees, 1999, p. 451).

Are we on the brink of the inception of informal “universities” owned by immersed cyber users? How credible will the product be of these populist non-institutions that bring together non-registered learners who browse and surf and get their problem-solving skills from RPG (online or on games consoles) and strategy gameware? How will formal institutions take on board such learning, which, arguably, is motivationally and stylistically more suited to lateral processing than what can be accredited by both traditional and online universities and schools, even if they take on board the suggestions for methodological rerouting to be found in the present work?

The answers will be predominantly determined by practice, and no amount of stubborn defending of the ages-old castles of formalized learning will dam the deluge of non-classifiable independent learning that seems to be a new variant on a decades-old learning preference.

Conclusions

Immersed usage of the Internet, with its predominantly hypertextual architecture, along with heavy usage of New Media technologies such as video gaming consoles, within a context of curt, swiftly shifting communications environments, has brought about a variable but quite evident information processing change that demands we rethink the paradigms of individual learning differences for educational purposes.

Teaching and learning methodologies that simulate cyber-technological environments may help bridge the gap between institutionally accepted instructional processes and more hypertextual processing-friendly approaches to educational acquisition.

However, the logical move towards informal, independent learning, using the very vehicles of change themselves (the Internet, particularly Web 2.0 applications, and other New Media) seems to be the logical way to go, with heavy users of New Media technologies finding a motivational setting away from institutions that are finding difficult discovering ways of formalizing for accreditation purposes the informal body of both substantive and procedural knowledge that is acquired by New Media users.

A number of ways forward exist. One way that can help young HTP learners is for formal institutions to adopt variants of the methodological styles suggested in this paper, which might help reroute to institutional formats traits that would otherwise exclude the subverted learner from benefiting from an institution-based education. But the change goes beyond the classroom and is inherent to varying degrees in the affective and cognitive character-set of immersed New Media and social software users, which makes informal, independent routes to learning much more motivationally attractive to them and their mindset. This leads to a social, educational dilemma and for these informal learners not to be marginalized within an industrial system that often demands formal certification of learning, will require a roots-up institutional changes once the acknowledgment of the processing transformations is in place.

This paper proposes that fundamental changes are underway in the preferred modes of learning by a whole generation. How institutions will adapt to take advantage of these transformations is unclear. A few modest proposals are offered here, but the fundamental proposal is that more discussion of the future alternatives needs to be conducted in thoughtful fora like this journal, and more broadly within academic institutions themselves, as they begin to change to adapt to this new future.

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