

Can we develop e-pedagogy by enhancing the new technologies involved? Is that a new approach to digital literacy across the Curriculum for the gifted students?

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Abstract

The educational environment is changing from traditional classroom teaching ecology from the adaptive individual/collaborative learning one by development of Internet, mobile and wireless technology. Therefore, we need to develop the new pedagogy in consideration of such new technologies. Especially, our knowledge and wisdom are cultivated by interactive learning/problem solving/building something through collaborative activities. In this paper, we would like to examine the meanings/ecology of "collaborative learning" again and explore the new technologies of communications which evokes and enhances it. Also, we aim to understand and share the concept of computer/Internet supported collaborative learning, and then we explore the technologies of collaborative tools and infrastructure to promote collaborative learning in consideration of the image of new e-pedagogy for collaborative learning. Teachers are now being told that e-Learning is way of the future. Computer video games have become highly interesting to educators and researchers since their sophistication has improved considerably over the last decade. Studies indicate that even simple video games are offering important educational benefits in classrooms with bilingual students from different countries. On the other hand, as a teacher, it is important to be aware of such technology and to know that these instruments can all be used in the classroom in some way. Can games based learning helps in eliminating racism problems, assisting the acceptance in small communities of the new immigrants, and can assist the gifted and talented students in their future plans? This essay identifies characteristics of highly cognitive virtual interactive environments and offers a detailed index and scoring rubric as a tool for teachers and preserves teachers to use when evaluating the tendencies a video game demonstrates toward encouraging higher order thinking in its participants. Computers have been used in the classroom for years but now it has become so advanced that it allows teachers and students to use the computers in a more efficient way.

Computer games have been developed for everything and anything, including topics such as typing, reading, math, science, foreign language training, etc. Research has been done to examine whether or not these games are useful to children. It appears that children are growing up in a technological world and that these games are useful to them because it is something familiar.

Keywords: Mobile and Wireless technology, digital literacy, enhanced curriculum, gifted students, e-pedagogy, intercultural didactic, immigrants.

1. Introduction

Teaching is, in fact, extremely complex. Teaching well requires practice, skill development and refinement, constant reflection, persistence, striving in spite of conditions that may encourage mediocrity or discouragement, tenacity, organizational abilities and insights required of few other professions. When you have gifted and talented students, curriculum (Salmon 2004) must be enriched in many ways: high level science, more distinguished exercises, etc. Adaptable teachers will be excited by new and creative ways to use technology effectively, and by the promise of unlimited possibilities. This does need to be balanced by the premise that the role of schools is to effectively integrate students into the dynamic social systems we call communities as positively productive and contributing citizens. Our influence on students is immense. Teaching is an awesome responsibility that directly affects students in myriad ways. Student learning is the key focus of teaching. Effective teaching stands at the centre of student learning. To create entire new learning environments that may involve the extended community and new technologies are challenging. All of this without the overlays of curriculum, assessment and reporting. People rarely underestimate the difficulties of learning. Having had to learn, we know it's a complicated and unpredictable business. Many of us, educators and lay people alike, however, tend to underrate the complexity of teaching. It often tends to be treated mechanistically- as something someone does to somebody else that can be easily measured, and on which macro-decisions tend to be made. This level of refinement takes time and genuine support. One rarely becomes a great teacher in a single school year. Outstanding teachers recognize their fundamental obligation is to help each student learn as effectively as possible and to support the ongoing learning of their peers. Despite an increased interest in the use of e-learning to enhance students' learning, it is surprising that so little research has been conducted to justify these claims. Goodyear (2001) concluded: 'the literature on learning in higher education is surprisingly quiet with respect to what both lay people and practitioners might expect to be a key construct—that of "understanding"'. Another confirmation was put forward by Spector (2002), who reported: '*the big lesson about technology and learning from the 20th century is that less is known about how people learn than many educational researchers are inclined to admit*'.

It is therefore critical to find out how effective e-learning practices are achieved. An effective 21st century classroom teaching and learning relies on a number of tools and one of these tools is technology.

In their review of 100 published research reports completed in the period 1991– 2001, Coomey and Stephenson (2001) found little if any definitive evidence of the overall

effectiveness of ‘e-learning’ compared with more conventional methods. This is not to say that this medium is ineffective but rather to say that there is little systematic and empirical work to show evidence of its evaluation. Laurillard (2002) added that “*we may not have an established set of characteristic forms of effective e-learning; however, we could identify some effective existing learning activities and produce a model that captures the good practices embedded in the activity regardless of the tool utilized*”.

As a result, if we are to unravel the various components of effective e-learning practice, we need to consider pedagogy. Pedagogies are connected with students’ learning and outcomes, and have been widely accepted for epistemological and empirical reasons. In this way, the issue of integrating e-learning into the pedagogical system has recently emerged as an important and pressing. The importance of e-pedagogy and learning is the enabler for e-learning but what could be discerned from the term e-pedagogy?

To some educators, this term may not be of any difference to the term traditional pedagogy. On the other hand, some educators view e-pedagogy as new challenges of teaching a 21st century classroom. The most critical understanding of e-pedagogy is that it ensures a successful implementation of online teaching focus for research. Many scholars view e-learning as a way forward for one aspect of e-pedagogy which is collaborative teaching. This is because all too often educators put technology 1st rather than the pedagogy.

2. “Have you switched on your mobile phones?”

This could be the first question teachers will ask students in class (Garrison, D, Anderson, T 2003) sometime in the near future. Although, there is resistance from educational organizations to let mobiles intrude into campus, educationists are taking the view that they need to be more adaptive. And rather than reject a trend, embrace it. Besides, why not let students use a mobile – which they have already paid for – and take advantage of it? In many schools and educational institutes around the globe, many researchers are setting an example of how mobile technology can be used in education – and it did not even wait for students to purchase their own mobiles. The college distributes low-cost handsets to students after disabling services such as gaming and uses them to administer multiple-choice tests, record attendance etc. The system allows the college to create and administer tests, track results and evaluate students. At the end of each day, students return the handsets to the college administration. For a small college it is a brave and visionary step to integrate mobile technology into formal education. A July 2011 study showed that more than half (52 percent) of 18 to 29-year-old US adults owned smart phones of the most recent technology; this is indicative of a global trend. Not surprisingly, educationists are attempting to integrate mobile technology in a blended learning environment that includes multimedia tools, computers and the Internet to create new teaching methods. Mobile Assisted Learning is helping young people today use voice recognition, text, multimedia, NFC, GPS, downloadable education apps, Bluetooth and browsing capabilities of mobiles to pick up languages and subjects, like math and history. The mobile technology is also helping them record observations and complete assignments. Practically anything in a classroom can be enhanced using a mobile phone, if educators invest adequate time and attention to the design. Mobiles can be used for listening, interacting, recording, questioning, reporting and responding – which is what

learning is about. Mobile technology can also be used for other purposes on campus: to send a message to parents of students who have been missing classes; send reminders to students about due dates for returning library books; report and prevent bullying on campus using imaging and texting tools; and alert students on changes in lecture locations. Educational institutions can also utilize mobiles for sending alerts for campus disturbances and intrusions and incidences that can place life at risks. Ironically, it is incidents of violence on campus that have led educationists to begin considering the advantages of using mobiles. Many colleges have taken mobility to the next step: they have begun to manage communication for fresh intakes and applications over mobiles. The scope for innovation in the area of education using mobile technology is immense and remains under exploited. There are four distinct areas for innovation in the education space:

1. Given the shortage in the trained number of teachers and the lack of classrooms in several parts of the world, innovation in mobile technology can be an ameliorating factor.
2. Underserved students can be provided a better quality of education using mobile technology through innovative education design that not only improves delivery but cost as well.
3. Using mobile technology, innovators can enhance and improve current education processes, making it more interactive, engaging and interesting.
4. Finally, innovative mobile apps can be developed to assist in routine administrative and marketing functions of educational organizations.

The question is truly simple for those who want to ride the mobile wave: What can you do as an innovator to ensure that cell phones – and not only - currently hidden in school satchels and student pockets, are brought out to aid education?

3. Curriculum planning for the gifted students

Special subject teachers enhance the gifted learner through student talents, which include artistic, dramatic, musical (vocal and instrumental) and athletic. Through the use of rubrics, portfolios, and teacher observation, the special subject teachers are able to identify those students with exceptional talent. In the regular education art classes, bringing students to the next level in their artistic development challenges the individual potential of the exceptional student.

Through the program, students continue to develop critical thinking, increase creative problem solving skills, and broaden the skills of fluency, flexibility, originality and elaboration through a variety of creative activities.

Much like immigrants who leave the cultural comfort of their home societies and move to places with very different cultures and social practices, those who teach online leave the familiarity of the face-to-face classroom for the uncharted terrain of the online environment, whose constraints and affordances often lead to very different practices. The trans-classroom teacher who moves between the two environments, transferring ideas, strategies, and practices from one to the other, is a mental migrant. The

transformations—of the teacher and of the course—that occur in these migrations and the two-way interactions between face-to-face and online teaching are the focus of this study. As teachers adapt their courses for the online environment, they are forced to re-examine the course design, reconsider curriculum strategies, and make many decisions about what to take out and what to keep, what to add and what to substitute.

Video games used in learning fall into four categories, ranging from purpose-built edutainment to commercial games integrated as-is into the curriculum. Games that come into contact with the educational establishment often become "teacherized" by the need to embed, add, or refer to educational content linked to performance-related outcomes within the curriculum. A good game designer gives his players continuous challenges, each of which leads to another challenge, to keep them "hooked" on playing a game. This can be done by setting clear, short-term goals appropriate to the level of the player and the context within the game. Each challenge should satisfy some kind of learning objective. However, a good storyline can liven up a competition still further. In various Internet forums and game-magazine columns about video and board games, a good plot or storyline is cited as essential to a good game. Oddly enough, a fantasy context makes players more motivated to succeed at a game. So instead of having students memorize types of ores, have them play as miners prospecting for minerals and needing to identify profitable sources. Rather than using games to escape from their studies, encourage students to use games to escape *into* their studies. Make sure that there are many different ways to accomplish each goal. Simply plotting out a step-by-step progression through the goals can be stifling. As much as possible, let each player (or team) work out their own strategy to the endpoint while still keeping the game challenging and achieving the learning objectives.

Using technology for learning in ways that are relevant, meaningful, challenging, and hands-on is not an easy task. It requires a rethinking of curriculum and pedagogy as well as the spatial and temporal boundaries of education. It necessitates a re-evaluation of learning in areas of engagement, individualization, and collaboration. Rethinking teaching and learning should move education away from conventional methods by which kids are told what to learn, when, where, and how. Instead, knowledge should be actively constructed and students should be made responsible for their own learning. The process of curriculum and pedagogy transformation is complex, cumulative, and long term in scope, but one way to initiate the process is to change the curriculum from within. In addition, the curriculum should be stripped of outdated and irrelevant content and replaced by a model of learning that recognizes that virtually any information can be accessed and manipulated anywhere, anytime, and by anyone. Just adding more content is not the answer. While technology plays an important role in this respect, the greatest obstacle to be overcome is human; parents, teachers, students, and other stakeholders need to come to understand school as a process, not a place.

3.1. Matching Games to the Curriculum - Teaching with games

“Although games can be effective learning environments not all games are effective, nor are all games educational. Similarly, not all games are good for all learning or for all learning outcomes. The key is how games are used. Simply adding games to a curriculum does not mean they are integrated with it. Consider how best to add games to the educational tool set, blending them with other

activities. Integration requires understanding of the medium and its alignment with the subject, the instructional strategy, the student's learning style and the intended outcomes. Game can be integrated into education through a range of approaches such as allowing students to create their own games, integrating commercial games into the curriculum, or critiquing games to find what is incorrect or lacking which allow students to explore not just the subject but how the games is structured" . Dr Diana G. Oblinger (2006)

Imagine a scene in which groups of tech-savvy students wander among dusty library stacks seeking the books and articles from the recommended hard-copy lists given to them by their professors. With iPods and smart phones intact, they do one-handed text messaging and then plunk down their wireless laptops and check their e-mail before earnestly hunting down a book's call numbers. Eventually, they go searching for those texts, finally reach the right floor, but are frustrated when the text is not there or is not what they thought it would be. They go back to their laptops, and using online databases, and interactive Web sites, they locate what they need. Then they instant message their classmates to ask for clarification about the assignment, and dialogue ensues about their respective research efforts along with exchanges of Web addresses for several popular political blogs. Perhaps this scenario, although fabricated, is a familiar one in schools and libraries today, when students from all over the world can easily communicate and share ideas, lessons and do inter-active plans in the same time.

At this point, let suggest some practical ideas concerning teaching with games such specific groups of students as migrants and ethnic minorities. Games are useful tools for teaching for several reasons. First, they engage. Second, they are a language that most immigrant bilingual students speak fluently; Immigrants, of course, speak "game" only rudimentarily if at all, and so distrust the medium. Third, games can in many instances present traditional content in previously unavailable ways that facilitate understanding, such as simulation games about resource management and scientific principles. It couldn't be ignored as a potential teaching tool a phenomenon that attracts millions of paying customers and has up to 1 million players collaborating and competing online at once, which is what massive multiplayer online games do around the world, major corporations, the U.S. military, and other government institutions are all in the process of incorporating various types of learning games into their methodologies and curricula. But not for all purposes, of course, and not as the only pedagogical medium they are using the games not only for "training," but also to enhance deep understanding. Of course, understanding all the ways in which computers can help students learn is a much longer discussion than any single citation or paragraph can deal with.

The field of literacy across the curriculum can be achieved in many ways with very positive results as well as the digital literacy by the use of all mobile and computer technology. It makes teaching and learning more participatory; students generate ideas and develop sub-skills which help their essay-based examinations.

We may see very good results in a major percentage of what we call School Literacy and the us of games based teaching will assist the teacher in a multi – cultural school to accomplish most of the targets of the curriculum in lessons like Math's, History, Geography and of course Language lessons (grammar, text writing, etc).

3.2 Our aims and goals from an enhanced curriculum plan

The primary purpose of the Enrichment/Gifted and Talented Curriculum is to challenge eligible students to think differently and critically through a variety of instructional approaches. Such instructional approaches may include brainstorming, cooperative learning, oral demonstrations and presentations, creative analytical writing, and creative problem solving techniques.

The primary goal for the teacher/facilitator is to determine a particular area of study. Such study may include short term tasks as well as long term projects. Instruction then focuses on refining and expanding previously learned skills through practice and application.

3.2.1 Goals for Enrichment

- Students will develop the ability to analyze and react to literature.
- Students will develop the ability to think and reason logically.
- Students will develop more adequate self concepts by utilizing small group cooperative learning strategies with other students.
- Students will develop their intellectual and creative abilities through challenging instructional activities.
- Students will learn to appreciate his/her values, worth, potential and achieve a sense of pride in work accomplished.
- Students will develop improved task commitment.
- Students will develop self- motivation and consistently produce quality work.

3.2.2 Goals for the Gifted and Talented Program

Students who are gifted and talented are found in full-time self-contained classrooms, magnet schools, pull-out programs, resource rooms, regular classrooms, and every combination of these settings. No matter where they obtain their education, they need an appropriately differentiated curriculum designed to address their individual characteristics, needs, abilities, and interests. An effective curriculum for students who are gifted is essentially a basic curriculum that has been modified to meet their needs. They need time for in-depth exploration, they manipulate ideas and draw generalizations about seemingly unconnected concepts, and they ask provocative questions. A program that builds on these characteristics may be viewed as qualitatively (rather than quantitatively) different from the basic curriculum; it results from appropriate modification of content, process, environment, and product (Maker, 1982).

Content consists of ideas, concepts, descriptive information, and facts. Content, as well as learning experiences, can be modified through acceleration, compacting, variety, reorganization, flexible pacing, and the use of more advanced or complex concepts, abstractions, and materials. If they master a particular unit, they need to be provided with more advanced learning activities, not more of the same activity. Their learning characteristics are best served by thematic, broad-based, and integrative content, rather than just single-subject areas. In addition, such concept-based instruction expands

opportunities to generalize and to integrate and apply ideas. Middle and secondary schools are generally organized to meet student needs within content areas. Jacobs and Borland (1986) found that gifted students benefit greatly from curriculum experiences that cross or go beyond traditional content areas, particularly when they are encouraged to acquire an integrated understanding of knowledge and the structure of the disciplines.

To modify process, activities must be restructured to be more intellectually demanding. Activity selection should be based on student interests, and activities should be used in ways that encourage self-directed learning. Bloom's Taxonomy of Educational Objectives (1956) offers the most common approach to process modification. His classification system moves from more basic levels of thought, such as memory or recall, to more complex levels of analysis, synthesis, and evaluation. Every teacher should know a variety of ways to stimulate and encourage higher level thinking skills. Group interaction and simulations, flexible pacing, and guided self-management are a few of the methods for managing class activities that support process modification.

Gifted students learn best in a receptive, nonjudgmental, student-centered environment that encourages inquiry and independence, includes a wide variety of materials, provides some physical movement, is generally complex, and connects the school experience with the greater world. Although all students might appreciate such an environment, for students who are gifted it is essential that the teacher establish a climate that encourages them to question, exercise independence, and use their creativity in order to be all that they can be. A primary reading goal is for students at all grades to read independently with fluency and comprehension so that they become lifelong readers and learners. In order to achieve this goal, students benefit from "*daily opportunities to read books they choose for themselves, for their own purposes, and their own pleasures*" (Calkins, 2001). In early reading instruction, children need to know about sounds, letters and words, and their relationships. Systematic phonics instruction typically involves explicitly teaching students a pre-specified set of letter-sound relations and having students read text that provides practice using these relations to decode words (National Reading Panel, 2000). In this point come the Web 2.0 services: they often, make better understanding and practicing tools than traditional teaching systems. It has been argued that e-Learning 2.0 and Assessment 2.0 are inevitable evolutions of current practice (and will replace it); that 'traditional' VLEs and e-assessment systems are unnatural to students and cannot keep up with the rapid change (and growth) of Web2.0 tools and services. The reading process requires readers to respond to texts, both personally and critically, and relate prior knowledge and personal experiences to written texts. In particular, the problem of how to teach and deliver content has been insufficiently attended to on the assumption that the technology itself will explain the many facets of teaching and learning (Bignell S.2008). This is because all too often educators put technology 1st rather than the pedagogy. In particular, the problem of how to teach and deliver content has been insufficiently attended to on the assumption that the technology itself will explain the many facets of teaching and learning. Many school principals note that appropriate channels for content delivery are as important as the selection of appropriate materials. The traditional custodians of knowledge, the teachers, now find that the possibilities of technology are outstripping advancements in pedagogical and psychological theory. Students are not getting the

experiences crucial for their development of critical, analytical and independent learning at tertiary level.

4. That means that we need a new pedagogy for e-pedagogy?

Since, the invasion of digital technologies in classrooms three decades ago, many education providers has been streamlining their education philosophies. Further as new technologies allow for democracy in education for all, Information Communication technologies (ICTs) have become the enabler to ensure access to education. Revolutions affect all parts of society, and education is not exempt from the on-going Cultural Revolution of which technological change is an intrinsic part. Connectivism may not be the answer – or, at least, not the complete answer – but it does add something to our thinking about teaching and learning in the 21st century.

While the new technologies may eventually lead us to develop a new understanding of effective pedagogies that are specific to these learning contexts, a good place to start is to look for well-established pedagogies that extant research tells us are effective For the purpose of this study, pedagogy is any effective behaviour or activities designed to impart knowledge, it is used in the process of teaching and learning, and has an association with students' learning and outcomes. Of particular interest to many e-learning researchers have been those pedagogies associated with social interactions (Stephenson 2002) and online discussions (Henri 1997) in other teaching and learning contexts and tie in well with students' outcomes.

A pedagogy that fosters deep learning, undertaken in collaboration with fellow learners, would require a commensurate assessment system. Such a system would exhibit some or all of the following characteristics.

- Authentic: involving real-world knowledge and skills.
- Personalised: tailored to the knowledge, skills and interests of each student.
- Negotiated: agreed between the learner and the teacher.
- Engaging: involving the personal interests of the student.
- Recognise existing skills: willing to accredit the student's existing work.
- Deep: assessing deep knowledge – not memorisation.
- Problem oriented: original tasks requiring genuine problem solving skills.
- Collaboratively produced: produced in partnership with fellow students.
- Peer and self assessed: involving self reflection and peer review.
- Tool supported: encouraging the use of ICT.

Information and communication technology (ICT) has a major impact on the world in which young people live. Similarly, e-learning (that is, learning supported by or facilitated by ICT) has considerable potential to support the teaching approaches outlined in the above section. Schools should explore not only how ICT can supplement traditional ways of teaching but also how it can open up new and different ways of learning.

4. How children learn, using e-technologies and enhanced web 2 facilities?

4.1 Encouraging reflective thought and action

Students learn most effectively when they develop the ability to stand back from the information or ideas that they have engaged with and think about these objectively. Reflective learners assimilate new learning, relate it to what they already know, adapt it for their own purposes, and translate thought into action. Teachers encourage such thinking when they design tasks and opportunities that require students to critically evaluate the material they use and consider the purposes for which it was originally created.

4.2 Enhancing the relevance of new learning

Students learn most effectively when they understand what they are learning, why they are learning it, and how they will be able to use their new learning. Effective teachers stimulate the curiosity of their students, require them to search for relevant information and ideas, and challenge them to use or apply what they discover in new contexts or in new ways. This encourages them to see what they are doing as relevant and to take greater ownership of their own learning.

4.3 Facilitating shared learning

Students learn as they engage in shared activities and conversations with other people, including family members and people in the wider community. Teachers encourage this process by cultivating the class as a learning community. In such a community, everyone, including the teacher, is a learner; learning conversations and learning partnerships are encouraged; and challenge, support, and feedback are always available. As they engage in reflective discourse with others, students build the language that they need to take their learning further.

4.4 Making connections to prior learning and experience

Students learn best when they are able to integrate new learning with what they already understand. When teachers deliberately build on what their students know and have experienced, they maximize the use of learning time, anticipate students' learning needs, and avoid unnecessary duplication of content. Teachers can help students to make connections across learning areas as well as to home practices and the wider world.

4.5 Providing sufficient opportunities to learn

Students learn most effectively when they have time and opportunity to engage with, practice, and transfer new learning. This means that they need to encounter new learning a number of times and in a variety of different tasks or contexts. It also means that when curriculum coverage and student understanding are in competition, the teacher may decide to cover less but cover it in greater depth. Appropriate assessment helps the teacher to determine what "sufficient" opportunities mean for an individual student and to sequence students' learning experiences over time.

4.6 Teaching as Inquiry

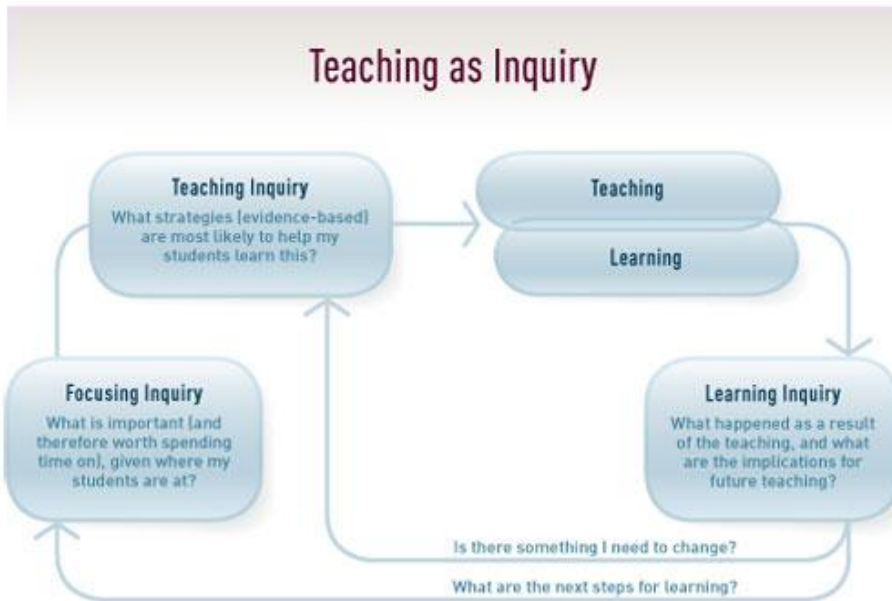


Table 1: More details can be found at <http://nzcurriculum.tki.org.nz/Curriculum-documents/The-New-Zealand-Curriculum/The-school-curriculum-Design-and-review>

5. Conclusion

Some academics have misunderstood the concepts of learning by doing it is not about organizing student activities in a classroom or arranging classrooms to create a scene of busy groups of students working on allocated tasks. On the other hand, many do believe that if we increase the role of all electronic devices involved in the classroom, then we will have the ultimate result; this is not true: the most essential element, the teacher should have vision, humor, be an investigator at all times and then use the digital appliances in his classroom. Rather the starting principle is to create a classroom situation in which students are intellectually active physical arrangements and curriculum can promote this kind of learning situation but they are no substitute for the overall learning environment that must create a discourse between students and students, teachers and students in order to discuss why particular understandings have emerged and whether these understandings represent an accurate and sophisticated view of whatever problem is before the class. In this way, I do believe that the student of a augmented mind should easily reach both literacy across the curriculum as well as digital literacy. The use of games in teaching is desirable not only in teaching children but also in the Secondary School. In fact, the idea of using games in teaching essay writing skills is already extended to the university system. Morris (2009), quoting The Economist (2008) notes that: *'Recently, several universities, including Cambridge, have pointed out that a significant number of students are not well prepared for the academic burden that awaits*

them Foundation programmes are more essential than ever to ensure that students' academic abilities meet university requirements one of the most essential skills academic writing'.

Morris (2009) further notes that academic writing may be one of the more difficult skills to master as it demands a new approach to register and generic structure. Similarly, research works, observations, experience and examiners' reports in Nigeria signify that students, especially at the primary and secondary levels need more and better improved teaching of essay writing skills. It is therefore necessary that deliberate efforts must continue to be made at further enhancing the teaching and learning of essay writing (and other language skills).

Learning experiences provided by games will need to rely on collaboration between educators and game designers and should become more commonplace both within commercial spaces and in education as digital technologies reshape established approaches to curriculum delivery. Through meta-teaching, we require students to make explicit connections about technology both as prospective teachers and as current and future learners. After each lesson, students and instructors critique both what went on in the lesson and why. We encourage students to ask important *why* questions about technology: Why did we ask you to do that activity? How is that activity enhanced with the use of technology? When we think of games, we think of fun. When we think of learning we think of work. Games show us this is wrong. They trigger deep learning that is itself part and parcel of the fun. It is what makes good games deep. If games are to stay complex and yet sell to more and more people, then learning as a lens for game designers may be significant. It is often said that what stops games from spreading to educational sites is their cost, where people usually have in mind the wonderful "eye candy" that games have become. But I would suggest that it is the cost to implement the above principles that is the real barrier. And the cost here is not just monetary. It is the cost, as well, of changing people's minds about learning—how and where it is done. This may also change some people's minds about computer and video games, as well.

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