

Connectivity, Multi-Literacies, Skills and Competencies: The Changed Contexts of Online Teaching and Learning

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ABSTRACT

This article addresses the changing contexts of e-learning and teaching. The research objectives of this purposive literature survey are to explore and describe the development of conceptual and multi-literacy skills. Findings reveal consensus that digital practices cannot be excluded from teaching; that students who have espoused technology are forming online associations and are connecting globally to create new knowledge. Existing online conceptual models enable the transformation of 21st century skills into e-learning. The article also considers challenges faced by students and facilitators under different circumstances. A pertinent need identified in an African context is the availability of online content in local languages.

Keywords: Collaborative learning, connectivism, digital skills and competencies, multi-literacies, online conceptual models, online learning, technological changes.

Introduction

The Y-generation (those born in the 1980s) grew up in a technological environment where their means of communication, interaction and learning superseded those of previous generations. The epicenter of most of their activities, relationships, work and personal lives is electronically-based by nature; and their modes of communication are mostly via social media. Their association with technology proves that their “thinking patterns” (Prensky, 2001) have changed and the augmentation of their required skills indicates that the semiotic practices of communication are being extended and adapted by multi-cultural societies.

This proliferation, as well as the array of available devices, the abundance of technology, and the fluidity and immediacy of information available via technology, confront academia. While the technologically-savvy generation has acquired germane skills (Gore, 2013), and the knowledge-rich environment of digital learning and teaching provides the perfect setting for a student-centered approach to learning, most facilitators still speak in the pre-digital language. The skills set of academics is being challenged and many of them have limited exposure, knowledge and training to become expert online facilitators. These aspects all accentuate the need for a new approach to teaching and learning.

The majority of academic institutions in South Africa offer limited courses online. Institutions either provide paper-based teaching (providing printed study material) or offer digital learning where study material is made available electronically and students can interact with academics via available electronic institutional forums. A third possibility is that institutions offer a blended learning (an approach where study material is printed or also made available electronically).

The main focus of this research is twofold. Firstly, to identify, analyze and summarize the conceptual foundations of pedagogical models of online teaching, learning and skills. Secondly, to link above models to the changes and related variables of online teaching and learning in the context of 21st century technological advancements. The objective of this narrative literature review, with an integrative focus, is to elicit background information on online learning and teaching, as well as associated variables. The acquisition of this knowledge will assist understanding developments, with a view to convey current advances, challenges and expectations. Information gleaned from the literature could contribute to

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establishing a theoretical framework to contextualize online learning, and the subsequent implementation of online teaching. This article also summarizes some of the criticism provoked and concludes by addressing the research questions, as well as challenges and research issues, which future empirical research studies need to address.

Research design

The research design is based on a qualitative literature survey of an accessible population of publications. Articles (Cronin, Ryan & Coughlan 2008; Guidelines for writing; Ng & Peh 2010; Research methods; ten simple rules; Undertaking a literature review) were scrutinized to define criteria to be used in the analysis and to inform the design of the article. These criteria included but were not limited to establishing common denominators and core elements in all articles, distinguishing between authors' assertions and authentic empirical research conducted, and identifying trends, patterns and conflicts to decide on the steps followed for the review.

The literature analyzed consisted of articles obtained from the EBSCO data-base cluster. Of the 95 articles collated 27 were web articles, 55 were printed articles and 13 were inapplicable because they did not relate to the issues of this survey. A purposive (or judgement) non-probability sample of publications was drawn. Key concepts applied in the sampling procedure addressed below were in the context of higher education (open distance education and universities). The demarcation indicated above and below meets the requirements of external validity, namely population, ecological and temporal validity (analyzing literature from diverse studies and settings covering 21 years).

The compilation of key concepts was the outcome of extensive assessment of literature broadly applicable to online teaching and learning. This systemization serves two purposes for the research procedure followed in this study. They demarcate the main focus areas of the literature survey and serve as sampling instruments of publications (as recorded in the references) analyzed as data.

The key concepts applied in sampling for this study are 21st century skills; best online practices; characteristics of adult students; collaboration and collaborative learning; connectivism; digital age literacies; educational technology; e-learning (literacies, electronic skills, electronic learning, strategy and methods, training facilitators); facilitator roles; learning approaches to digital age; learning theories and technology; and meta-literacy.

Assessment; drop-outs; emotional intelligence; gender; personal attributes of students, excluding age (such as accuracy, assertiveness, attitude, compassion, coping mechanism, cyber surfing, dedication, enthusiasm, performance); Open Educational Resources; pre-service facilitators; and social media (cell-phones) are key concepts that were excluded from the analysis, as they did not fall within the defined parameters of the purpose of the study.

It became evident from the literature survey that the majority of authors referenced in this article, were diverse in their exposure to and use of the online learning and dimensions thereof. Some authors had already experimented with and/or were teaching according to online frameworks, while continuing with research related to online learning and teaching. In addition, others indicated that they had written extensively on the subject or were columnists, teach 21st century skills; were members of working groups aimed at improving existing policy documents; and presented papers at various conferences.

Publications of these authors listed in the references were scrutinized and summarized to identify their research orientation and applicable theoretical framework; establish their purpose; and determine their objective basis to reasoning. The in-depth systematic analysis and evaluation of above variables were guided by three research questions:

- Which pedagogical models exist and which skills are required for online learning and teaching?
- What is the nature of the changing contexts of adult online learning and teaching?
- Which associations do online students form with others in order to learn from one another?

Pedagogical models of required skills

Jacobs (2012a) contends that social interaction and group participation are what motivates people to use digital technology and learn new skills. Motivated online learners are challenged to comprehend what they are learning and develop their multifarious skills in stages when they keep the company of others by socializing via WhatsApp, YouTube, Second Life, BBM, Facebook, Twitter, et cetera; when they play around by experimenting with other online tools; or as

they geek out to become experts in one or more specific areas.

The development of diverse online skills challenges online facilitators because they have to create continuous multi-faceted and miscellaneous learning opportunities, while accommodating diversity among students with dissimilar online knowledge, skills and abilities. Many students do not possess the basic skills to apply, analyze, synthesize and evaluate knowledge they actually merely function on the levels of knowledge and comprehension (Larson & Miller, 2011). Area and Pessoa (2012) realistically ask the question as to how a facilitator teaches students with diverse abilities, skills, technological aptitude and learning styles to interpret and transform data into new knowledge by using different types of language (sound, audio-visual, iconic or text) in a variety of formats, such as narrative text, hypertext or micro content. “Iconographic audiovisual language” (Area & Pessoa, 2012) for example, require pertinent competencies for successful interaction with multimedia formats and audio-visual languages. Digital knowledge and how to apply such knowledge are essential in becoming a prosumer of information.

Above examples validate Blaschke’s (2012) predications that capability is preceded by competency and that competence constitutes the demonstration of knowledge and skills. Capability on the other hand serves as an addition to competence, because capable students can use both their knowledge and skills to function as required under unaccustomed circumstances. It is noticeable that a technological learning environment demands multi-faceted skills, as well as the ability to multi-task. Imminent issues such as these bring to the fore the question: Which skills, competencies and literacies are required to ensure responsible digital citizens in the future?

Skills and competencies of the digital era

Although all the skills required for success in the 21st century have not yet been identified, nor included in educational curricula across the world, or assessed as such (Lemke, 2003), a number of conceptual models attempting to address the skills requirements for the 21st century, have been compiled and implemented.

The International Society for Technology in Education (ISTE) (Larson & Miller, 2011) identified 21st century skills as communication, collaboration, critical thinking, creativity (the 4Cs) which correlate with the core subjects and 21st century themes identified by the Partnership for 21st Century Skills (P21, 2011); innovation; problem-solving and decision-making; research and information fluency; digital citizenship; and technology operations and concepts. These ISTE skills are also all encapsulated in the conceptual model of the Assessment and Teaching of 21st Century Skills – ATC21S (Assessment and Teaching, 2011) as represented in Table 1.

Table 1: General 21st century competencies, purposes and skills in four dimensions (compiled with reference to Lemke, 2003; Fandino, 2013).

Competencies	Purposes	Applicable skills
Digital age literacy (Skills required to live in the world)	Knowledge of technology and associated tools to function optimally in the online knowledge environment	Basic, scientific, technological, visual, information; and cultural literacy as well as global awareness
Inventive thinking (Ways of thinking)	Applying technology to diverse situations while demonstrating ability to realise the implications of subsequent consequences	Adaptability; managing complexity and self-direction; ability to take risks by being curious and creative; demonstrating higher-order thinking and sound reasoning
Effective communication (Ways of working)	All forms of communication with other people	Ability to collaboratively and interactively work in teams, demonstrating interpersonal skills and maintaining personal, social and civic responsibility
High productivity (Ways of working)	Delivering high performance results which are on or above standard	Thorough planning and managing of priorities in order to use real-world tools to deliver appropriate high-quality work

As can be seen, the fundamental principles of the ATC21S conceptual model are directed towards the assessment of success (Assessment and Teaching, 2011) and can be juxtaposed to those of the Partnership for 21st century skills(P21). The ATC21S conceptual model contains a few comprehensive skills in addition to those identified in the P21, namely, ways of working which includes teamwork; tools for working which include researching sources, evidence and biases; skills for living in the world which were extended to distinguish between local and global citizenship; and cultural awareness and competence. These universal skills identified in the ATC21S conceptual model and the four “categories of competence” (Fandino, 2013:195) correspond with those of the P21, which has identified learning and innovation skills; information, media and technological skills; as well as life and career competencies, in addition. The core subjects of the P21 conceptual model (English, Reading or language arts, Mathematics, Arts, Economics, Science, Geography, History, Government and civics, World languages) also relate to the identified 21st century themes dealing with global awareness, business and entrepreneurial literacy, economics, environmental literacy, finance, civics, and health. (Eguchi, 2013; Fandino, 2013).

It is therefore postulated that the integration of the 21st century themes will enhance the development of required life and career skills, such as flexibility and adaptability; initiative and self-direction; social and cross-cultural skills; productivity and accountability; leadership and responsibility (Assessment and Teaching, 2011; Gore, 2013; Hobbs, 2011; P21, 2009). A possible reason for this assumption is because the components of the P21 (2009) conceptual framework are interconnected, underpinned and supported by building blocks to ensure that domain knowledge is linked to competency-based skills which can be assessed.

Collaborators designed the framework to ensure that the technological requirements of the multi-literate global environment could be met. This achievement can be attained if authentic, real-life, practical issues and subject content is explored via functional, innovative, problem-solving, critical thinking, decision-making and meta-cognitive skills (ways of thinking). In turn, these skills are to be sustained by information, media and information and communication technologies (ICTs) literacy skills (tools for working). It is via communication and collaboration that life and career skills, citizenship, as well as personal and social responsibility skills (skills for living in the world) are to be advanced (Assessment and Teaching, 2011; Gore, 2013; Hobbs, 2011; P21, 2009).

The NLG (1996) also elicited that globalization, technological advancements and increased social and cultural diversity could be addressed via a conceptual model encapsulating multi-literacy. Such a self-referential conceptual model not only incorporates multiple literacy types (such as, but not limited to, information, media, digital, visual, and cyber literacy), but also recognizes a skills-approach; integrates emerging technologies; and advocates online collaboration (Mackey & Jacobson, 2011). These activities stimulate awareness of the inter-relationship between tools, discourse conventions and contexts (Dupuy, 2011) in the creation of new knowledge. This pedagogy once again challenges the skills set of academia as it requires the re-thinking of teaching strategies and methods, as well as the holistic planning of curricula (Jacobs, 2012b) and must incorporate meta-cognitive reflection and assessment in the learning design (Mackay & Jacobson, 2011).

Technology enhances multi-literacies pedagogy by scaffolding existing skills. Scaffolding also facilitates a constructivist model of learning because purposes and processes related to authentic experiences enable the creation of meaning. The objectives of the traditional curriculum are supported and the inclusion of social networking sites, such as blogs, discussion forums, wikis, vodcasts, podcasts and the use of Facebook and Instagram, for example, creates opportunity for the development of these multi-literacies in both formal and informal learning (Borsheim, Merritt & Reed; 2008:88; Chetty, 2013).

Area and Pessoa (2012) assert that new literacies are a civil right and a condition for social development. Many of these skills are acquired through online socialization, collaborative interaction and group work. These online interactions also afford opportunities for communicative competences signifying empathy; democratic values; cooperation; and respect for public and private needs. Academics accept ownership of their modules, courses and students. Responsibility and global citizenship is demonstrated through actions and reactions when facilitating and interacting with students online. It is inevitable that the best results will only be accomplished if social media becomes part of the professional development of academics.

The changing contexts of adult online learning and teaching

Technology became interrelated with our daily activities and lives and brought about an explosion of knowledge that is instantly available. The interactivity of digital communities who use a wide range of devices, tools and social media platforms that act as a means to communicate, socialize and learn, results in learning being branded as a “network phenomenon” (Alfuqaha, 2013). This learning can either be entrainment (obtaining training), infotainment (attaining information), or edutainment (accomplishing the emotional intentions of edification). While entrainment and infotainment have a teacher-centred approach and employ new technologies as teaching aids, edutainment is appropriate in the net-centric, learner-centred paradigm of heutagogy.

Heutagogy

Heutagogy can be defined as self-determined learning with the self-directed learner determining a learning path based on personal experiences. Heutagogy is learner-centred and is associated with a strong focus on developing capability and capacity with characteristics relating to self-efficacy, creativity, working well with others, applying skills to any situation, having acquired appropriate values, and knowing how to learn (Hase & Kenyon, 2000; Hase & Kenyon 2007). The ultimate aim of heutagogy is that once students have developed the capacity, the mentoring and tutoring roles of the facilitator are relinquished.

Twenty-first century education is regarded as an ecosystem where digital abiotic factors (subject, content and interface) and biotic factors (facilitator and student) entertain the interactions of students with one another; students with the interface and content; as well as students with facilitators (Reyna, 2011). There are one or more relationships possible among students working in an online environment, such as

- Mutualism: Learning takes place in an advantageous manner from each other and students enjoy equal participation and collaboration.
- A relationship of commensalism, benefits some students, while others are not necessarily assisted, but actually neglected.
- Social loafing or parasitism occurs when students contributions are distorted because some students contribute more than others, or only some students benefit and others are not stimulated (Reyna, 2011).

Hidden curricula, too much dependency on the leader, group-think, coercive acts, or exhibitionistic behaviour (Area & Pessoa, 2012; Downes, 2007) play a significant role in these relationships, while unequal and less productive contributions from some members in groups, result in criticism of group work.

Different and changing learning societies

Heutagogy also encourages the global connection of students from diverse cultures and languages. This interaction with other students accommodates the formation of relationships, resulting in the establishment of online learning societies. Interdependent members of these societies negotiate and converse to create shared meaning in multi-modal ways via constructivist learning opportunities. These activities and interactions afford opportunities to stimulate language development; they result in reciprocal learning, determination or re-directing of learning; and inspire collaborate paralogy (peer-to-peer) learning. Critical thinking and reflection are used in the exploration of authentic and relevant issues and problems, in order to eventually become self-directed, mature and autonomous learners.

Double-loop learning is applied in this experiential learning process, because while considering the problem, the required action(s) and anticipated outcome(s), the students also question their personal values by bearing in mind potential problem-solving processes and the likely impacts these may have on their own beliefs, values, habits, conceptual frameworks, preconceived ideas and actions. Double-loop learning therefore results in the development of competencies and capabilities promoting self-efficiency, team-work, communication and flexibility (Alfuqaha, 2013; Anderson, 2010; Area & Pessoa, 2012; Blaschke, 2012; Dupuy, 2011; Hase & Kenyon, 2000).

Alfuqaha (2013) proclaims that humans retain about 20% of what they see; 30% of what they hear, 50% of what they see and hear, and 80% of what they see, hear and do simultaneously. Learning, driven by the integration of digital technology, accommodates all these senses. It is therefore incontestable that net-infused learning communities, who participate as a social

group by connecting, communicating, collaborating and sharing, compel the enhancement of multi-literacies to allow e-learning to come to fruition. Individuals form, nurture and maintain learning communities or nodes (information sources) where they create new knowledge by connecting, interacting and cooperating with learning communities in different nodes, thereby creating various paths to knowledge. Information networks and people are regarded as sources of information in support of creating autonomous, original and diverse knowledge (Boitshwarelo, 2011).

Communities of practice (a group of people with a shared domain of interest) are also referred to as nodes. These nodes are reinforced by constructivist theories of learning related to situated and distributed cognition, as well as those supporting social learning. The membership of and departure from such nodes are determined by common interests, while their relationships are built and cultivated via mutual engagement by sharing socially and culturally bound activities, discussions and information, and learning from one another (Boitshwarelo, 2011). These diverse nodes are inter-disciplinary connected, and require students to share and remain actively involved.

The fluidity of membership in nodes could therefore result in emerging leadership, which changes from time to time. Boitshwarelo (2011) proclaims that connectivism is clearly evident in communities of practice, because not only are the principles of situated cognition evident (where people in a social learning context share interactions, tools and activities), but the fundamental principle of distributed cognition strongly supports the notion of connectivism that knowledge is embedded in different people, equipment or tools used during interaction (Anderson, 2010; Dron, Anderson & Siemens, 2011; Siemens, 2005).

Connectivist online learning

The individual is the kingpin in connectivism which can be regarded as networked learning. Connectivist learning takes place in the context of a familiar group (a node, learning community/society), which becomes part of a network of nodes. These nodes are underpinned by the principles applicable to chaos, network, complexity and self-organisation (Siemens, 2005). Members of nodes could be bound by a collective purpose (for example registered for a specific subject in a specific semester) and could be directed by assigned roles (imposing leadership), rules and the delegation of responsibilities.

Within these well-organised learning communities, the strong emotional ties and feelings of belonging to a social group, as well as the trust and support of members of the node, create an environment for critique and the development of social, cognitive and other skills. It is, however, impossible to validate the accuracy of information in a node, due to the fluidity of information and because traditional verification methods are unable to stay abreast of this challenge (Anderson, 2010; Area & Pessoa, 2012; Boitshwarelo, 2011; Cormier, 2008); Dron et al., 2011; Siemens, 2005).

Connectivism results in learning when dissimilar information is connected and affects a better understanding of a phenomenon (Sahin, 2012). This positive learning outcome transpires when members of this networking environment use their similar capabilities in an equal space to seek information and learn from one another in the absence of a structured hierarchy (Dron et al., 2001). During this process, pertinent skills, such as the capability to grasp connections between fields, ideas and concepts; the talent to combine connections and patterns; and the proficiency to decide what to learn specifically, are developed.

While all of the above activities and social interactions take place, there has to be a demonstration (by everyone involved) of empathy, respect for privacy and the upholding of ethical principles and democratic values. The fact that learning may reside in non-human appliances such as in electronic devices or interactive communities, is an additional contribution to enhancing the ability to access up-to-date information/knowledge and to know more than what is currently known (Anderson, 2010; Siemens, 2005). It is therefore evident that the success of managing and engaging with social media is dependent on the skills and ability of the individual (Slagter van Tryon & Bishop, 2012).

Connectivism not only acknowledges the existence of a variety of different learner contexts but also the multiple paths to learning (a clear link with heutagogy). The diverse theory of human knowledge (epistemological approach) of connectivism thus concedes to divergent opinions and negotiations from group members. On the other hand and with a focus on the nature and relationships of being (ontological perspective), it is clear that connectivism emphasizes critical

skills, such as autonomy, diversity and openness (Alfuqaha, 2013; Cormier, 2008; Siemens, 2005). It is also obvious that connectivism is situated in a digital environment and that it is influenced by technology, (Sahin, 2012), while the relationship between learning, work experiences, knowledge and technology is also self-evident.

Critical evaluations of connectivism

Authors, such as Anderson (2010); Boitshwarelo (2011); Cormier (2008); Fandino (2013); New London Group (NLG 1996); Ratvich (2009); Sahin (2012); Silva (2009); Slagter van Tryon and Bishop (2012) and Verhagen (2006) have criticized connectivism and assert that connectivism

- offers nothing new to what is already known about learning theories;
- is not widely accepted as a learning theory for the digital age, because it is regarded as a theory of curriculum; a pedagogical skills set – a theory of learning because learning is a process, not an end product; and
- cannot be used on its own to discover the sum of learning.

These authors furthermore contest that practices of connectivism as a theory require context-specific research to enhance existing general principles, since connectivist pedagogies cannot denote online learning on its own. Demarcating the functional role of the facilitator and developing suitable measuring instruments will clarify the affiliation between connectivism and formal education. A purpose of online educational reform is to ensure motivated, self-directed learners who can maintain and apply ethical practices, equity and social justice. Institutional infrastructure and access to the internet are therefore crucially important to address above criticism on connectivism.

The significance of above points of criticism is indicative that transcendent opportunities, possibilities and the implications of social media for pedagogy require continued exploration and research. It is evident that the socially constructed information created in a technological environment, in conjunction with subsequent socio-cultural changes, not only challenges the current skills sets of students and academics, but also requires different pedagogical approaches and delivery technologies (Area & Pessoa, 2012; Hase & Kenyon, 2000).

New approaches, as well as learning and literacy models are imperative due to the fluidity of the digital environment. In addition, Blaschke (2012) espouses the notion that success in future teaching and learning entails building capacity rather than competency, because capacity subsumes the ability to learn in familiar, as well as in changing and unfamiliar contexts. The inference can hence be drawn that students of the 21st century and beyond will utilize various digital tools, media and related techniques to develop multi-literacy skills to give meaning and create new knowledge (Borsheim et al., 2008).

Twenty-first century literacies

Literacy has been defined as a social act (NLG, 1996), allowing meaning to be created by re-designing text. A variety of resources and communication modes, linked to multiple literacies, thus enable individuals to create meaning. Knowledge and meaning are, in terms of the multi-literacy framework, socially, culturally and historically situated (Dupuy, 2011). The focal point of multi-literacies is *design*, and the six design elements in the meaning-creation process are “linguistic, visual, audio, gestural, spatial and multimodal patterns of meaning” (NLG, 1996), which can be acquired through

- situated practice (personal experiences, resources and skills are used to generate meaning);
- overt instruction (employing pedagogical interventions to support learning);
- critical framing (learner ability to interpret political, social, economic and ideological learning contexts); and
- Transformed practice (reflective practices on a variety of contexts stimulate understanding and result in new meaning and knowledge).

Jacobson and Mackey (2013) developed seven learning objectives to enable the transformation of multi-literacies into e-learning practices, while Area and Pessoa (2012) identified competencies that could relate to each of these learning objectives. Above integrative collaboration is summarized in Table 2.

Table 2: Transforming multi-literacies into e-learning practices

Learning objectives	E-learning opportunities/practices	Competenceenvironment
Understand format type and mode of delivery	Determine and analytically analyse via critical thinking, the extent, format and delivery type of information to verify the applicability of integrating multi-purpose information types	Instrumental
Evaluate feedback as an active researcher	Use appropriate tools for the type of information sought and learn how to distinguish between experts and novices; usable and unusable resources; and to critically evaluate feedback	Instrumental Cognitive-intellectual
Create a context for user-generated information	Evaluate information sources by collating meta-information to assess, understand, contextualise and categorise information in a specific knowledge domain	Instrumental Cognitive-intellectual
Evaluate dynamic content critically	Interpret visual cues to authenticate material; to reconcile conflicting information and to distinguish fact from fiction	Cognitive-intellectual
Produce original content in multiple media formats	Become knowledgeable about fundamental changes and differences between document/format types, so as to select the most appropriate format types for individual or group productions	Instrumental Cognitive-intellectual Socio-communicative Axiological
Understand personal privacy, information ethics and intellectual property issues	Seek legal, social, economic, and political information mediating technology, as well as access to types of documents in order to respect personal privacy, information ethics and intellectual property	Instrumental Cognitive-intellectual Axiological
Share information in participatory environments	Utilise auxiliary skills and user-friendly media applications in appropriate ways to create and share information cross-culturally and globally	Instrumental Cognitive-intellectual Axiological Socio-communicative

A critical reading of each key competence environment provides the following operational definitions:

Instrumental competence denotes a basic foundational understanding of technological hardware in order to use appropriate peripheral devices; and knowledge and skills to utilise software and computer programmes for internet navigation and communication.

Cognitive-intellectual competence signifies that mental abilities and skills associated with the searching, selecting, analysis, interpretation (assigning own meaning) and reconstruction of information for effective interactive communication via digital resources, have been acquired.

Socio-communicative competence relates to developing and distributing an assortment of texts in different languages with a positive social attitude, while adhering to behavioural norms and demonstrating respect and empathy during collaboration with others.

Axiological competence necessitates the development of ethical skills and upholding democratic values which could prevent socially negative communication, particularly because ICTs can be contaminated in different ways and fulfil a significant role in cultural, political and social environments.

Emotional competence entails the control of negative emotions by developing and exercising empathy, as well as by exhibiting an affective-personal balance when operating in an online environment.

Critical evaluation of pedagogical models and skills

Although the technological explosion with its impact, benefits and future role cannot be denied, all claims and beliefs surrounding its application, assessment and instrument as teaching and learning tool, remains contestatious. Not only is world-wide substantial empirical evidence lacking, but the impact of the quality and standard of learning outcomes and the effects thereof on the job market also needs to be determined. These results will only become available over time as longitudinal studies are conducted.

Analysis of the literature review reveal that researchers, such as Fandino (2013); Larson and Miller (2011); Prensky (2001); Ratvich (2009) and Silva (2009) contend that:

- The 21st century skills movement is but yet another fad because core knowledge cannot be ignored, and a symbiotic relationship between core knowledge and skills is required for the best results;
- although online learning skills are important in context, they are not superior to core knowledge and skills, applied in educational practices overdecades;
- promoting only skills not only side-tracks the focus away from content, but could result in lower-standards of teaching;
- measuring and assessing online skills scientifically are challenging and require the development of specific tools and interventions applicable to a variety of teaching strategies;
- facilitators' e-learning knowledge and skills need to exceed or be equal to those of students. Experts are required in this field and, because no facilitator can be an expert in all technological areas. Facilitators lacking skills and knowledge should allow students to teach them what students actually need to know;
- facilitators skilled in delivering content, while also enhancing their own skills, could be a daunting task for some individuals; and
- an analysis of the 21st century skills movement needs to be done to identify possible discrepancies, irregularities and shortcomings.

Above limited criticism highlights the interrelationship among pedagogical models, skills and the variety of associations applicable to online teaching and learning.

Pertinent barriers to online teaching and learning

Although the information reported in this article may represent the ideal, realities and unique circumstances may result in barriers to effective online teaching and learning. The realities and circumstances discussed below serve as examples.

Access to computer technology in South Africa remains a contentious issue in education, as everyone does not have equal access to hardware, software and resources. Social stratification and imbalances influence digital access and skills (Oyedemi, 2014). Furthermore, many students may have access to computers in their place of employment, but are not allowed to use them for personal matters such as for studying. Other students may have limited access to the internet, due to a lack of funds. Access to electricity may also be problematic. In addition, e-learners have different technological aptitudes, learning styles and degrees of experience with online learning. All these factors affect their tangential control over technology and competencies required for online learning.

Oyedemi (2014) conducted research among South African university students and found an inequality between the paper-based and online survey responses. Although the majority of respondents (who owned their own computers) could access and find electronic information or find specific information and video sites, few were able to find sites related to creating a blog or Wiki. It was furthermore established that the majority of students had never before created online content or posted photos or videos online, and that almost none of the students were creating content.

These findings could all support claims that students have too little confidence or a lack of digital knowledge and are faced with the barriers to navigate and access online information. The low online response rate could be attributed to students who do not own a personal computer and therefore have to use a computer elsewhere, such as in computer laboratories and internet cafés. It was concluded that the high cost of the internet, internet access, bandwidth restrictions and the blocking of social networking sites (such as YouTube and Facebook) could also be reasons for these shortcomings.

Research findings are supported by Baloyi's (2013) analysis of 400 randomly sampled students from a target population of 1808 students enrolled for a specific module at a South African university. Results of this study revealed that 76,3% of students did not have access to the internet and were therefore denied access to their online study material. In addition to access limitations and despite the view that technology is transformational, neither academics nor students always experience the same level of confidence or success when working online. These impediments could result in some people experiencing the online environment as hostile, intimidating or challenging.

In another study Simonds and Brock (2014) explored student preferences in online courses. The demographics of 66 students differentiated three age groups, namely 21-30 (N=25); 31-40 (N=15), and 41-70 (N=26). Students were exposed to 1 to 33 online courses with five as the average (indicating their levels of experience with online learning). An analysis of the relationship between age, digital experience and learning strategies indicated that the learning styles of students of different ages differ.

Moreover, researchers identified a relationship between online experience and the facilitation of online learning strategies and found a statistically significant relationship between student age and their preference for specific types of online activities. Young students experienced online courses as challenging, and preferred interactive tools and interactive activities, moving through the material in an immediacy mode. Older students devoted more time to their course work than younger students; experienced online learning as a positive event; preferred asynchronous tools and opportunities; and favoured watching pre-recorded videos and lectures asynchronously (Simonds & Brock, 2014).

Simonds and Brock (2014) advocate synchronous as well as asynchronous learning activities with more than one possibility in completing assignments. The selective exposure of digital immigrants – those who resist change and may prefer to revert to hard copies and the old-fashioned way of teaching and managing learning (Prensky, 2001) – to the “new ways of learning” (Simonds & Brock, 2014) is yet another benefit which could be derived from this approach.

Another possible barrier is the fact that few facilitators are technical computer experts because they did not grow up with computers (Baloyi, 2013; Esterhuizen, Blignaut & Ellis, 2013; Simonds & Brock, 2014), have a limited knowledge of computer technology, and thus have to learn how to use computers and the related technology on a trial-and-error basis. Baloyi (2013) reported that approximately 90% of academics interviewed did not have formal computer literacy qualifications. This lack of knowledge and unfamiliarity with the environment could have a profound effect on the linguistic abilities of some students and academics and could result in the inability to benefit from e-learning experiences (Dupuy, 2011; Esterhuizen et al., 2013).

Facilitators also need institutional support of a technical nature at the very least. They also need access to reliable computer technology; a specific level of technology-related competencies (including proficiency in varying computer and technology skills); and the ability to work with integrated development tools, electronic formats and web-based skills. This knowledge and these skills will empower facilitators to ensure a smooth adaptation to new system updates and to address simple technical issues (Berge, 1995; Hung & Lee, 2012; Seaton & Schwier, 2014).

It is essential and apparent that facilitators will have to adopt a different approach to teaching and apply different methodologies. Step-by-step instructions will have to be replaced by facilitation of learning so as to stay abreast with the faster pace of interactivity and fluidity of information. Everything will have to be done in a style that suits students, while promoting collective participation that integrates multi-media and multi-literacies (Larson & Miller, 2011). It is furthermore obvious that online learning needs to entertain differing learning styles, students with learning disadvantages, and cater for students with different learning preferences, including visual, interactive, aural, print, verbal, visual/verbal, visual/non-verbal, tactile/kinesic, auditory, auditory/verbal students (Alfuqaha, 2013; Yang & Cornelius, n.d.). Online teaching therefore requires much more than merely implementing different communication strategies in order to accommodate the differences and difficulties experienced by individuals and/or amongst e-learning communities.

There are a number of strategies that online facilitators could use to address differing learning styles. These strategies should preferably be implemented after having determined and understood the “proximal development” (Alfuqaha, 2013) of each individual student. One such strategy is scaffolding. Scaffolding allows for showing and explaining; tapping into

prior knowledge; allowing time for feedback; using pre-taught vocabulary and visual aids; pausing; asking questions: and pausing again to do revision. Scaffolding in an e-learning context also enables students to expand their own representations by incorporating inputs from experts or more advanced fellow-students (Alfuqaha, 2013). Layering content information, by using hyperlinks and journal articles, constitutes another strategy and, if students know which activities measure e-learning outcomes, they will be in a better position to map these outcomes in accordance with assessments that suit their learning style. In addition, full details on assessment and the calculation of marks, as well as the inclusion of rubrics provide clarity and could prevent misinterpretations or misunderstandings (Parietti & Turi, 2011).

Conclusions

As with any literature survey, the fundamental limitation of this study is the absence of the verification of assumptions by means of empirical data. However, the significance of this study lies in the synthesized overview it provides of pedagogical models, skills and changed contexts of online learning and teaching. The merit of this theoretical framework is found in the pedagogical pointers provided for future longitudinal empirical research, especially in an online teaching and learning environment, embedding culturally diverse and multi-lingual societies, such as South Africa.

This article represents major agreements, as well as some criticism among the researchers consulted. The findings indicated consensus that teaching and learning will have to be associated with digital practices, socio-cultural changes and socially constructed information. These will have implications for teaching methodology, curricula, facilitators and students. It was also confirmed that students can either study online on their own; form relationships (nodes) by joining social groups, communities of practice and, learning societies; or experience peer-to-peer learning. For many students successful online learning is embodied in connectivism owing to the prospects for the expansion of literacy skills to include multi-literacies and other diverse online skills and competencies. There is sufficient evidence around us every day which indicates that learning, work experience and information have become inter-related, and are essential for functional connectivity in serving the ethos of collaborative participation and sharing.

Although pedagogical frameworks for teaching online do exist (Assessment and Teaching, 2011; Larson & Miller, 2011; P21, 2011), they are not necessarily universally applicable. Unique African circumstances and needs (such as availability of online content in local languages) have to be addressed in context to ensure successful online learning and teaching.

The conceptual models assessed in this survey (Area & Pessoa, 2012; Assessment and Teaching, 2011; Fandino, 2013; Jacobson & Mackey, 2013; Larson & Miller, 2011; Lemke, 2003; P21, 2011) propose the development and integration of skills related to intellectual activity, literacy, media and technology. These and other concomitant skills enable global collaboration among diverse students to understand complex perspectives. Becoming prosumers of knowledge requires the integration of a plurality of multi-modal texts and multimedia in synchronous and asynchronous environments. Proposed competencies may require the un-learning of that which is already known and/or the re-learning or re-acquisition of extended skills for application in new contexts. The transformation of multi-literacies into e-learning practices (Jacobson & Mackey 2013) also confronts the ability of facilitators to develop specific skills and understand the dynamics of knowledge and information created and shared online. It is also crucial for facilitators to accommodate different learning styles (Simonds and Brock 2014) and specific challenges faced by students since these have an impact on designing and facilitating online learning.

Different teaching strategies and methodologies, which incorporate multi-media and multi-literacies to suit varied learning styles (Jacobs, 2012b; Mackay & Jacobson, 2011), will have to be implemented. Facilitators of learning should consider socio-economic affordances as well as the ability of students. Familiarity with the pedagogical principles applicable to instructional designs for digital educational settings, and an understanding of applicable learning theories for online learning spaces, are indispensable. In addition, online facilitators have to demonstrate innovative thinking in selecting suitable content and assistive applications. Digital citizenship, responsibility and ethics (Assessment and Teaching, 2011; P21, 2011) must be epitomised if intellectual and responsible citizens (demonstrating competencies embedded in the curricula and teaching frameworks), are to be developed. The professional development of facilitators

should, among others, also include social media (Area & Pessoa 2012), while a different approach to communication competencies is required if interaction with students has to reflect professional and social capabilities.

Although the different approaches to teaching and learning each have unique characteristics and benefits, the proliferation of ICTs poses specific challenges to students, facilitators and institutions alike. Adaptation to a more engaging electronic learning environment, supported by constructivism, heutagogy, paragogy (collaborate peer-to-peer learning) and connectivism (Cormier, 2008; Gore, 2013), as well as to evolving learning environments and delivery technologies have become a necessity. It is therefore evident that students and facilitators need additional support and encouragement to overcome their assumptions and become confident with the technology and e-learning. Limited ICT skills are developed in this manner and it is therefore essential that novices should be granted sufficient time to familiarise themselves with this new environment (Berge, 1995).

Future empirical studies of the relevance of age; gender; the number of years and level of exposure to technology; as well as the level and quality of involvement in nodes would generate information that could guide online facilitation, curricula development and activities. Such research could also provide direction in determining:

- the extent to which online access, software and the internet enhance digital experience and the development of related skills;
 - the roles that the immediacy of information, interactive participation and experiential learning play with regard to the learning preferences of students;
 - the effects of connectivism on individual students; and the school of thought that students should determine the curriculum; and
 - appropriate assessment models and strategies for both individual and group work.
- It is concluded that technologically-mediated learning challenges facilitators to adapt to a net-centric pedagogical approach, while students master multifarious skills. The future requires a socially responsible and skilled workforce advocating social justice and embracing social change, in order to function optimally in a multi-faceted world driven by technology.

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مهارات التواصل ومحو الأمية-المتعدد: أنماط التعليم والتعلم الإلكتروني

إليز تريلانش *

ملخص

يوضح هذا المقال الطرق المتغيرة للتعلم الإلكتروني والتعليم. إن دراسة الأدب الهادف تسعى لاستكشاف ووصف تنمية المهارات المفاهيمية وتعدد مهارات القراءة والكتابة أو محو الأمية. ملاقي بالإجماع أنه لا يمكن استبعاد الممارسات الرقمية من التدريس. حيث إن الطلاب الذين جمعوا التكنولوجيا تشكل جمعيه الانترنت وتتصل على الصعيد العالمي ليخلق معرفة جديدة. تمكن النماذج المفاهيمية الحالية الموجودة في الأنترنت تحول مهارات التعلم في القرن 21 إلى التعلم الإلكتروني. بالإضافة إلى أن هذا المقال ينظر إلى التحديات التي يواجهها الطلاب والميسرين في ظل ظروف مختلفة. حاجة ذات الصلة التي تم تحديدها في السياق الأفريقي هو توفر المحتوى عبر الأنترنت باللغات المحلية.

الكلمات الدالة: التعليم التعاوني، التواصلية، المهارات الالكترونية، محو الأمية-المتعدد، التعليم الإلكتروني، التغيير التكنولوجي.

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