

## Educational Technology and Authentic Learning: Impetus for Research and Innovation

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### ABSTRACT

The impact of globalization on education is unprecedented. Another revolution is needed to transform educational systems and to prepare graduates for 21<sup>st</sup> century working environment. During the past several decades, an academic revolution has taken place in higher education marked by transformations unprecedented in their mission, roles and scope. Even at the gradual level, evolution has accelerated from geologic speed to Internet speed that could make Artificial Intelligence at par with human intelligence. Hence, the importance of research and innovation in pushing the frontier of knowledge is never been so critical. Authentic learning, educational technologies, multi-literacies, innovative thinking, and research-based practice are keys to 21<sup>st</sup> century learning model. Authentic learning typically focuses on real-world, complex problems and their solution using role-play exercises, problem-based activities, case studies, and participation in virtual communities of practice. The learning environments are inherently multidisciplinary. The purpose of this article is to revisit authentic learning as a dynamic tool to enhance learning and to provide opportunities for students to engage in higher order thinking and active learning. In addition, the article also explores some of the new ways that students can use research, innovation, and technology as a way to enhance learning. Nevertheless, the challenges of changing demographics, mind-set, rapid technological changes, and resources are overwhelming. Thus, a new paradigm for the learning innovation is urgently needed.

**Keywords:** Future paradigm, education, technology, research, innovation

### INTRODUCTION

The impact of globalization on academia is unprecedented. Another revolution is needed to transform educational systems and to prepare graduates for 21<sup>st</sup> century working environment. Several scholars and writers have put critical analyses on the impact of globalization on higher education (see for example, Altbach, 2004, 2007; 2010; Altbach et al., 2009; Barnett, 2012; Etzkowitz, 2004; Etzkowitz et al., 1997; 1998; 2000). During the past several decades, an academic revolution has taken place in higher education marked by transformations unprecedented in their mission, roles and scope (Altbach et al., 2009). Even at the gradual level, evolution has accelerated from geologic speed to Internet speed that could make Artificial Intelligence at par with human intelligence (Church, 2012). Thus, the importance of research and innovation in pushing the frontier of knowledge is never been so critical. Knowledge innovation in today's hyper competitive market could enhance organization's competitive edge (Drucker, 1993). This also applies to universities - institutions in the knowledge-intensive sector that need to respond to market demands just like any other business.

Based on constructivist philosophy, the use of authentic activities has been shown to have many benefits for learners (Herrington, Oliver, & Reeves, 2003). Authentic activities have been used successfully across a wide variety of discipline areas. Herrington, Oliver and Reeves (2003) defined

key characteristics of authentic activities based on a wide literature review of recent research and theory. They summarized ten (10) broad themes of authentic activities that include:

- *Authentic activities have real world relevance:*  
Activities match as nearly as possible the real world tasks of professionals in practice rather than decontextualised or classroom based tasks.
- *Authentic activities are ill-defined, requiring students to define the tasks and sub-tasks needed to complete the activity:*  
Problems inherent in the activities are ill-defined and open to multiple interpretations rather than easily solved by the application of existing algorithms. Learners must identify their own unique tasks and sub-tasks in order to complete the major task.
- *Authentic activities comprise complex tasks to be investigated by students over a sustained period of time:*  
Activities are completed in days, weeks and months rather than minutes or hours. They require significant investment of time and intellectual resources.
- *Authentic activities provide the opportunity for students to examine the task from different perspectives, using a variety of resources:*  
The task affords learners the opportunity to examine the problem from a variety of theoretical and practical perspectives, rather than allowing a single perspective that learners must imitate to be successful. The use of a variety of resources rather than a limited number of preselected references requires students to detect relevant from irrelevant information.
- *Authentic activities provide the opportunity to collaborate:*  
Collaboration is integral to the task, both within the course and the real world, rather than achievable by an individual learner.
- *Authentic activities provide the opportunity to reflect:*  
Activities need to enable learners to make choices and reflect on their learning both individually and socially.
- *Authentic activities can be integrated and applied across different subject areas and lead beyond domain specific outcomes:*  
Activities encourage interdisciplinary perspectives and enable students to play diverse roles thus building robust expertise rather than knowledge limited to a single well-defined field or domain.
- *Authentic activities are seamlessly integrated with assessment:*  
Assessment of activities is seamlessly integrated with the major task in a manner that reflects real world assessment, rather than separate artificial assessment removed from the nature of the task.
- *Authentic activities create polished products valuable in their own right rather than as preparation for something else:*  
Activities culminate in the creation of a whole product rather than an exercise or sub-step in preparation for something else.
- *Authentic activities allow competing solutions and diversity of outcome:*  
Activities allow a range and diversity of outcomes open to multiple solutions of an original nature, rather than a single correct response obtained by the application of rules and procedures.

Authentic learning and innovation are closely related in the sense that authentic learning nurtures divergent thinking. In the new millennium, most teachers believe that creativity and innovation in the classroom could enhance authentic learning. The appropriate use of educational technologies could boost creativity in the classroom. According to Plsek (1997), creativity is the connecting and rearranging of knowledge – in the minds of people who will allow themselves to think flexibly – to generate new, often surprising ideas that others judge to be useful. Innovation is the application of a creative idea that results in a valuable improvement. Integration of technology in the classroom, as an example of innovation, goes far beyond just dropping technology into classrooms. For barely a decade, the world has witnessed what amounted to an innovation of the learning cultures. For example, teachers' instructional beliefs and practices underwent an evolution and this has enhanced students' competencies as a result of teachers' creativity in the classroom (Dwyer, Ringstaff & Sandholtz, 1991). According to Dwyer et al. (1991), teachers were beginning to achieve a balance between the appropriate use of direct instruction strategies and collaborative, inquiry-driven knowledge-construction strategies. This collaborative inquiry-driven knowledge-construction can be considered as innovative strategy.

In the 21st century, income and wealth are generated by “selling” new ideas, new products and services. In the post-capitalist and post-modernist era, innovation has become the industrial “religion” through which firms believe it could increase market share and profits (Valery, 1999). According to Fisk (2011), idea is a new currency of success. According to MIT former President, Charles M. Vest, the challenge of the future will be to create new ideas and to make innovation. The next round of competition is likely to be won by those who innovate, i.e., those who create new ideas, products, and services and those who solve new human problems and create new commerce. The new economy is driven by k-workers, entrepreneurs, technology, and innovation. New ideas, discoveries, and technologies have created new industries and products. Consequently, innovation is important and essential for income and wealth generation (IDRC, 2011). Moreover, the application of information technology in business operations has caused a profound change in the workplace. The new economy is rewarding for those who have high educational achievement and technical skills. As a result, the workers of the 21st century must acquire the needed skills and talents. Therefore, to accomplish this, the education system must be transformed to fulfil the requirements of the new economy. Emphasis on developing quality human capital is indispensable.

If a country lacks an adequate number of highly skilled local workers to cater the demand of the industry, foreigners and expatriates will fulfil the vacancies. The industry requires skilful workers, well educated, competent, talented and able to think critically. For that reason, managing a country's human talent is therefore the key to achieving global competitiveness. As for building of capabilities, this spans both education system and the ability to continuously upgrade the skills and capabilities of the population. In education, the focus should be on acquiring technical expertise, most recently in the areas of engineering, IT, services and biotechnology. It is also critical to enhance the skills of our graduates, like communications and public relations. The education institutions should offer various skills courses at different levels for those who are interested in authentic learning. In addition, post-graduate studies are aimed at helping graduates develop research skills.

## **DEVELOPING A RESEARCH CULTURE**

Next, I'm posing this question, “How can a student develop a research skill?” There is a vast literature on research epistemology. In addition, research culture should also be nurtured among the students especially the post-graduate students. In general, culture may be thought of “...as being synonymous with tradition or heritage. It is a way of life particular to each succeeding generation. Culture contains the ideas and values, skills, art and technology of a people. It is the means by which each of us is able to guide our daily interaction with others” (Webb & Collette, 1973:49 quoted in Ferguson, 1999). In Malaysia and Indonesia, the Ministry of Education is committed to providing education and training to fulfil the human capital needs of the nation through strategic management, relevant and dynamic curricula, effective training and career development programs, continuous quality assurance and strong support services based on the National Education Philosophy. Universities also provide relevant technological or entrepreneurial education and training. These are

aimed at upgrading basic skills as well as to promote research and development projects in collaboration with businesses and industries. Universities were also designed to provide lifelong learning opportunities for the students to be trained, “re-skilled” or “up-skilled”.

There are multiple perspectives of culture. To enhance innovative and research culture, a teaching institution needs to identify the teacher culture. Hargreaves (1994: 166) stated that “...teacher culture consists of the substantive attitudes, values, beliefs, habits, assumptions and ways of doing things that are shared within a particular teacher group ... the content of teacher cultures can be seen in what teachers think, say and do”. According to McRoy, Flanzer and Zlotnik (2012), building research culture and infrastructure is critical. They assert that institutions need to examine or re-examine their research climate and culture and assess their readiness to further enhance their research environment. While research infrastructure was initially seen as support for scientific and engineering research, scholars in nearly every discipline increasingly require the same range of support to enhance their research capability. The critical aspects include to define the research needs, set priorities for research support, develop support strategies, design a funding model, and build partnerships to support research.

Creating and sharing new knowledge across a broad range of disciplines enhances the intellectual life of both teachers and students, and research productivity often serves as a yardstick by which the institution reputations are measured. At larger universities, research may be deeply embedded in the institutional culture, while at schools, a research agenda might require incubation, nurturing, and development of appropriate support. Schools might have fewer large projects, less indirect cost recovery, and fewer possible economies of scale than large universities. Nevertheless, research remains important to teachers as change agents.

Some education institutions often lack staff with PhD qualification and departmental structures to support large-scale research, so they might need to take a different approach to developing an adequate research infrastructure. This could result in inappropriate infrastructure to support research, inability to actively promote support for research, conflicting priorities for research infrastructure funding, reduced agility in providing needed computing resources to researchers, and lack of awareness by researchers of the limits of institutional infrastructure. These realities can result in dissatisfied researchers and a barrier in conducting research activities. To build a research culture, education institutions need to use creativity in discovering the needs of their researchers, setting priorities for support, developing support strategies, funding and implementing research infrastructure, and building partnerships to enhance research support. Research cultures are investigated in more depth but a brief definition is provided here. A research culture might be described ideally as the common values, beliefs, attitudes and “ways of doing things” that affect the carrying out of research tasks in an institution. Nevertheless, it has been fascinating to trace the various ways in which individuals and groups have sought to define and extend the research culture in education setting.

## **ACTION RESEARCH**

Action research is a form of enquiry that enables teachers or practitioners to evaluate their practices. The idea of action research is that educational problems and issues are best identified and investigated where the action is – in the classroom and at the institutional level. By integrating action research into these settings and engaging those who work at this level in research activities, findings can be applied immediately and problems solved more quickly. McNiff (1988) defined action research as an approach to improve or enhance education through changes which make teachers more alert about themselves. They should also become more critical with those practices and ready to change any ineffective practices. Lomax (1994) has come out with the similar concept when he stressed that an action research is an educational research and it is different with research in education. This is because the researcher is the teacher herself, who aims to improve herself and her profession. Lomax also stressed that action research is very important for educational innovation as it is a way which enables the teachers to make improvement in education. In school setting, action research is a research on social situation involving teachers as researchers, with the aim of improving the quality of teaching practices. In doing the research, the teachers do innovation and changes by reflection and inquiries.

According to Ferguson (1999), teaching is a social practice that is susceptible of improvement. It is possible to improve teaching practice by following the “plan, act, observe and reflect” spiral, and teachers can learn how to follow these spirals self-critically and systematically. McNiff (1988) discussed action research in a specifically teaching context. She stressed collaboration with others, particularly noting that “it is research WITH, rather than research ON” (McNiff, 1988:4). In later writing, McNiff (1994: 19) stressed the affective aspect of action research also, an aspect often not mentioned in other discussion:

*For me, in my perhaps idiosyncratic understanding of action research, it is that ability to be able to share the passion, the awe, the wonder, the beauty, the delight in your own life and share that with somebody else, to show that you really do delight in your own life, and each moment is better than the last, and help someone else to share that view of delight, and help someone else to find the delight in their own life.*

McNiff (1988) believes action research is largely a personal research endeavour, in which the researchers investigate their own practice with the aim of sharing with someone else what the research has revealed. It does not imply that the action researcher’s specific contextual learning is necessarily appropriate for or should be applied to the work of others. Others have also added their perspectives to the action research literature. Kemmis and McTaggart (1988) emphasized the valuing of social justice in the conducting of action research – this is not stressed by other action research writers. They observed that action researchers take their collaborative action in order to improve the rationality and justice of their own social or educational practices, as well as their understanding of these practices and the situations in which these practices are carried out.

According to Ferguson (1999), some researchers described uses of action research either purely or mainly for purposes of improving the teacher’s own practice, sometimes in a solitary way. Broader issues of social justice, whether in their own context or looked at more widely, were not their immediate concern, and there is a debate over whether action research should be carried out individually or collaboratively (Elden & Chisholm, 1993; Zeichner & Noffke, 1998). Carr and Kemmis (1986) and McNiff (1988) emphasize on individuals working to improve their own practice; its use of the same plan, act, observe and reflect spiral, and its emphasis on collaboration. It does not mention, specifically, working for social justice. The World Congress on Action Research did, however, spell out the need for publication, power-sharing and ideally, absence of hierarchical ways of which are not overtly mentioned in the other definitions. It also noted connections with the tradition of reflective practice. Action research, then, is a research approach with the following three agreed characteristics. Firstly, it is about individuals working in their own contexts to bring about improvements in their own practice in areas that they determine. Secondly, it follows a systematic process characterized by planning, acting, observing and reflecting. This is described as a spiral because the cycles of planning, acting, observing and reflecting. Thirdly, action research places a high priority on collaboration and on sharing of knowledge. This collaboration aims for the power-sharing to be egalitarian and the ways of working increasingly to become non-hierarchical. Kemmis and McTaggart (1988) emphasized that there should be some benefits for justice in the wider community, although this is not common to all approaches to action research.

Further, Ferguson (1999) explains about practical and emancipatory action research. Practical action research puts the emphasis on the conduct and outcomes of the research on the practitioners themselves. Outside facilitators form cooperative relationships with practitioners, helping them to articulate their own concerns, plan strategic action for change, monitor the problems and effects of changes, and reflect on the value and consequences of the changes actually achieved. Such action research may be labelled “practical” because it develops the practical reasoning of practitioners (Carr & Kemmis, 1986). In contrast, emancipatory action research occurs when the practitioner group takes joint responsibility for the development of practice, understandings and situations, and views these as socially-constructed in the interactive processes of educational life. It does not treat teacher responsibility for classroom interaction as an individual matter, but, on the contrary, takes the view that the character of classroom interaction is also a matter of school determination and decision-making.

According to Ferguson (1999), Stenhouse (1975) was at the forefront of the “researching teacher” movement in the United Kingdom claiming that all teaching ought to be based on research but that research and curriculum development should be the preserve of teachers who gain understanding of their work through studying their own problems and effects (McKernan, 1991). Stenhouse coined the term “teacher as researcher” (quoted in Zeichner & Noffke, 1998). Elliott and Adelman (1973) further promoted teacher-research work using action research in their identification of problems through utilizing systematic reflection, and the ongoing development of teacher self-awareness. Teachers, according to Elliot (1978), should interpret their everyday practice through the pursuit of reflective self-development. His idea was that the two areas, split by the tendency for theory to be developed in universities and promoted to practitioners, should be reunified through being developed by teacher themselves. This kind of thinking has been continued and further developed in other countries around the world. Nevertheless, to move the “teacher as researcher” agenda forward, transformational leadership at the institution must be put in place and functional.

### **WHO IS A TRANSFORMATIONAL LEADER?**

According to Palispis (2010), a transformational leader is one who seeks to radically change an organization. The goal of the organization is to change for the better. A leader is naturally visionary in the sense that he/she has a clear vision for organization. A transformational leader creates a situation in the organization that is visionary, coaching, affiliative, and democratic. A leader possesses a charisma that resonates in the entire membership of the organization. First, this dream is transformed into a new vision. Experts in the study of leadership have pointed out time and again that the principal leaders of the world were dreamers and visionaries. They are people who look beyond the confines of space and time transcend the traditional boundaries of either their position or their respective organization. The first requirement of transformational leadership is the ability of the leader recognize the need for change, that the situation prevailing in the organization no longer sufficient to meet the demands and challenges of the present time. The leader affects change in the organization. When change starts to take place in the organization, the leader manages it very effectively.

According to Bennis and Goldsmith (1997), leadership is about innovating and initiating reforms. To instil the culture of innovation, leaders have to reward people for disagreeing, thinking outside of the box, and to tolerate failure. Great leadership keeps great talents. As Apple genius and innovation icon Steve Jobs aptly put it: “Innovation distinguishes leaders from followers” ([http://thinkexist.com/quotes/steve\\_jobs/](http://thinkexist.com/quotes/steve_jobs/)). The central focus of this leadership in the commitment and capacity of individual members; a higher level of personal commitment to organizational goals and a greater capacity for accomplishing organizational goals. Authority and influence are not necessarily allocated to those occupying formal positions. Everyone is recognized to possess certain potential that can contribute to higher performance. Power is attributed to collective aspirations and the desire for personal and collective mastery of the organizational vision. Transformational leadership involves the ability of the leader to reach the souls of the members in a fashion which raises human consciousness, builds meaning, and inspires human intent which is the source of power. This power is utilized for the benefit of the entire organization and its members. In the nutshell, transformational leadership involves building a shared vision, developing consensus about goals, and creating high performance expectation in the entire organization. Eventually this lead to innovative culture.

### **CONCLUSION**

Authentic learning and educational technologies are critical in the future paradigm. Authentic learning nurtures divergent thinking in students. Divergence leads to innovative and inquisitive ways of thinking. Innovation in pedagogy and the enhancement of research culture in teachers is pertinent to achieve real transformation in education. The use of educational technologies has been seen by researchers as a means to assist in enhancing learning. However, although the use new technologies within the educational function has been seen as crucial in education, a substantial number of teachers

have not considered technology integration in their pedagogy and research. This paper explores some of the new ways that teachers/researchers can use technology as a way to improve practice by using action research. Further, action research as a methodology uniquely suited to researching the processes of innovation and change. Action research can be a powerful systematic intervention, which goes beyond describing, analyzing and theorizing practices to reconstruct and transform those practices. In many institutions, technology integration - the use of technology to solve research problems – has become a norm. Drawing on socio-cultural theory, this paper describes how future generation should develop ways of using technology in assisting them to embark on action research. However, the tension between idiosyncratic and institutional knowledge construction is exacerbated by lack of technology proficiency among educators. In addition, the lack of research culture and infrastructure in the education institution makes it even worse. Nevertheless, to move the research agenda forward, transformational leadership at the institution must be put in place and functional. Thus, the need for transformational leadership in spearheading innovative teaching and research initiatives in the individual institution is crucial. The impetus to develop innovation and to actively engage in research and development emanated from the intense desire to expand the frontier of knowledge. Research should not only be aligned to the institution's vision and mission but should remain as its handmaiden in the actualization process of such. The primary goal of research is to transform society through its impacts and outcomes. The generation of knowledge and its dissemination cannot be an end in itself. Knowledge must be utilized and the utilization becomes worthwhile if it leads to the generation of good and services for the improvement of life. A better civilization is expected to bloom.

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