Early Technology and Education

1

Activity

Think of a recent period of history you are familiar with and the technology that might have been used in education. It could be the 1950s or a time closer to our own. Write a few sentences on what you know about it and identify the sources on which you base your ideas. What else could you do to ensure the validity of what you write?

Activity

The caution about history issued by Voltaire suggests that it is prudent to suspect the veracity of witnesses or commentators on events or initiatives from the past. Read the following extract from the early part of the last century advocating the use of the blackboard in the classroom:

> From other departments we have learned many things. Not the least of these is the value of blackboard work. Many English teachers, however, neglect this effective means of reaching the elusive minds of their pupils. It tends to noise and confusion, they assert. But if it helps to banish the sluggishness, the hands folded on desk attitude, the deadly inertness of the classroom; if it substitutes interest for forced attention, isn't it perhaps worth trying?It is time for the "perfect discipline" of the dry as dust teacher to go. Let us joyfully bid it farewell and greet in its stead a more thought producing, soul stirring spirit. I do not claim that blackboard work will of itself do all this, but it will help, and help greatly; chiefly, it seems to me, because it gives an opportunity of reaching a child's mind through his senses and through his nervous system, the only means of making knowledge useful and permanent. This is done by appealing to the eye and by providing an outlet for self-activity. Without these two – vivid sense perception and expression – mental images are sure to be faint hazy and ephemeral. (Monro, 1918)

What would you need to know about the source to determine the legitimacy of her comments? What additional information would help?

Activity

UNESCO suggests that technology is a combination of the knowledge and skills and creative processes that may assist people to utilize tools, resources and systems to solve problems and to enhance control over the natural and made environment in an endeavour to improve the human condition (UNESCO, 1985). Using this definition as a starting point for your thinking, identify reasons why speech and language should be regarded as a technology.

Activity

Although Plato and his followers had much to say about the theory of education, they provide very little insight into what education in general was like at the time. However, it is clear from the literature that there was a gradual shift during this period towards providing education for its intrinsic value and enjoyment rather than solely to meet the needs of the state or in support of some higher being (Cubberley, 2007). Do you think that the advent of the recorded word made this more possible? Justify your conclusion(s).

Activity

The advent of print enabled those including governments who controlled access to the presses to promote their own views. What affect do you think this had on the curriculum material used in the burgeoning education systems that appeared in Europe an America at the end of the nineteenth century?

Early Technology and Education

<div style="float:right">**1**</div>

Big Question

Are there contemporary examples of technology that have made such a radical diffe-rence to education as the printing press and the mass-produced book and what lessons can we learn from history?

Early Technology and Education   1

Chapter Outline

Introduction
The challenges of looking backwards
The first real technologies?
Books and printing
Print culture
Conclusions

The Automation of Education

2

Activity

It could be argued that, in the past, the advent of popular newspapers made major events such as war and pestilence much more immediate to those in the community, at least to those who were literate. Schools of that time needed to reflect this change in the curriculum they delivered. Identify contemporary equivalent technologies that have forced changes in the curriculum.

Activity

In his experiments on learning, Thorndike confined a hungry cat in what was referred to as a puzzle box. In order to get at food, which had been placed outside the box and in a position where it was clearly visible, the cat had to depress a lever which opened an access gate. Random actions were replaced eventually once the cat learned the correct response. If you were presented with the results from a similar study today that advocated a particular approach to teaching and learning based on the modification of behaviour through reward, would you be willing to adopt them and why? What do you think the difference between attitudes then and now would be?

Activity

Pressey explored the link between technology and education for some considerable time and mused that schoolwork, in what to him was the future, would be:

> marvellously though simply organized, so as to adjust almost automatically to individual differences and the characteristics of the learning process. There will be many labour saving schemes and devices, and even machines – not at all for the mechanizing of education, but for the freeing of teacher and pupil from educational drudgery and incompetence both. (Petrina, 2004, 328)

Do you think that Pressey's vision of the future has become a reality and what evidence do you base your conclusion on?

Activity

Despite the fact that his own efforts to market a machine were not very successful, Skinner's ideas generated a revolution in teaching. However, the 1960s saw a vast increase in the number and type of teaching machines used in a range of educational settings in America. By 1962, the Grolier Company had sold a 100,000 teaching machines based on his principles at $20 each (Benjamin, 1988: 709). Can you suggest reasons why a slow uptake was followed by wide adoption of these devices and what bearing this has for today?

Activity

In relationship to the use of television in the classroom, Freeman (1967) commented that for generations the

> . . . quality of instruction in the schools has depended, fundamentally, upon the teacher working alone in his self-contained classroom. Subject to a minimum of supervision, the schoolmaster determined the learning objectives and the learning experiences to which pupils were exposed. Textbooks, curriculum guides, and instructional aids increasingly influenced the nature and quality of instruction, yet the teacher continued to be the master of his own domain, choosing his texts, deviating from curriculum guides, adopting only those aids. (Freeman, 1967: 199)

Do you think that nature of the contemporary teacher's role has changed because of the increasing use of technology? Does this matter?

The Automation of Education

2

Big Question

Skinner and his colleagues were convinced that the process of teaching and learning could be made much more effective by the use of technology, developed using sound scientific principles. Teachers were deeply sceptical about this notion, concerned that the real agenda was to find ways of replacing them by the machine. It took many years for the profession to accept some technologies in the classroom, although this was not just because of the spectre of job losses. Is the modern teaching workforce equally as reluctant to accept innovation and how best can this tardiness, if it still exists, be overcome?

The Automation of Education

2

Chapter Outline

Introduction
In the beginning
A glimpse of the future
Skinner's machine
Other devices
Conclusions

The Computer and Education 3

Activity

Early adherents claimed that programmed learning was as old as education itself and followed in the tradition of great thinkers such as Socrates, whom they thought of as the first programmer (Fonseca, 1965). Why do you think they made this assertion?

Activity

Computers were either regarded as a universal panacea for all educational ills or as a force that would compromise the relationships between people, particularly in education (Coulson, 1966). Do you think any element of this statement holds true today? Justify your conclusion.

Activity

The IEA study appears to indicate that the rate at which computers were being adopted for educational use in the early days varied considerably between countries. Can you suggest what factors affected uptake? What principles can you derive from your reflection that can be applied to the introduction of any new technology into the classroom?

Activity

Morton (1996), when referring to the introduction of computers, suggests that educators were far too eager to look 'studiously backward' and that, as a result, their thinking was destined to be flawed, rather like the Laputans in *Gulliver's Travels* who always rejected new ways of doing things, regardless of the consequences. Do you think teachers today still have this Laputian mindset? What do you base your conclusions on?

http://education.edwards.continuumbooks.com
© Edwards, A. (2012) *New Technology and Education.*
London: Continuum.

Activity

It is clear from examining this period that even until quite recently, and despite great potential for change, the computer has been used falteringly. However, while it has been possible to choose the extent to which the technology is involved in the process of learning and teaching, that option is no longer available. What has altered between than and now?

The Computer and Education 3

Big Question

Are there any current technologies that appear to have as little potential to be used in education as the computer did in the early days that should be employed in learning and teaching?

The Computer and Education 3

Chapter Outline

Digital Poverty and Education

<div style="float:right">**4**</div>

Activity

The gap between the information rich and poor is the most pressing civil rights issue of the millennium and education in both traditional and new settings is the key to creating equitable knowledge societies. Why do you think such significance is placed on access to information?

Activity

According to the World Hunger Education Service (WHES) more than 1.3 billion people worldwide live in extreme financial poverty (WHES, 2011). Their daily income is less than one dollar a day. Becket and others argue that, rather than emancipate, digital technologies aggravate such inequities (Beckett, 2010; Guillén et al., 2005: 682). Why do you think Becket has reached this conclusion?

Activity

Neill suggests that the savage inequalities of the past extend into 'the wired savagery of the future. There is neither empirical nor theoretical reason to believe this scenario will change for the better' (Neill, 1995: 184). Do you think he is right, and what would you do about it?

Activity

Which do you think is the most important feature of digital literacy – skills or understanding and how would you teach it?

> ## Activity
>
> The educational establishment in Europe and America has been reluctant in the past to abandon its traditions and structures, particularly as a result of the advent of new technologies. Competing demands and limitations on spending and staff time mean that educationalists find it difficult to fulfil their current mandate yet alone embrace a visionary new one. What implications do you think this has for digital poverty?

> ## Activity
>
> What lesson can be learned from both the Kenyan and American Samoan approaches to addressing the issue of digital poverty in countries with very low Infostate ratings?

> ## Activity
>
> Clegg et al. (2003) contend there is a presumption that 'in order for citizens and workers to meet the challenges of the information age, they must become ICT proficient. In terms of debates about education the use of ICTs is over-determined by assumptions that link globalization and information to particular ICT competencies. As Michael Apple (1998) and others have pointed out manufacturers have been quick to capitalise on this assumption using parental anxiety as a way of targeting sales' (Clegg et al., 2003: 46). Do you think that sales and not need drives our desire to become digitally literate?

Digital Poverty and Education 4

Big Question

Will giving the populace Pentiums (or the equivalent) prove any more useful in addressing social ills such as digital poverty than Marie Antoinette's apparent *cri de coeur* to the poor of Paris in the late eighteenth century that they should overcome hunger by eating cake? (Attewell, 2001)

Digital Poverty and Education **4**

Technology and Pedagogy 5

Activity

The computer and Internet might be used as core technologies in series of lessons on the daily lives of people in different parts of the world. They could be employed to allow pupils to gather information and even engage in direct communication with those in other locations. How would the roles of the learner and the teacher be changed, given the same educational context, if these technologies were unavailable?

Activity

Read the extract below from the *High School Journal* and try to determine when it was written.

> In order to teach successfully, one must be extremely careful in the selection and use of texts. It is always inadvisable to make the pupils believe a thing because a book says it is so. He will, in this way, acquire the pernicious habit of believing all that is printed and this will gradually but surely put an end to his own independent thinking and reasoning. Textbooks, like everything else, may be useful or harmful, depending entirely upon the way they are used. . . . The texts, however, in all subjects should merely be a guide to the pupil's own thinking and the successful teacher will see to it that too much dependence is not laid upon the text. (See Marshall, I. V. in the Reference section for the date when the extract was written.)

Does this represent a positivists or a constructivists approach to pedagogy?

Activity

Discuss whether the transition from traditional to new pedagogies is solely dependent on the introduction of ICTs into the classroom? List any other factors that might influence this change.

Activity

Goethe et al. (2006: 6) contend that CHC males have more influence in group discussions than females do. What implications do you think this has for the educational use of social networking technology in these countries?

Activity

Conole et al. (2004) wanted to develop a checklist which practitioners could use to help them make informed decisions about how to map specific pedagogical approaches to learning design. What is missing from it if anything? Upon what do you base your conclusions?

Activity

Can you remember the first time you saw an Interactive Whiteboard being used in an educational context? What were you studying at the time and was it a tool dominated by the teacher or by those being taught?

Technology and Pedagogy 5

Big Question

Resta (2002) contends that the most important aspect of infusing technology in the curriculum is pedagogy. Is this true and upon what do you base your answer?

Technology and Pedagogy

5

Chapter Outline

Community, Technology and Education 6

Activity

Kruger (2000) suggests that communities of learners based on new technology will not look or feel like those found in a traditional classroom. Make a list of the best features of a community of learners located in the physical rather than the virtual world. What could you do, if anything, to make sure these features are available to a virtual community of learners?

Activity

A community of practice is not just people who meet because of shared interests such as films or antiques. Identify what a group of teachers meeting regularly for lunch should do if they wish to convert their recreational activity into a community of practice.

Activity

Both communities of practice and communities of inquiry provide models of how a community of learners might be organized. Summarize what the key differences are between the two. Identify which type of community you might use to encourage students to lead rather than just participate in learning and say whether this could be readily done virtually. State the reasons why you made these choices.

Activity

The characteristics of face-to-face (FtF) communication are that it is time dependent, has many opportunities for interactivity, low expediency, few opportunities for feedback, a low technological component, possible opportunities for peer to peer communication, anonymity is not possible, it possible for the leaner to control learning and takes insignificant time to establish. The characteristics of synchronous communication are that it is time dependent, has many opportunities for interactivity, medium expediency, many opportunities for feedback, a high technological component, many opportunities for peer to peer communication, anonymity is possible, it is probable that the leaner can control learning and takes significant time to establish. The characteristics of asynchronous communication are that it is not time dependent, has limited opportunities for interactivity, high expediency, many opportunities for feedback, a medium technological component, opportunities for peer to peer communication, anonymity is possible, it is highly probable that the leaner can control learning and takes t time to establish (Olaniran, 2006). Using these characteristics as a guide, can you suggest reasons why asynchronous learning, rather than synchronous learning, has been at the heart of developments in distance learning and has been widely used in education?

Community, Technology and Education 6

Big question

If teachers fail to make proper use of the technologically mediated communities that are so attractive to the young, are schools in danger of becoming less relevant as agencies of education?

Community, Technology and Education   6

Chapter Outline

Creativity, Technology and Education 7

Activity

Do you think the current use of technology in schools lends itself more readily to the creativity associated with artistic outcomes or to those more akin to the commercial and business world?

Activity

Applying either the list of attributes of the creative individual identified by NACCCE or that of Csikszentmilhalyi as a guide, reflect on some learning activity that you have been engaged in that makes extensive use of technology. Decide whether you were being creative or not. State why you have come to that conclusion.

Activity

Loveless (2007) believes that digital technologies can allow for non-sequential thoughts and actions. This reflects how the human brain works and, thus, more readily facilitates creativity. Provide examples from your own learning of the capacity for nonlinearity that ICTs in particular have.

Activity

Use the web to find additional examples of modelling or simulation packages and identify how they might be used in an educational context to promote creativity.

Activity

Monke (2004) highlights a simulation package designed to expose users to the decision about resources that early American pioneers faced to illustrate what he perceives as a fundamental weakness. He complains that because the deeply human element of the real story of these explorers has been reduced to no more than deciding whether to take one tin of beans or two, 'the resilient souls of the pioneers are absent from the simulation' (Monke: 2004, 11). What significance does this have for developing creativity in learning and teaching context?

Creativity, Technology and Education 7

Big Question

Does technology truly offer the facility for learners to be more creative, or is the caution identified by Monke (2004) about experiencing things one-stage removed in virtual environments (whatever form they take) an impediment to real creative activity?

Creativity, Technology and Education   7

Future Technology and Education 8

Activity

The US National Intelligence Council suggests that by 2020, countries that remain behind in adopting technologies are likely to be those that have failed to pursue policies that support the application of new technologies – such as good governance, universal education and market reforms – and not solely because they are poor (US National Intelligence Council, 2004: 34.) The question for policy-makers is how should the education system be used to address this growing trend. What would you suggest?

Activity

Why should it be necessary that, regardless of location, future curriculum developments will have more of a focus on multiple language acquisition and a greater emphasis on global history and geography?

Activity

It is clear that the developed and developing world display some conflicting trends, although there is a general convergence towards what is happening in the developed world. For example, the birth rate in parts of the developing world is increasing rather than decreasing (Index Mundi, 2009). What is the significance of this variation in terms of education for both the developed and developing worlds?

Activity

Moore's Law implies that computing power will continue to increase, for the foreseeable future at least. This is manifest in Specks and a similar development called mote (very small) computing. What do you think this will mean for learning and teaching?

Activity

It appears that trends in technology might help to bring about future in which we all have the equivalent of our own personal digital cloud, information landscapes become richer and deeper and traditional locations where learning can take place will be abandoned. Considers each one of these in turn and decide how likely it is to occur, the impact it will have if it does become a reality and how quickly the effect will be felt. Taking into account your thinking on the technology issue and the other trends now decide which one of the three scenarios (if any) is most likely to occur and identify why.

Future Technology and Education 8

Big Question

Watkins (1942: 214), when writing about the future of education during the Second World War, was moved to point out that this new order of things that were emerging was 'not the arbitrary creation of a few geniuses nor of a few fanatical mentalities. Rather, it is the by-product of economic and social forces that have found their way irresistibly, cutting deep channels through the soil of traditions and institutions' (Watkins, 1942: 214). Perhaps then the real question we should be asking about the link between technology and education is not what will happen but what do we want to happen?

Future Technology and Education

8

Chapter Outline

Virtual Worlds and Education 9

Activity

De Freitas (2008) suggests that immersive virtual worlds can be grouped into five categories, although her categorization is not definitive. These are *Role Play Worlds* such as World of Warcraft and Guild Wars, which are role-playing games driven by quests with different levels and rewards; *Social Worlds* such as Second Life and Active Worlds, which tend to be immersive without specific quests and focus community-building activities and communication between individuals; *Working Worlds* such as Project Wonderland and Metaverse which focus on corporate communications and facilities to support business activity; *Training Worlds* such as the Online Interactive Virtual Environment (OLIVE) for the American Army, which has a singular focus on developing specific professional skills and knowledge; and *Mirror Worlds* such as Google Earth and Planet Earth that offer a 3D representation of the real world that can embed onto other unrelated applications. Using the Internet, find and explore different examples of as many of the principle types of virtual worlds mentioned above. Decide which might be used in education and state at what level and why.

Activity

Dalgarno et al. (2010) suggest that there are five affordances that virtual worlds possess. They can be used to facilitate learning that enhances the spatial knowledge of the domain being explored. They can allow learning to take place that would be impractical or impossible to carry out in the real world. They increase levels of motivation and engagement. They offer opportunities to transfer knowledge and skills to the real situations. Activities can be richer and more collaborative in nature. Using either the River City example provide in the text or one you have found yourself, identify practical examples of each of these affordances.

Activity

Discuss if it possible to create a virtual world dealing honestly and fully with issues such as the genocide that took place in Cambodia from 1975 to 1979 and avoid the macabre and mawkish? What would you do to maximize the educational value of such a resource?

Activity

It appears that younger rather than older users of virtual worlds have fewer problems with adopting an avatar identity. What implications dose this have for teachers and teacher training?

9

Virtual Worlds and Education

Big question

The technology to make virtual worlds more immersive will be available shortly. The clamour from the young in particular will be to embrace them fully in all aspects of life. Is it necessary or desirable to resist their use, particularly in education?

Virtual Worlds and Education

9

Chapter Outline

Enhancement Technologies, Transhumanism and Education 10

Activity

A school has decided to boost the performance of its pupils by offering a freely available smart pill, proven to have no detrimental physical side effects, to all who want it. While a number of parents welcomed this action, a vociferous few object in the strongest possible terms that human intelligence is a sacred gift and to tamper with it in this way is contrary to divine will. The school has called a meeting to discuss this issue. With which group would you side and why?

Activity

Can you suggest reasons why the educational community has been slow to adopt legitimate neuroscience and what would you do to address this deficiency?

Activity

The enhancement technologists and transhumanists sometimes disparagingly refer to those who contest their viewpoint as bio conservatives or bio Luddites. They argue that opponents fail to see the opportunities that technology is presenting to shape the human future in ways unimagined before. What would you do through education to prepare for or resist it' with 'What would you do through education to prepare for or resist this view of the human future

Enhancement Technologies, Transhumanism and Education **10**

Big Questions

Can we (or should we) resist the benefits that enhancement technologies clearly offer both generally and specifically in education?

What do educators need to do to help us *pay attention*?

Enhancement Technologies, Transhumanism and Education

10

Chapter Outline

Introduction: Technology, Education and Change

Activity

The list of issues generated as a result of the growing link between education and technology is by no means definitive. What others would you add?

Activity

What do you think is the difference between science and technology?

Activity

Identify two things, one complex and expensive and one simple and cheap, that you think has had a significant impact on your education.

What are the advantages and disadvantages of using complex or high technology in education?

Do you think your viewpoint would be the same if you lived in a country that was significantly different from your own?

Activity

The shovel and the earthmover, although they do the same job, are at different ends of the technological spectrum. Try to identify devices that you may have seen used in teaching and learning that represent similar extremes.

Provide an example of technology as a system or a series of interconnected activities from an educational context.

Activity

1. Did suburbia create the car or did the car create suburbia?
2. Is there a link between the development of the Spinning Jenny (see URL link at the end of this chapter) and the necessity for a literate working class?
3. The technological determinists would argue what will be will be. Does this mean that if the development of weapons of mass destruction is preordained any form of moral education to halt their advance is pointless?

Activity

1. Can you think of a device(s) used in schools or universities where many variants existed and now only one is available?
2. Can you suggest whom the actors and relevant social groups in the evolution of the device(s) identified above may be?
3. Using a recently developed technological device that you are very familiar with (it could be an iPod), identify which different social groups (old, young, etc.) could be ascribed to which adopter profiles.
4. From your own experience, identify a device that has been available but not widely adopted in school or university that would be useful in promoting teaching and learning. Suggest a reason why it has not been adopted.

Introduction: Technology, Education and Change

Big question

Neil Postman in Olson et al. (2001: 9) muses that all technological change 'is a Faustian bargain – that every advantage is tied to a corresponding disadvantage'. We are fast approaching a point where the disadvantages of using technology in learning and teaching are outweighed by the advantages. Does it matter that we have reached this state?

Introduction: Technology, Education and Change

Chapter Outline