

Edutainment Applications for the Creative Age: Interplay of Design, Technological and Educational Methodology

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Abstract: This article discusses the interplay of the three aspects of edutainment applications for the creative age, namely design, technological, and educational methodologies. This article begins with an overview of edutainment, follows by a discussion on the contribution of edutainment in our understanding of adult learning and education, and the relationship between theory and practice, and finally a conclusion on how educational psychology with an emphasis on adult learning and design methodology in human computer interaction determines the success of edutainment. This article attempts to propose that edutainment (education through entertainment) could be one of the solutions for adult education in the creative age.

Keywords: edutainment applications, creativity, education psychology, design methodology, human computer interaction

Creative Age

Regardless of one's talents, penchants, tendencies, abilities, vocations, and the race of his ancestors, J. B. Watson (1919) argued that one can be trained to any type of specialist. Modern intellectuals were not simply talkers, but directors and organisers involved in the practical task of building society (Gramsci, 1971). The need to create a working-class culture relates to Gramsci's call for a kind of education that could develop working-class intellectuals. Education is seen as the model of transmitting key element of society's culture to a new generation (Skilbeck, 1976). Classical humanism viewed education as the model to maintaining a stable society by transmitting society's cultural heritage to students. Liberal humanism viewed education as the intellectual discipline in developing individuals and consequently a fairer society. Progressivism viewed education as the model to meeting individual's needs and aspirations so as to support their personal growth and strengthen a democratic society. Instrumentalism viewed education as a curriculum delivering a specific product such as the development of skilled worker. Reconstructionism viewed education as a model to change society. Watson considered the ultimate aim of psychology to be the adjustment of individual needs to the needs of society (Cohen, 1979). Schön (1983) argued that change is a feature of modern life and therefore it is necessary to develop social systems that learn and adapt. The decrease in work time is leading toward age of leisure where a larger amount of free time is available. Is the time that has been liberated from work singular & individualized, or could it be seen as a public or mixed good, the product of society's evolution, that has affected free time and education, as evidenced by the notion of edutainment (De la Durantaye, 1998)?

As a worldwide move, governments and local communities have recently been advocating and implementing policies and projects to raise the competitiveness and quality of in-service professionals and teachers, and to develop strong integration between relevant sectors in the education and professional community. Although schools are by nature conservative and can be resistant to reform, in the light of new technological advancement, as factors such as convergence, increased bandwidth, edutainment, multitasking and changes to traditional socialisation modify everyday life, there is a corresponding need to consider the ways in which emerging practices and beliefs challenge traditional assumptions about the nature of school education (Russell, 2000). As hypermedia technology develops, the educational environment will advance beyond lectures, note-taking, and other common forms of learning. In post-industrial societies saturated with the multi-modal texts of consumer culture - film, computer games, interactive toys, SMS, e-mail, the Internet, TV, DVDs - young people are developing literacy skills and knowledge in and for a world significantly changed from that of their parents and educators (Carrington, 2004). The zeitgeist is creativity. Florida (2004) defined a new rising social class that he labelled as creative class whose economic function is to create new ideas, new technology, and new creative content. The new global market is looking for creative talents that determine the success of an organization. This article begins with an overview of edutainment, follows by a discussion on the contribution of edutainment in our understanding of adult learning and education, and the relationship between theory and practice, and finally a conclusion on how educational psychology with an emphasis on adult learning and design methodology in human computer interaction determines the success of edutainment. This article attempts to propose that edutainment could be one of the solutions for adult education in the creative age.

Edutainment Applications: Merits and Demerits

Edutainment is a neologism that expresses the marriage of education and entertainment. A déjà vu in science fiction, since the early 1990s, the burgeoning market in electronic media has encouraged a trend toward edutainment, a hybrid genre that possesses the engaging nature of entertaining, media-based material, narratives or game-like interactive environment while achieving educational goals. Edutainment can be broadly classified as soft and hard (Kay, 2003), where soft (e.g. eTV, audio-taped instructional material) is largely passive, and hard is largely active (e.g. interactive toy, videogame-based learning). Children's TV programs on television such as Sesame Street could be classified as soft edutainment. Outstanding Websites that edutain include Serious Game, Games2train, MBA Games, and Simulearn. Interactive toys that edutain include MINDSTORMS, Discovery Space Kit, and Steven Spielberg MovieMaker Set developed by LEGO. Videogame-based learning can be categorized according to the following perspectives: number of participant (single-player, two-player, multiplayer, or massively multiplayer), duration (session-based or persistent-state), media (video or real-time animation), and interaction (narration-based or reflex-based; synchronous or asynchronous). Early examples of videogame-based

edutainment employed in military training include SIMNET and Joint Force Employment by Cornerstone.

Merits and demerits of edutainment to the instructional process are being critically examined from educational psychology and human computer interaction domains. Jackling and Webster (1994) discussed that better understanding of the motivating pleasures of computer games can help effectively exploit their pedagogic potential. In 1996, edutainment is ranked 10th of the top ten technologies (Olesen, 1996), following genetic mapping, super material, high-density energy sources, digital HDTV, miniaturization, smart manufacturing, anti-aging products, medical instruments for detecting and treating diseases, and hybrid fuel vehicles. Different to pure entertainment or traditional computer-based training, edutainment requires high level of engagement and learning (Prensky, 2000). Applications for adults include medical and dental sciences education system with extensive anthropological data (Demirjian & David, 1995), anti-alcohol education (Borzekowski, 1996), HIV/AIDS education (SIDA, 2002), and morphogenetic art education that allows evolutionary 3D art design (Thomas, 2003). Applications for children include voice recognition software as a compensatory strategy for post-secondary students with learning disabilities (Roberts, 2002), history education through walking dinosaurs (Darley, 2003), robots education using LEGO MINDSTORMS (Lund, 2001) in events such as RoboCup (Kitano et al, 2000), learning set theory through a Wenn-diagram inspired interface while entertained with music (Wiberg, 2003), utilization of karaoke for elementary music education on the Internet (Miyashita, 2004), tools for creating physical interactive storyrooms (Montemayor et al., 2004), wildlife rescue as a framework for learning (Romeo, 2003), multi-user programming pedagogy for enhancing tradition study (Phelps et al., 2003), edutainment package for studying computer science (Wilson, 2003), augmented education of math by 3D interactive learning environment (Elliott, 2002), and mobile-based edutainment system for diabetic children (Aoki et al., 2005). One interesting example is the edutainment system for learning about Dead Sea Scrolls in a shared 3D virtual world (Di Blas et al., 2003). In this edutainment environment, learners can discover, explore, and analyse with reference to the underpinned values, beliefs and power relations. This system encourages analytical thinking and critical reasoning. Learners can identify and critically analyse the contextual and human influences which affect the history.

Some researchers and developer, in a rush to adopt this new seemingly harmless medium, created products that were merely either replica of instructional material disguised in cutie-looking interfaces or gimmicks that did not lead to a practical educational outcome. Karlen (1994) questioned the inequities in availability of sophisticated technology at higher education and appropriateness of making learning fun through technological edutainment, as this may create students who later become employees resistant to working when the work is not fun. Marshall (1996) argued that museums are in danger of becoming too much like theme parks in their attempts to attract children by means of edutainment systems.

Computer-mediated communication's self-described democratic access is challenged by a concluding argument that demonstrates how cyber-culture's discourse is primarily male (Luke, 1996). Wood (1998) discussed the potential use of Video on Demand (VOD) system for classroom teaching of English-as-a-foreign-language (TEFL) and questioned the compatibility of education and entertainment. White and Breen (1998) raised concerns about the concept and application of theory of multiple intelligences (linguistic, musical, logical-mathematical, spatial, body-kinaesthetic, interpersonal, and intrapersonal), stressed the importance of practical wisdom, subject-matter content, and intelligent time-utilization, and warned against edutainment as the ungrounded appeals to fun or entertainment based on supposedly neglected forms of intelligence. Okan (2003) drew attention to the long-term harmful effects that both educators and parents overlooked, particularly to the inflated expectation in the learners that the process of learning should always be colourful and fun, and that they can acquire information without work and serious study. He argued that what is essential is realizing that education is concerned with the development of cognitive structures and that educational technology is a medium, not a pedagogy that is useful in creating such learning environments. From an educational psychology point of view, pedagogical analysis on multimodality, navigation and interactivity on two British educational websites (Buckingham & Scanlon, 2004) showed that content is often divorced from the context in which it is situated, leading to a relatively mechanical approach to learning.

While videogame has become the entertainment medium of choice for millions of people, who now spend more time in the interactive virtual world of games than they do in watching movies (Wolf, 2001), television remains omnipresent and provides a considerable portion of public's knowledge in professional practice through situation drama. Reception research by Davin (2003) on the comparison of medical documentary and soap operas on learning of medical knowledge showed interesting results. While soap operas, using emotional and ludic strategies, were described as good pedagogical tools because they attracted large audiences and promote identification and repetition which enhance learning; documentary were criticised for being incomplete and artificial. Studies by Buckingham and Scanlon (2001) on the pedagogic strategies of edutainment magazines aimed at preschool children suggested that many of the magazines are informed by a reductive and disciplinary conception of learning, combined with an apparently contradictory emphasis on entertainment and fun, a combination which may be symptomatic of contemporary changes in the forms and sites of learning. A robust pattern of null findings of a study undertaken by Zeedyk and Wallace (2003) with 120 families in Britain on the impact of video on either children's knowledge or parent's awareness of pedestrian skills indicated that the video when used in standard home-based fashion had no educational impact on either parents or children. These limitations are seen as symptomatic of broader difficulties in combining education and entertainment.

Theory and Practice

Education and entertainment both seek to create memorable events (Garrett & Ezzo, 1996). Garrett and Ezzo (1996) explored the potential role of multimedia in memory enhancing techniques, and determined the appropriate and inappropriate merging of education with the emotionalism of entertainment. In the design of an edutainment application, it is important to consider the following 4 Is of edutainment applications: namely instructional design, interface design, interaction design, and information design.

Instructional Design: Learning has three dimensions (Illeris, 2004): a) the cognitive, content dimension; b) the psychodynamic emotional and motivational dimension; and c) the social and societal dimension of interaction. Most contemporary educational theories accept that meaningful learning is an active, self-regulated, constructive, cumulative, and goal-oriented process. Jarvis (1987:105) stated that education is organized and sustained instruction designed to communicate a combination of knowledge, skills and understanding valuable for all the activities of life. Atkinson et al. (1993) defined learning as a relatively permanent change in behaviour. Learning can be viewed a process (Kolb, 1993) and an outcome (Tight, 1996), and involves a change in an individual's knowledge, skills, values or attitudes which lasts over a period of time (Daines et al., 1993). For experiential learning to be successful, learners must have the opportunities to complete the learning cycle (Kolb, 1993). A. Rogers (2002:86) defined inclusively that learning is more or less permanent changes and reinforcements brought about in one's patterns of acting, thinking and /or feeling. A. Rogers (2003) argued that the vast majority of learning takes place throughout life. When we help adults to learn, we will be most effective if we can bring together both acquisition learning and formalized learning (Rogers, A., 2002). According to A. Rogers (2002:285), this will mean: i). making acquisition learning (which is largely subconscious or at least conscious of the task rather than the learning) more learning-conscious and critically reflective; ii). making formalized learning (which is largely decontextualized, based on general rules and theories) more contextualized, more task-conscious. With this in mind, development of both traditional and digital material to complement each other through a contextualized education framework is important. According to C. Rogers (1993), learning is most effective when i). student participates completely in the learning process; ii). learning directly addresses practical, social, personal, research problems; iii). self-evaluation is the principle method of monitor progress. This notion of task-consciousness of learning activities coincides with the process of creativity. Wallas' model for the process of creativity (Wallas, 1926) includes four sequential stages: preparation, incubation, illumination, and verification. Wallas implied that creative thinking is a subconscious process that cannot be redirected, and that creative and analytical thinking are complementary. Osborn's seven-step model for creative thinking (Osborn, 1953) includes seven sequential stages: orientation, preparation, analysis, ideation, incubation, synthesis, and evaluation. Plsek (1996) suggested that creative process involves purposeful analysis, imaginative idea generation, and critical evaluation, and we must work to make ideas concrete realities. Based on Root-Bernstein (1999)'s notion of trans-disciplinary education, and acquisition learning and experiential learning approach, to

nurture creativity and innovation, it is important to provide a technology-enriched environment with complementary digital and traditional material that facilitates: i). teaching of universal process of invention besides disciplinary specifics; ii). teaching of intuitive and imaginative skills; and iii). cross-disciplinary education providing exemplars of creativity..

Information Design: Information design concerns itself with the structure of conveyed information, the appropriateness of the communication medium and the manner in which information is presented to an intended audience from a user-oriented and cultural perspective. Its disciplines govern the design of human understandings and interactions in our information-driven environment. While metaphysicians (by observation) suggested that human are born with knowledge (such as mathematics and geometry), empiricists (by observation) suggested that all knowledge come from our sense of perceptions, particularly through observation (Gellatly et al., 1999). Gestalt theories (Wertheimer, 1923) emphasize stimulus, organization, and relationships. In an edutainment application, learner should be encouraged to establish the relationship between elements of a topic or problem, a structured or grouped relationship. Gaps in structured relationship are important signposts to learning. Information pickup theory opposes most traditional theories of cognition that past experience plays a dominant role in perceiving knowledge. Gibson (1966) suggested perception is based on information in the stimulus array, realistic environment can facilitate perception. Learning could be enhanced with unconstrained learning environment with stimulus that provides perceptual clues. Aguilera (2003) discussed that videogames can assist in acquiring abilities and skills, particularly in spatial perception and recognition, visual discernment and separation of visual attention, inductive logic, cognitive development in scientific or technical aspects, complex skills, spatial representation, inductive discovery, iconic code construction, and gender construction.

Interface Design: The development of an effective interface requires not only an understanding of the structure of knowledge domain but also the most effective way to represent this structure to users and allow it to be manipulated in the pursuit of desired outcome. The role of interface design is two-fold: 1. to facilitate understanding by learners through effective visualization and screen design; 2. to reduce cognitive load by means of visual design and metaphor. Learning modalities include visual, kinaesthetic, auditory, gustatory, olfactory, proprioceptive. Strength in a multimodal interface derives from a number of factors, including their compatibility with users' abilities and existing work practices, and the flexibility these hybrid interfaces permit (Reeves et al., 2004). To meet the needs of learners a multi-sensory teaching strategy is implied (Dale, 2005). In the design of an edutainment application, a multimodal interface is preferred.

Interaction Design: Gee (2001) suggested that successful videogame-based education has the following qualities: 1. active and critical which allow learners to experience (see and act on) the world in a new way, to affiliate with a new affinity group, and to develop resource to

prepare for future learning and problem solving in a semiotic domains to which the game is related; 2. new identity which entice learner to try even if one already has good grounds to be afraid to try, to put in lots of efforts even if he or she begins with little motivation to do so, and achieve some meaningful success when one has expended this effort; 3. situated and embodied with meanings, storyline which allow learners to probe, to hypothesize, re-probe and rethink; and 4. learning undertaken in a sub-domain (with overt information and immersion in practice) of the full domain which allow learners to transfer beyond. In the development of Kids Innovation (Sauer & Gobel, 2003), to motivate learners by providing an intuitive, natural and human-like interface, similar to Hollywood, production content and dramaturgic scripts are generated by authoring tools and transmitted by multimodal interfaces enhanced by natural conversation forms. These concepts are enhanced by interaction design principles, methods and appliances. Robertson & Good (2005) developed a novel approach to the use of games in educational settings. The aim was to develop children's narrative skills and creativity by having them design the characters and storylines of computer games. Students and teachers can connect subject topics that interest different people - music, graphics, movie-making, robotics, and science. Allowing students to create interactive story they will ultimately want to play not only offers key educational benefits but builds self-esteem and teamwork skills. Students can develop general storytelling skills (coherent plots, motivated characters and convincing dialogue) and medium-specific storytelling skills. Students will learn how to express the emotional content of stories using sounds, music, and lighting effects which is a valuable part of becoming literate in the medium of digital age.

Difference and Inequity

Illeris (2004) named four significant context of learning: in institutions, in everyday life, in working life, and computer mediated through virtual processes, respectively. The challenge towards universal application of edutainment technology and methodology lies on the learner difference and social inequity.

Learner Difference: Hogle (1996) discussed several factors which must be considered when attempting to measure the benefit of edutainment, including issues of learner differences, assessment methods, and implicit knowledge. Different adults learn differently. Cross (1976) stated there are two variables: personal characteristics (age, life phase, development stage), and situational characteristics (full-time, part-time, voluntary, compulsory). Illeris (2004) stated that there are four variables: differences with respect to position on the labour market, generation differences, gender differences, and differences to do with ethnicity. By virtue of simply having lived longer, adults have accumulated more experiences than they had as children. This difference in quantity and quality of experience has several implications for adult educators and edutainment developers. Adult learners, imbued with bias and presupposition, can be reluctant to accept edutainment as the medium of learning (Knowles, 1990). In contrast to children's learning in school which is subject-centred, adults are life-centred (task-centred or problem centred). Adult become ready

to learn those things they need to know and be able to do in order to cope efficiently with real life situations (Knowles, 1990).

Social and Economic Inequity: Nowadays, society is confronted with slogans like knowledge economy, learning organization, and information society which are all set against a world polarized by a series of dualisms (Atkin, 2005): 1). those with technology and money and those with none; 2). those who have an excess of food and shelter and those with very little; 3). those whose goal is a competitive market economy and those who live in fear of it. This dualism on social and economic inequity is one of the main obstacles of prevalent use of edutainment in the wider community. Harvey (1995) concluded that school budgets for educational applications remain: 1). controlled by only a few key figures; 2). too low; 3). tied to outmoded premises about learning; 4). concentrated on the elementary grades; and 5). subject to rising expectations placed on them by the visual sophistication of home edutainment software.

Institutionalized Education: Illich (1970) questioned the apparent discrepancies between schooling's promise and its actual outcomes. He concluded that schooling, contrary to its promise of serving equality and providing education, instead promoted a class-based society as well as a society addicted to progressive consumption. Freire (1972) suggested that education is for liberation rather than for domestication, and believed that education is political. Learning takes place in a number of forms. Pask (1975) suggested that learning occurs through formal and informal learning conversations which serve to make knowledge explicit. La Valle & Blake (2001) divided learning into two categories, taught learning and self-directed learning. Livingstone (2001) classified learning into four categories, formal education, non-formal education, informal education, and informal learning. Atkins (2005) classified learning into four categories: 1. incidental learning that is unintentional or unplanned and results from other activities; 2. informal learning that occurs when people involved in action recognise the potential for learning and make a decision to actively learn from their experiences; 3. informal education that is organised although not necessarily in an educational way, normally very participant directed and often one-off or sporadic; and 4. formal education that is structured process taken place with an institution or designed or accredited through a state legitimised body. Out-of-school development, initiated by grass-roots movement, is beginning to have a catalytic effect on schooling (Molnar & Deringer, 1984). In the creative age, institutionalized education not only serve the interest of a single homogeneous population of students, but also need to be flexible enough to cater for a more heterogeneous group of in-service professionals with mixed abilities and relatively diverse learning expectations. Sociological studies of educational sites which extend or which are located beyond the school, such as museums, galleries, heritage and conservation sites in the form of castles and zoos, in terms of pedagogic and exchange relations, have something to teach as well as something to learn from schooling (Dowling & Brown, 2000).

Conclusion: To Inspire

How edutainment can prepare a new generation of life-long learners and help cultivating creative and innovative talents of our knowledge-based society in this creative age remains a challenge educators are facing nowadays. Di Blas et al. (2005) questioned how difficult students can be “rescued” by unusual learning activities while supported by technologies, how virtual worlds be a magic place where inter-cultural exchange with remote peers take place, how teachers pay a fundamental facilitating role while using advanced e-learning tools. Usrey (2000) suggested that educators can take advantage of the benefits of edutainment while avoiding its hazards by keeping the following guidelines: 1. substantial content and learning outcomes must be conceived before edutainment is utilized (White & Breen, 1998); 2. approach to that substantial content must respect basic intellectual norms; 3. leave room for interactive exploration; 4. remind students that it is necessary to attentively complete tasks whether they are fun or not (Karen, 1994); 5. avoid sarcasm and slapstick (Fister, 1999). Chew and Ho (2001) traced and discussed the evolution and impact of the Singapore education system from the survival-driven phase (1965-1978) to the efficiency-driven phase (1979-1990) to the current ability-driven education phase from the predominantly social-reconstructionist conception of curriculum to the academic rationalist, humanistic and cognitive conceptions. The physics curriculum packaged being examined is incorporated into the disciplinary knowledge approach with an edutainment framework that presents physics as a body of content knowledge of high educational value in an entertaining way. In USA, a technology-based partnership between Richard Daley College, the National Center for Education and the Economy, and the Associated Equipment Distributors Foundation reported that the resulting edutainment program had motivated students and resulted in an 84% graduation rate, including 32 graduates with one year of college and six students among the top 100 Hispanic graduates (Landt et al., 2001).

The ultimate goal of edutainment is to inspire. Kolb (1984) stated three stages of lifelong growth and development, namely integration where self as process (transacting with the world), specialization where self as content (transacting with the world), and acquisition where self as undifferentiated (immersed in the world). As a developer of edutainment applications, the author believes that the essential quality of successful edutainment are: 1). allow active learning that focuses on thinking, task, teamwork, and transcendence (Leung, 2004); 2). promote interactions of teacher, students and experts; 3). get student engaged cognitively, physically, and socially; 4). provide a universe to collect, connect, create, and donate (Schneiderman, 2002); 5). compatible and compliant to a common standard that is multilingual, and with content and knowledge management function; 6). provide a one-stop environment for trainer, learner, supervisors, administrators, and edutainment content providers; 7). intelligent, immersive, integrated, and reusable. In summary, a successful edutainment application for creative age shall provide an education framework and platform that are conducive to creative development, synthesize education across disciplines, and create alternative tools for education..

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