The Impact of Computer Technology on Taiwanese Art Education: A Socio-Historical Perspective

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Abstract

This article provides an overview of how typical socio-historical background contributed to Taiwanese adaptability to the impact of technology; how technology, especially computer technology, affected art education; how the new curriculum titled 1st–9th grade curricular alignment was developed in response to the impact of computer technology; and how the issues regarding the fulfillment of the instruction surround the ongoing curricular reform.

Keywords: Computer technology, art education, first to ninth curricular alignment

Preface

The development of contemporary computer technology has strongly affected the world. From one perspective, technology seems value-neutral; it is the human soul that decides what our world looks like. However, as Stephen Bertman (1998) points out, “technology tends to multiply geometrically, and its cultural influence increases accordingly” (p. 24). At the turn of the twenty-first century, Taiwan, a small island country with approximately 14,000 square miles and a population of more than 20 million, has revealed a determination to embrace this wave of technology shock. Throughout the past few centuries, Taiwanese society has demonstrated a high adaptability in encountering the impacts of external political and cultural invasion. This adjustability is based on the country’s unique socio-historical background, and is vital to the assimilation of technology flow.

A Socio-Historical Exploration of Taiwanese Adaptability to Computer Technology

There are three main factors for why Taiwanese society moves quickly in response to the global trend in the development of computer technology. One factor is the country’s power of cultural fusion brought about by historical forces. Another factor is due to an indigenous island economic style. A third factor is Taiwan’s emphasis on education.

A Cultural Perspective

In an essay titled “A Study of Contemporary Taiwanese Cultural Phenomena” (2000), Shu-Lun Jhang argues that the factors which resulted in cultural changes of Taiwanese society were mainly derived from external factors (p. 60). These external forces, according to Ching-Song Shen (1990), include four cultural systems:

1. The traditional Chinese culture and folk religious beliefs imported from the

early Chinese immigrants.

2. The foreign cultures introduced by colonialist countries.
3. The cultural momentum evoked by industrialization.
4. The contemporary cultural impact resulting from the influence of advanced Western countries. (pp. 108-109)

Shen's argument ignores the existence of the original Taiwanese aborigines. However, before the seventeenth century, Chinese people had immigrated and lived in Taiwan. In the early and mid seventeenth century, the Spanish and the Dutch occupied Taiwan for thirteen and thirty seven years, respectively. In 1661, the Chinese assumed governance for over two hundred years until 1895, when Taiwan was ceded to Japan by the Ching Dynasty as a spoil of war. In 1911, when the Ching Dynasty was overthrown by the Republic of China, Taiwan was still a Japanese colony. In 1945 after World War II, when the Japanese surrendered to the Allied Forces, the ROC government gained the governance of Taiwan. In 1949, the Chinese communists assumed authority over mainland China and established the People's Republic of China (PRC). At that time, the ROC government moved to Taiwan.

This historical track explains the complexity of Taiwanese cultural forces. Basically, the Chinese culture is still the most influential force in Taiwanese society. Daniel Lynch (2002) argues that though some Taiwanese new historians insist that the Taiwanese gene pool is actually unique as a result of intermarriage between Chinese and plains-dwelling aboriginals, most historians acknowledge the fact that the genetic code and much of the culture of the Taiwanese people originated from China. This Chinese cultural heritage is evidenced by the reverence for Confucian ideology in education, religious beliefs in Taoism and Buddhism, and traditional customs such as celebrations of the Lunar New Year.

In addition to the main influence of Chinese culture, Jhang (2000) points out

that being attached to Japanese and American cultures is one of the characteristics of the Taiwanese cultural phenomenon. It is understandable that Japanese culture is popular if we realize that, after fifty years of colonialist control, most of the older generation living in Taiwan now can speak and read the Japanese language. American culture has become prevalent since the U.S. army garrisoned in Taiwan after the ROC government retreated from mainland China. More importantly, by the late 1970s, a great number of students began to return from the United States after completing advanced studies. As Lynch (2002) points out, most of the overseas students regarded the U.S. as the wealthiest and most scientifically advanced country; they had adopted the United States as their general model for Taiwan. Thus, Taiwanese people have been immersed in a blended culture for a long time. This adjustability, as I have termed it, has empowered Taiwan to absorb the new cultural impact caused by the development of computer technology.

An Economic Perspective

The second factor enabling Taiwan to adapt to the new computer age is its indigenous island economic style. Due to the long chaos caused by colonialism and war, industrialization in Taiwan occurred later than in most advanced countries. In a study titled “Four Misunderstandings of the Economic History of Taiwan under Japanese Colonial Rule” by Man-Houng Lin (1997), he points out that during the Japanese colonial periods, the main economic activity of Taiwan was agriculture, and there remained hardly any heritage from the colonial rule to postwar Taiwan. In the 1980s, Taiwan not only eliminated the poverty resulting from war, but became one of the four Asian newly industrialized economies. According to the Directorate General of Budget Accounting and Statistics (2004, Important Social Indicators, ¶ 2), in 2002, Taiwan’s per capita GNP (Gross National Product) was US $12,916, ranking 24th

among 108 countries. The $1,617 billion foreign exchange reserves ranked in the top fourth.

Two features of the Taiwanese economic model are related to the current tendency to rely on computer technology. The first is the high ratio of small and medium enterprises; the second is the export-oriented economic mode. According to the statistics of the Small and Medium Enterprise Administration, Ministry of Economic Affairs (2006), Taiwan had 1.2 million (97.8%) small and medium enterprises, which generated 17.6% of annual national export value in 2005. In Gin-Yuan Lee's (2001) study on "Organizational Growth of Small and Medium Sized Business under the Impact of Information Technology," he points out that the use of information technology (including computer and communication devices) has resulted in a positive circulation of organizational growth in Taiwanese small and medium enterprises. In a small and medium business, since the organizational divisions are not as sophisticated as in a large sized business, the employees are usually required to be more versatile. In a highly competitive society, increasing computer skill has become fashionable.

High dependence on international trade is one of the main characteristics of Taiwan's economy. In a study of the transition of the Taiwan economy, Shirley W. Y. Kuo (1983), Taiwan's Ex Minister of Finance, compares the effect of different economic indexes which result in output expansion within four five-year periods. She points out that the contribution of export expansion was the most important factor throughout the past twenty years. Henry Wan (2002) claims that "The significance of an economy is reflected by its interaction with others." He further stresses, "A fair measure is export" (p. 145). The export-oriented economy favors interaction with other countries. Thus, through economic interaction, Taiwanese society also synchronously imports world fashions.

The statistics comparing Taiwan with the United States in the use of computers and the Internet show that Taiwan almost synchronizes its steps with that advanced country. In 2001, according to a survey of The U.S. Department of Commerce's Census Bureau (2002), approximately 56.6% of U.S. homes had a personal computer. Seven of every eight households with computers (88.1%) also subscribed to the Internet. As a result, more than half of U.S. households (50.5%) had Internet connections; the annual rate of increase in computer ownership was 5.5% and in Internet use it was 9%.

During the same years in Taiwan, according to a Taiwanese official report by the Directorate General of Budget Accounting and Statistics (2002), by the end of 2001, more than half (50.8%) of Taiwanese households had a personal computer, and 38.7% of Taiwanese households had Internet connections. The annual increase in rate of computer ownership was 4.8% and of Internet use, 5%. By the end of 2005, 63.1% of Taiwanese households had a personal computer; the percentage of households with Internet connections increased to 55.7%. The degree of computerization in Taiwanese public schools has reached 100%, with a computer per staff ratio of 1.13 (2007).

In addition to being a heavy consumer of computer technology, Taiwan is also an important world producer of computer technology. Since the late 1980s, computer monitors, terminals, and microcomputers have become the major export products of Taiwan. Economist Denis Fred Simon (1992) points out that Taiwanese production of computer systems climbed from 100 in 1980 to 1.5 million in 1987; manufacture of monitors for computers grew from 39,000 to 6.2 million. Moreover, many Taiwanese firms have eliminated the role of OEM (Original Equipment Manufacturer) producers and have been manufacturing products under their own brand names. Simon claims that "Taiwan has moved from being a technological imitator in this field to a technological innovator" (p. 142). This achievement has accelerated the intensive

utilization of computers in Taiwanese society.

An Educational Perspective

As I have noted above, Chinese culture is one of the most important cultural sources in Taiwanese society. This Chinese cultural heritage is reflected in the reverence Confucian tradition holds for education. In contrast to children in the United States, Yuling Hsue and Jerry Aldrige (1995), both leading experts on early childhood education, claim that children in Taiwan are expected to take the adults' lead and focus their attention on academic efforts. In order to ensure better achievement in academic learning, Taiwanese parents are apt to impose a competitive mindset on their children. Huse and Aldrige point out that in Taiwan, parents value higher education and generally expect their children to go to a university. This fierce competition culminates in the entrance examinations of high schools and universities and ultimately results in a high enrollment rate at every level of education.

According to the Government Information Office (1999) and the Department of Statistics in the Ministry of Education (2004), in 1950, the second year after the ROC government moved to Taiwan, the enrollment rate in elementary schools was 79.98%. At that time junior high schools and senior high schools were not compulsory, and the opportunity rate for the graduates of elementary schools to enter a higher education level was 31.78%. For the graduates of junior high schools, it was 51.15%, and only 39.76% of senior high school graduates could enter the university. Junior high school became compulsory in 1968; the enrollment rate of elementary school graduates significantly increased each year and has been over 99% since 1986 (Figure 1).

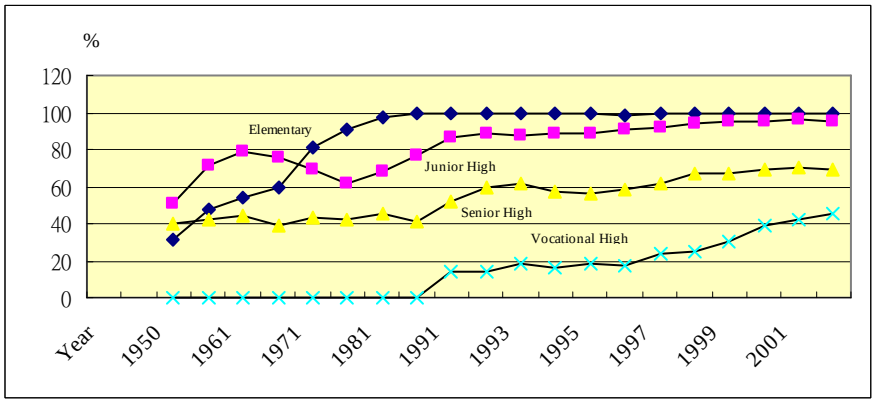

Figure 1 The ratio of each level of Taiwanese graduates entering higher levels of education.

Source: The Department of Statistics, MOE, ROC (March 15, 2004)

Currently, senior high school is still not compulsory in Taiwan; the entrance examination at this level is still highly competitive. However, about 47% of the graduates of junior high schools can choose to enter the vocational education system. After graduating from vocational high schools, they can go into the world of work or enter technological colleges/universities. The actual enrollment rates at all levels of education are: 100 % in elementary schools; 99.83% in junior high schools; 96.01% in senior high schools; and 82.02% in higher education (2007).

Schools favor the promotion of computer technology. In Taiwan, the first computer courses in high schools began in 1985. The conventional top-down manner of decision-making in Taiwanese educational affairs catalyzed the transplant of the United States' education model. During the 1980s, Taiwan reached great achievements in both economic development and political reform. In 1987, the government abolished martial law, which had been in force for forty years. The establishment and growth of opposition parties indicated a more democratic political atmosphere. In 1992, the foreign exchange reserve was 85 billion U.S. dollars, the highest in the world. Economic and political progress led to requests to increase the budget for education, and heightened expectations for more efficient and higher

quality education. In 1994, the Committee of Educational Reform was established by the central government as a consultative and supervisorial institute for the Ministry of Education. From 1994 to 1995, the National Curriculum Standard prescribed computer courses in the required curriculum, first in senior high schools and then in junior high schools. In elementary schools, the selected computer course began to be offered in 1986 and was required in 2000.

Since the mid 1990s, a series of educational reforms have been set in motion by MOE. One significant reform was labeled the “First to Ninth Grade Curriculum Alignment.” The new aligned curriculum started in 2002. This was the first time that Taiwan developed the curricula of elementary schools and junior high schools as a whole. It has maintained the required status of the computer courses. We can anticipate that new generations of Taiwanese students will be equipped with basic computer competence during their compulsory education just like their counterparts in the United States and other developed countries.

In this section, I discussed how the typical socio-historical background contributed to Taiwanese adaptability of the technology impact through cultural, economic, and educational perspectives. Before discussing how Taiwanese latest curricular reform was impacted by computer technology, an exploration of how art education was affected by contemporary computer technology are discussed in the next section.

The Impact of Computer Technology on Art Pedagogy

Technology impacts education at every level. The invention of Gutenberg’s movable type is one of the best examples. Marshall McLuhan (1967) points out that the development of printing techniques brought about a revolutionary change in people’s learning styles. The mass production of books made it possible to learn by

eyes instead of the traditional method of learning by ears. What is more, the portable book not only expanded the distance of message communication, but also created a possibility for individualized reading and learning through standardization of language, writing style, and fonts, all the result of printing technologies (Jones, 1990). Elizabeth L. Eisenstein (1983) in her book, *The Printing Revolution in Early Modern Europe*, points out that the reproduction of written materials not only brought about a dramatic shift of all forms of learning, but also resulted in the revolution of modern European civilization, including the emergence of the Renaissance, religious reformation, and modern science, and standardization in written languages.

In the realm of art education, the combination of printing techniques and photography not only changed the notion of art creation, but also enhanced the study of art. Photography benefited art education at the turn of the twentieth century in magazine publishing during the arts-and-crafts movement, in the picture study movement of 1899, and in Arthur Wesley Dow's synthetic art education begun in 1899 and continues today in curricula based on the elements and principles of design (Efland, 1990). The development of computer technology in the late twentieth century has had a huge influence at every level of education. Becoming an aggressive user of computer information technologies has become an important qualification for an art teacher.

Jon Wiles and Joseph Bondi (2002) argue that in the new century, programming functions are crucial for curriculum design; they point out that "Not only is knowledge of how technology works (literacy) important, but also how technology can be used to improve communication and the transmission of knowledge" (p. 331). What Wiles and Bondi refer to here includes two dimensions of educational activity. The first is curricular design and the second is pedagogy.

Elliot W. Eisner (1972) points out that just as the curriculum lies at the heart of

education, learning activities lie at the heart of the curriculum. Pedagogy is concerned with learning activity; successful learning activities help to achieve the objectives of curricular design. In order to discuss the influence of technology on art pedagogy, I refer to four pairs of conflicting pedagogical ideas in art education and explore how technology, especially computer technology, contributes to the resolution of the contradictions they embody.

From Teacher-centered to Student-centered

Half a century ago, John Dewey (1954) pointed out that the history of American schools has shown a swing of the pendulum between two extremes: one end is external imposition and dictation, and the other end is "free-expression" (p. 32). Peter Smith (1996) echoes Dewey's metaphor of the pendulum and applies it to the phenomenon of art education. He claims that during the last four decades of the twentieth century, visual art education in the United States appears to have shifted between art-oriented and child-oriented approaches. Both Dewey' and Smith's comments imply a dilemma between teacher-centered and student-centered modes of pedagogy. If this pendulum effect is inevitable, then the difference between teacher-centered and student-centered modes is merely a matter of fashion.

Contemporary educators, such as Kaustuv Roy (2003), have attempted to use Deleuze and Guattari's metaphor of "rhizome" to reconstruct the traditional relationship between teachers and students. A rhizome, as Roy describes it, "is a lateral proliferation of connection, like the spread of moss, the sudden branching off or joining up of different intensities, flows, and densities to form new assemblies that have no fixed form or outline" (p. 75). The notion of rhizome tries to overthrow the traditional linear and hierarchical relationship of teaching and learning. M. Jayne Fleener (2003) comments that the curriculum-as-rhizome analogy encourages students

to pursue “tangents,” discover personal interests and needs, and create their own teachable moments and starting points (p. 10). This webbed, interactive, and non-linear learning style conforms to the contemporary communication function developed by the Internet and computer technology.

In a lecture titled “Interactive Aesthetics,” Karen Keifer-Boyd (2001a) points out that today’s visual communication design is no longer viewed as either linear or cyclical, but instead it is often experienced as nonlinear. Nonlinear design has multidirectional intersections to lead the viewer to travel within a loop to a place different from where he or she began or even intended to go. Thus, Keifer-Boyd (2001a) claims: “To develop a curriculum that incorporates creative and critical thinking necessary for design communication in the 21st century, we need to regard knowledge as dynamic and indefinite rather than as definite and fixed” (p. 2). This dynamic curricular design creates a broader space to accommodate nonlinear interaction. The poststructuralist idea of rhizome combines with the development of the Internet and computer technology, enabling a breakthrough in the dilemma between the two extremes of teacher-centered and student-centered modes.

From Standardized to Individualized

Learning with peers has educational as well as economic significance. Conventional instruction depends on a teacher who arranges appropriate learning content and sequence, drills students on correct performance, and evaluates learning achievements by using standardized tests. However, individualized instruction has always been an ideal based on the educational ideology of cognitive pluralism.

According to Eisner (2002), the roots of cognitive pluralism can be traced back to Aristotle’s tri-part distinction among the ways of knowing—“theoretical, practical, and productive” (p. 80). One of the most influential learning views is Howard

Gardner's (1983) conception of seven intelligences, later expanded to nine (Gardner, 1999). He denied the long-term psychometric tradition which defined human intelligence as a single general or "G" factor. His views have helped educators reconsider the learning opportunities which a school should provide. Eisner points out that one of the potential consequences of cognitive pluralism is the "expansion of educational equity" in the classroom (p. 82). From the perspectives of the nature of intelligence and of the need for equality of learning opportunities, a wider array of curriculum tasks is needed to meet individual needs. Emphasizing individual value judgment has become the prevailing educational principle today in the United States and Taiwan. Olivia Gude (2004) points out that "Postmodern thought embraces the heterogeneous, the local, and the specific. It affirms the choice-making capacity of individuals" (p. 13).

Computer technology enhances the implementation of this educational ideology. The study of how to use the computer as a teaching aid is decades old. While traditional media such as slide projectors, overhead projectors, televisions and VCRs lack interactive functions, computer-aided instruction is capable of interactivity. Hank Bromley (1998) claims that "computing technologies could support independent action and variety as easily as centralization and standardization" (p. 15). The interactive aspect of the Internet makes the computer completely different from traditional media. Lovejoy (1997) argues that being in cyberspace is closer to reading a book than to watching TV. She explains that the viewer can "now type in text, scan in visuals, and access the Net, placing messages online" (p. 213). The accessible input/output system, the real time feedback, and the multiple information styles together make the computer a powerful interactive medium.

How can we conduct individualized instruction? One approachable technique is through the use of learning centers. Beverley E. Crane (2000) suggests that a learning

center should be a collection of materials arranged around stations where students can interact with the materials. Each station provides students with materials for particular tasks (p. 123). Individualized instruction enables students to learn in accordance with their intelligence and interests, and at their own pace. It is the interactive capacity of computer technology that makes individualized instruction possible. WebQuests is one good example. As Tom March (1998), one of the creators of WebQuests, points out, the development of the Internet and the World Wide Web has revolutionized student learning style. Based on its student-centered and active-learning emphases, WebQuests has been developed into a huge instructional source, providing individualized teaching and learning activities for K–12 educators and students.

From Mainstream to Multicultural

In the 1970s some educational historians and philosophers challenged the contents of the curriculum which were taken for granted in mainstream culture. These scholars based their arguments on critical theory, and questioned the tendency of tacit values resulting in sexism and racism. They examined cultural issues. In the realm of art education, critical theorists criticized the neglect of multicultural resources for the teaching of art. For example, Dennis Earl Fehr (2000) argues that in the U.S. one of the goals of teaching art history is to "create cultural parity with Europe's educated class. One of its results was to create a European canon, a standard by which to judge non-European art—that is, the remaining 95 or so percent of the world's art" (p. xiv). Many scholars doubt the practicability of critical theory. However, Efland (1990) argues "in view of the fact that art education has a history of identification with the privileged levels of society, such studies are long overdue" (p. 255). Eisner (2002) also claims that "[critical theorists'] views on the ills of education are often exceedingly plausible; they are frequently both trenchant and accurate. What is

missing is a positive agenda" (p. 77). Eisner's argument is not an overstatement. Andra Lucia Nyman (2002) points out that though globalization and multiculturalism have become overwhelming educational goals, there are many challenges that educators still face. Three questions are brought out by Nyman: "How do we meet the individual needs of the child? How do we kindle children's imagination? How do we help children to learn about their own identities?" (p. 62). Today, this "missing agenda" of multicultural art education can be achieved easier through computer technology. Tom Anderson and Melody K. Milbrandt (2004) point out that "Using the web, student can critically examine issues in their own communities, the nation, and world through cooperative thinking and learning activities" (p. 164). They also use digital artist Bill Viola's works as example, demonstrating how to design technologically based learning activities and how to conduct discussions on contemporary cultural issues.

Though the evolution of a high-speed, electronic culture began in the United States, it has been largely adopted all over the world. McLuhan foresaw that this new power would "fuse time and space and reconstruct human dialogue on a global scale" (p, 16). Stephen Bertman (1998) echoes McLuhan's idea of a global village by arguing that "The result is a high-speed, electronically integrated global culture, a synchronous society on a planetary scale" (p. 150). Some scholars warn us of cultural colonialism in technology and remind us that we must be very careful to think over whose culture controls or dominates the Internet's language, social practices, and economic access and gains (Keifer-Boyd, 2001b, p. 1); however, recent developments lead to an optimistic view. Wiles and Bondi (2002) point out that statistics show that non-English speakers will soon outnumber English speakers on the Internet, and there will be more Chinese users than English users by 2005. Thus the cultural colonialism may shift if sites of influence are not produced in multiple languages, or translation

software are not more fully developed to translate any Web site to one's own native tongue.

Internet art also has promising prospects. Jon Ippolito (2002) argues that artists outside the mainstream geographic channels, such as artists in Slovenia and Korea, have had remarkable success in making art for the Internet. This development helps artists from all corners of the world to display their works through a worldwide approachable channel and ultimately benefits the accomplishment of multiculturalism.

Multiculturalism has become an important issue in education. The achievement of new communication technology favors this overwhelming trend. Crane (2000) claims that the Internet benefits the study of world culture. He gives an example of students in a fourth grade class in California who now can learn to contrast art and folk music from Mayan, Aztec, and Mexican cultures through the Internet (p. 326). If we believe that the teaching of multiple cultures is a proper choice for art education, we can use computer technology as the vehicle to take us from mainstream to multiculturalism.

From Discipline-based to Interdisciplinary

In the conventional teacher-as-artist model, art education was conceived as a series of studio activities which were always segregated from critical social issues. In 1957 the Soviets launched the first artificial satellite, Sputnik. This event heavily impacted United States' society and evoked a major movement for curriculum reform, especially in science and mathematics. Efland (1990) noted that there were two main reactions within the art education community. The first was to emphasize the importance of art for its function as enabling creative problem solving. The second was to emphasize art as a structuralized discipline (p. 237). After a series of initiatives by Manuel Barkan, Elliot Eisner, Harry Broudy, Ralph Smith, and Laura Chapman

during the 1970s, the label “discipline-based art education” (DBAE) (consisting of four disciplines: art making, art history, aesthetics, and art criticism) was formally coined in 1984 as the embodiment of this wave of the curriculum reform movement. Smith (1996) claims that historians of the future will see DBAE as one of the most important contributions to twentieth century American art education (p. 214). Nevertheless, he argues that despite DBAE’s attempts to give art the form of an academic subject, “we still await the realization that art might represent something more permanent” (p. 218).

Smith’ argument is sustained by contemporary educational trends. Gude (2004) points out that postmodern visual arts are hybrids of the visual and the conceptual. She argues that “this hybridization is itself a hallmark of many postmodern cultural productions, eschewing the boundaries imposed by outmoded discipline-based structures” (p. 8). Mary Adams (2002) claims that traditional definitions of art and their disciplinary boundaries usually keep teachers and school subjects apart. Thus, she suggests art teachers and elementary classroom teachers should “reconsider their subject area boundaries for a more fluid approach to teaching” (p. 362). Beyond teacher-as-artist and DBAE, we have another choice: interdisciplinary art education, a cross-curricular model.

Crane (2000) lists four benefits of a cross-curricular approach. First, individuals learn best when encountering ideas connected to different disciplines. Second, cross-curricular problem solving provides students with critical thinking and real-life skills they need when they enter the work force. Third, the integrated curriculum with its increased emphasis on the interconnectedness of curricular concepts may enhance student motivation and interest. Fourth, interdisciplinary activities encourage students’ capacity for critical reflection and deep understanding of complex societies. How could computer technology benefit interdisciplinary pedagogy? Wiles and Bondi

(2002) claim four decisive skills are required to conduct the interdisciplinary approach: organizing data, ordering information, comparing data, and contrasting data. These tasks are exactly what the computer, and more specifically the Internet, can perform best, employing the powerful techniques of visual and audio processing, enabling a new era of interdisciplinary art education.

The impact of computer technology on art pedagogy has become an important topic in art education. Many art educators are engaging in related studies, such as Taylor and Carpenter, Milbrandt and Anderson, Emme, Krug, Gregory, June Julian, Sakatani, jagodzinski and Keifer-Boyd. Technology has been the focus of several books in art education and journal themes. Technology has also been a special issues group of the NAEA (National Art Education Association); the number of presentations on technology in art education increases each year.

In this section, when discussing how computer technology impacted contemporary pedagogy of art, I focused on four prevailing types of concept, including student-centered, individualized, multicultural, and interdisciplinary. The interdisciplinary strategy was adopted by MOE and became the pivot of Taiwanese 2002 curricular reform, which is addressed in the next section.

Taiwanese Response to the Impact of Computer Technology: The Curriculum Reform of 2002

Discussing new vision in art education, Brent Wilson (2003) claims that art educators are apt to be stuck in the past. He takes Elliot W. Eisner as an example and argues that when Eisner implied that his challenge to art educators of the 1970s was to develop curricula based on contemporary artworks, he was ignoring the most current trends in contemporary art, such as “happenings” and “performance art” (Wilson, 2003, p. 216).Wilson calls this the problem of “contemporary blindness”.

At the turn of the twenty-first century, the new "1st–9th grade curriculum alignment" has caused revolutionary changes in Taiwanese pre-secondary education. In order not to allow the syndrome of contemporary blindness to exclude digital art from the new Taiwanese art education, I briefly review Taiwanese art education, focusing on two topics: the ideological origin of Taiwanese art education and the development of discipline-based art education (DBAE) prior to the educational reform of the 1990s. I also explore, in this section, the prospects of fitting digital art into Taiwanese art education, its advantages, and the problems accompanying it.

A Brief Review of Art Education in Taiwan

Two forces shape Taiwanese art education. The first is the influence of United States' educational ideologies; the second is the centralization of curricular development. In an essay discussing Taiwanese art education in the postmodern age, Chun-Chen Jhang (1998) points out that Taiwanese art education has been affected by the United States for a long time. Jhang argues that Viktor Lowenfeld was the most influential person; his concept of art as a means for creativity and mental growth influenced Taiwanese art education before the 1970s. This educational ideology was reflected in the national curriculum standard at that time.

In Taiwan, each level of education has a nationally standardized curriculum enacted by the central government. Since 1949 when the ROC government moved to Taiwan, the Ministry of Education (MOE) has made more than ten amendments to the national curriculum standards. In 1972, the third year after junior high school became compulsory, a new national curriculum standard prescribed five basic educational domains, including art education, virtue education, intelligence education, physical education, and group life education. The goal of junior high education is to cultivate healthy citizens both mentally and physically through a balanced development in

those five domains. In the 1975 national curriculum standard of elementary schools, art and labor were merged and contained six subjects including painting, sculpture, design, crafts, gardening, and home economics. In that period of time, the objectives of art education focused on art's instrumentality for individual growth.

DBAE has been practiced for eighteen years since the 1980s in the United States. DBAE was soon transferred to Taiwan via academics. Since the late 1980s, DBAE has been introduced through international art educational conferences and translated publications, and has become the prevailing educational trend in Taiwanese art education (Chen, 1998). One of the key people in the Taiwanese DBAE movement is Cheng Shiang Kuo, Ph.D. of the University of Illinois, a professor at the National Taiwan Normal University in the Department of Fine Arts. Her first article about DBAE, *The Theory Study, Experiment, and Promotion of DBAE by the Getty Center*, was published in the *Journal of National Taiwan Normal University*, 1989. She highly recommended this new curriculum in her later article, *Pursuing Excellent Art Education—DBAE* (Kuo, 1991). The notion of DBAE immediately affected the curriculum of Taiwanese art education.

From 1993 to 1994, MOE made a series of revisions to the *Curricular Standard of Elementary Schools* and the *Curricular Standard of Junior High School*. Both standards in art curricula are obviously discipline-oriented. In chapter four of the junior high school version, it clearly states that "all teaching materials should be discipline-oriented" (MOE, 2000). Both versions classify instructional activities into three learning objectives:

1. Expression: focus on art production including fine art and applied art; the proportion of this part should be reduced from 60 to 40% per year.

2. Appreciation: focus on principles of form, aesthetic cognition, and aesthetic judgment; the proportion of this part should be increased from 40 to 60% per year.
3. Affection: focus on promoting aesthetic taste, the notion of environmental preservation, and the enjoyment of art.

Meanwhile in the United States, DBAE continually faced queries regarding both its basic concept and practical execution. Art educators in Taiwan have sensed those counter voices emerging around United States' society. In the next wave of curriculum reform in 1994, DBAE faded out of Taiwanese art education.

A significant contribution of the *Curricular Standard of Junior High School of 1994* was to prescribe computer courses as required courses in the last two years of junior high school. In elementary schools, computer courses appeared in 1986 and were required by 2000. In 2002, both levels of curricula merged in the new aligned curriculum.

New Prospects for Taiwanese Art Education

The whole structure of the new curriculum emphasizes an interdisciplinary approach, including seven disciplinary domains: language; health and physical education; social studies; arts and humanities; mathematics; science and technology; and integrative activities. The arts and humanities domain includes visual arts, music, theater, and dance. The number of learning hours in arts and humanities are flexibly prescribed to be 10–15%, selected from all seven domains.

The learning objectives—practice and application, exploration and expression, and appreciation and comprehension—follow the same principles of the old curriculum standards. However, in order to stress the interdisciplinary concept, the guidelines highlight ten interdisciplinary learning objectives below:

1. self-understanding and potential development
2. appreciation, expression, and innovation
3. career planning and life-long learning
4. demonstration, communication, and sharing
5. respect, care, and cooperation
6. cultural learning and international realization
7. planning, organization, and practice
8. technology and information application
9. active exploration and research
10. independent thinking and problem-solving (MOE, 2003)

In addition to seven disciplinary domains, MOE pointed out six important issues in the new curricular system. According to MOE, these areas reflect public concerns in current Taiwanese society: information technology education; environmental education; gender education; human rights education; career development education; and home economics education. Thus, seven disciplinary domains along with six important issues form 13 learning areas in the 2002 1^{st}–9^{th} curriculum alignment, with an emphasis on interdisciplinary instructional strategy.

One of the most important contributions of the new curriculum is MOE's abolition of long-term control over the national curriculum standard in favor of flexible curriculum guidelines. Thus, art teachers are empowered to develop more flexible teaching content. The new curriculum guidelines, unlike the conventional curriculum standards, do not mandate details of teaching content. Instead, MOE issues so-called "competence indicators," assigning a series of descriptors of competence in each disciplinary domain and each important area.

Competence indicators are published to help teachers design instructional objectives. This change not only offers art teachers more autonomy in curricular

design, but also increases teacher responsibility in both curricular planning and professional teaching. Nevertheless, Shu Huey Yang, Guan Chen Lin, and Siou Jie Jhang (2003) point out that one of the most serious problems of the 1st–9th grade curriculum alignment is that many teachers have no idea how to translate MOE competence indicators into practical instructional objectives. How to bridge the gap between ideal and practice has become a decisive challenge in the implementation of the new curriculum.

Problems Emerging from the Implementation of the New Curriculum

Teacher cognition, skill, and attitudes are influential factors in developing digital art, especially in the new, flexible, aligned curriculum. In light of this situation, almost every teacher education program in Taiwan's universities has developed curricula to conform with the new changes. Sherron Killing Roberts and Ying Shao Hsu (2000) point out that U.S. experience has been positive, noting that "as technology is integrated into teacher education programs, preservice teachers take these innovations into our public schools where inservice teachers and their students may take part" (p. 135). Susan McAleenan Butler (2003) echoes their observation and points out that several studies on the efficacy of improving pre-service teachers' competence in computer technology show positive effects on technology integration in the public schools. However, whether these positive effects occur in Taiwanese art education still await investigated.

A crucial problem has emerged in implementing this wave of curriculum reform. Many in-service art teachers are asked to teach in the new interdisciplinary curriculum in spite of their insufficient familiarity with computer technology. Art teachers, as those who are empowered to conduct the curricular design, are the decisive factor in successfully developing digital art. What are art teachers' attitudes toward computer

technology and digital art? Can they properly employ computer technology to assist in teaching? Do they have adequate competence to introduce the notion of digital art to students? And, can they efficiently conduct the learning activity of creating digital art? Responses to these questions will inform both the development of an effective on-the-job education for in-service art teachers and the development of an adequate curriculum for teaching art teachers in higher education.

Adapting to Social Change

Techniques of reproduction have resulted in a series of revolutionary changes in the world of art since the late nineteenth century. The development of art post-dating Benjamin's *The Work of Art in the Age of Mechanical Reproduction* is more complex. As Anne Morgan Spalter (1999) points out that "No other art medium is bound to a technology that changes as rapidly as the computer" (p. 3); computer technology has exceeded almost any invention in human history. No matter if the term "digital art" is popularly accepted or not, the revolutionary effect of computer technology on visual arts is an overwhelming trend that contemporary artists and art educators can hardly avoid.

Curricular development must address social change. The foregoing review of Taiwanese socio-historical background explains how Taiwanese society can quickly locate itself in the new age of computer technology. However, this does not mean that Taiwan has adapted itself completely. Bertman (1998) uses a brakeless car rolling downhill as an analogy for the effects of technology. He argues that when technology, like the vehicle, acquires its own momentum and accelerates downward, human beings, once the steerers of the car, become only passengers who maintain the illusion of control. Nearly all of us have sensed the disturbances caused by the acceleration of computer technology in many fields. This is also true in the realm of art education.

Summary

In this article, I discussed how Taiwanese society adapted to the impact of computer technology based on its unique socio-historical background. In order to explore current educational trends in the U.S. and in Taiwan and to acquire a cross-cultural understanding of the current uses of computer technology in art education, I analyzed how visual arts were affected by modern image reproduction technology. These issues introduce the arguments of how computer technology brings about its revolutionary effects on visual arts and art education. Finally, I brought up the problems surrounding Taiwanese contemporary art education by examining the theories and the practices of the 1^{st}–9^{th} grade curriculum alignment.

Curricular development must address social change. The new curriculum system has been implemented since 2002. The first generation of students in this new program has graduated in June 2005. An educational evaluation is necessary. Through the examination of the educational objectives, instructional practices, and students' achievements, the feedback could provide the information required for improving the curriculum.

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