

How Technology Affects Art Education:

A Review of the Literature

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As technology increases in use as an educational tool, a need exists to explore how technology affects art education. This paper will provide a review of recent literature based on this question. Both primary and secondary articles were evaluated from current scholarly research journals in relevant fields of study for the development of this broad review. Relevant topics such as assessment, attitudes and integration of technology in the art classroom will be explored.

The integration of technology in the classroom is gaining momentum in most areas of the study. However, the art classroom remains a place of relatively slow adoption. It is very important to examine how technology affects art education and explore opportunities for integration. Gregory's (2009) review of this topic advises a timely, wise approach so that we may consider both keeping aesthetic and physical approaches currently present in the art classroom while carefully balancing an integration of the technology that is so prevalent. As students enter today's art classroom they have been exposed to more images that have generated and delivered using technology now more than ever before. This visual exposure of images forms ideas and perceptions that affect outcomes of their creative work. Also, the saturation of technological social visual media device usage is pervasive in today's culture and the age of adoption and mastery of these devices often begins at a very young age. The need for connection and collaboration that these visual tools provide can have significant insight to the needs of today's creative learner. The art teacher needs to develop approaches that

provide integration of a variety of available technology into the classroom. These tools assist in helping students to relate their creativity to their visual world and meet challenges ahead in this digital age. At present a growing number of art educators are prepared to meet the challenge, however there exists a need first to explore the availability of technological resources in their respective learning environments.

Bauer and Kenton (2005) employed a mixed-method research design, including interpretation of interviews and Likert scale data, as their approach to exploring available technology integration in public schools. Participants were 30 volunteers from one high school, one middle school and two elementary schools. The data within this particular study, although validating need for more resources in a specific environment, must be viewed in relation to the sample type and size. The small sample of voluntary participants are described as being “tech-savy”, indicating proficiency that may facilitate technical inquiry beyond what may established as normal use within the school environment. This study, although presenting a valuable perspective, could be vastly improved through random sample to indicate a more representative model of educators’ use of technology in schools. However, the results show that even from a biased perspective, true technology integration has not yet been achieved in the general K-12 classroom. The study indicates that this may be because of a need for up-to-date software, more computer resources and a concern about lack of technological know-how on the part of other faculty and students. The availability of technology resources for the student in and out of the classroom is an important factor while considering the needed time for exploration and creative problem solving with the media.

Barron, Walter, Martin and Schatz (2010) investigated the relationship between access to computers and creative production activities at two middle schools, “Juniper” and “Maple” in Silicone Valley, California. The sample of 160 8th graders was socio-economically diverse and the boy to girl ratio in the study was near equal. Several sets of comparative analysis were completed during the survey research study of the two schools. Comparison of the two school’s population’s including average level of student creative production experience, access and use of computers in and outside the home and learning resources were correlated. Correlates of variability were explored through a regression analysis investigating individuals experience with creative production activities. The study showed that a divide indeed still does exist in individual’s opportunities to use technology for creative production. This is due largely to physical access to computers at home, access to networks outside the home and learning resources. However, the findings of the study also indicated that individuals did not differ in their interest in learning about technology and suggests we explore new ways to keep student’s connected through creative technology integrated learning experiences.

Gorder (2008) focused a study to examine how technology was used and integrated by teachers into the K-12 classroom. In the study of 300 (56% response) teachers who attended an educational technology seminar in South Dakota were sent an existing well-defined survey instrument (including significant reliability and validity data) that identifies instructional strategies for demonstrating appropriate use of technology for enhancing student learning in the classroom. Results were then compared by integration of technology variables based on gender, age, number of years teaching,

grade level taught, content taught and education level. A correlation analysis of the data was performed and analysis of variance (ANOVA) was used to determine differences among the groups of data. According to results of the study no significant differences existed in the variables of the study except for grade level taught. This study needs to be expanded in terms of a more diverse sample of educators (as each were attending a “technology” seminar) and inclusion of research into availability and creative use of technology, such as the use of online resources for creativity, collaboration and meeting learning objectives.

Janet and Miles (2009) provide information from a case study involving an interactive online environment to first-year college students at an Australian university that investigated the use of this tool as a possible collaborative way to “reinvigorate” the teaching and learning of art and design in the digital age. The theme of the investigation was that the new generation of art and design students are in need of learning devices that keep up with the current social technology trends and stimulate interest in the learner. ARTEMIS (Art Educational Multiplayer Interactive Space) was designed as an online e-learning game in which students may interact and collaborate on objectives based on art history and design theory. In the study 200 first-year fine art and design students engaged in the use of ARTEMIS for an allocated amount of time and then filled out a questionnaire relating to their experiences including their impressions of the tool as a learning device. The results were described as “mixed but very encouraging”, providing percentages indicating a high approval rating. No details are provided regarding the questionnaire instrument or statistical analysis of the data used in the study. The

gathering of such data with the inclusion of interview and observational record could possibly shed more light on the value of interactive media integration into the learning environment. The opportunity also exists in this situation to provide a detailed experiment involving this tool in relation to control groups and subsequent test score data from the students' respective traditional art and design classrooms. A conclusion based on this survey states that although more research needs to be done regarding the long-term effects of the continued use of the tool, that the students were receptive to it and that it facilitated collaboration with peers and generated interest in the subject matter.

Seet and Quek (2010) investigated 68 secondary school students' perceptions of a created art project-based, face-to-face learning environment that included the requirement of online collaboration with peers, and attitudes towards subsequent project work. Survey methods research using two questionnaires as designed instruments were administered including a "Project Work Classroom Learning Environment Questionnaire (PWCLEQ)" and a "Project Work Related Attitudes Instrument (PWRAI)". Reliability and validity reports of these instruments are neglected within the study. Simple correlation analysis showed that all environmental dimensions were significantly related to attitudes towards project work. Multiple regression analysis uncovered the strongest predictors of students' attitudes to be instructor support and social presence. This may indicate that environment and teacher attitude play a significant role in the adoption of technology into the art education classroom. The interaction and support from the instructor in regards to technology in the art classroom can play a vital role in the motivation of the teacher and student to explore technology as a creative tool in the learning environment.

Phelps and Maddison (2008) reported on a study of 14 diverse secondary visual art instructor's integration of information and communication technology (ICT) in rural Australian based on the question as to whether there were specific motivational factors that inspired art teachers to integrate technology into their classrooms. A qualitative, interpretive approach to the research included interviews and questionnaires based on a point system. Other than the table defining the participants, no reliability or validity data regarding the instrument or other quantifiable data was presented in the research findings. The initial research question in this case is valid and research could be improved by a quantitative study based on simple random sample of population and the distribution of a similar questionnaire as the one used, but based on a quantifiable Likert scale survey. The findings did however reveal important observations. That age or time teaching did not appear relevant to acceptance of technology and that it was the proactive and learner-centered art teacher that had a more positive attitude in regards to technology adoption. Most importantly it was the technology applicable to project first, not teaching technology first teacher that appeared to be the most proficient in the integration of technology into the art classroom. This was an important point as access to technology resources influenced individual visual art teachers approach to application. The study concludes in the observation that there needs to be more investigation towards the attitudes of teachers regarding not just there acceptance of technology in the art classroom, but their values, beliefs and motivation using technology.

Technology integration into the art education classroom requires an examination identifying pedagogical characteristics of teachers that employ such tools. Black (2009) conducted a cross-case study research project over several years collecting data using media sources, interviews and observations of teacher's motivation for employing visual technology at two private Canadian schools. Although no instrument is defined or statistical data detailed, an analysis is described as revealing generalizations of the data. Mandates appeared highly influential in teaching styles as well as required special programs involvement. Most importantly it showed that available resources influence teaching styles. These generalizations show that in a changing educational environment, a successful pedagogy must include the involvement of both the teacher and learner in establishing goals in concert with the technology at hand for delivery of effective learning outcomes. The Internet is a generally available form of technology that should be considered by the art educator as a viable resource for this type of incorporation into creative learning activities.

Colman (2004) did an exploratory case study investigating the integration of the Internet to a traditional secondary art classroom unit. The Internet was used to introduce visual elements for aesthetic interpretation, identification of artistic elements and subsequent application of gained knowledge in student artwork. Coded observational notes and interviews of 17 secondary art students in one course were evaluated for similarities and emergent themes. Although an opportunity existed within this process to expand the study to include quantifiable research method, no empirical evidence appears within the study. The findings are presented as detailed descriptions of classroom process

and lengthy quotations of student experience and subsequent interpretations relating to the process applied within the unit. This dialogue provided substantial insight into the frustration and lack of agreed upon method of the integration of technology into a highly creative environment such as the art classroom. The study concluded by emphasizing the need for the instructor to be involved in formulating traditional aesthetic and critical judgment skills in relation to subject-specific software.

In a recent scoping survey Lindsay and Meachem (2007) investigated the integration of subject-specific design software into the structure of a visual communications courses to investigate use of such technology in respect to necessity within curriculum design. The study included interviews of 3 educators and 33 students who completed questionnaires inquiring on software use and learning objectives. This data was evaluated for content and applied in context and often as quotes throughout the report. The argument was made that learning new design software was a priority and

should be available not only in design courses, but the “normal” learning environment. This is a limited baseline survey that although may provide relevance within the institutional structure of a visual communications program and make a good argument for updating and/or purchasing more software, it could provide more value for art education by including a large simple random selection design and an established survey instrument to indicate levels and specific expectations of technology use.

However, several pertinent thoughts may be taken from the study that has implications for art education in general. This includes, the emergence of prevalent software that may soon be deemed standard in the art classroom and the importance of teacher and student

involvement of technology integration in tandem with curriculum design. It also helps us to appreciate the emergence of the computer as an instructional device to demonstrate art and design elements for communication of learning objectives.

Austin (2009) examined key differences in design element application in multimedia to investigate transfer of gained visual knowledge to an applicable interpretive task. In the study undergraduate students were randomly assigned to three separate experiments involving a series of electronic visual images and subsequent completion of reliable and highly validated survey instruments. Two academicians evaluated the surveys and a Pearson's correlation coefficient resulted in a significant positive relationship in the scoring. Extensive additional statistical procedures including coefficient of correlation and analysis of variance were performed on the completed data including individual, in-group and between group analysis involving such variables within the research as multimedia combinations, cognitive individual differences and placement of text. Overall, the results indicated a high relationship between designed elements and communication comprehension. Although visual placement of art and design elements within electronic display devices may appear to facilitate transfer of applicable knowledge of certain criteria, it is important to consider the many contributors of the students overall cognitive development that facilitate their individual interpretations of image as delivered by the digital media. The study of individual interpretation and understanding of message relative to visual placement is an important but should also include the impact of color and color theory.

Kim and Hameed (2009) did an innovative correlation study between human evaluation and computer ratings of color usage in children's drawings. A computer based assessment tool was created as a way to explore the possible integration of technology as an assistive rating device in the evaluation of student artwork. The computer system rated the variety and placement of color in individual artwork based upon methods from the field of artificial intelligence including, "blurring, clustering and clustering and technologies of vision." Two art therapy experts also independently ranked the artwork of 52 third, fourth and fifth grade elementary students in order of variety of color usage variables. A spearman rank correlation coefficient and was used to measure inter-rater reliability between the two revealing a high positive significance. A correlation of the computer results and the human evaluations were conducted to reveal very little differences between the two. The evidence provided in this very detailed correlation study indicates that the technological tool described can provide assistance in assessment of color usage in artwork. Although this provides interesting possibilities for future art assessment using technology, there are current digital visual processes and delivery methods involving artwork that are becoming more and more familiar to the modern art and design educator, such as digital copies of portfolio work.

Dorn and Sabol (2006) conducted an experimental study that focused on whether 29 secondary art teachers evaluated actual works of art differently from digital copies in select 178 secondary student portfolios. The study used a pre-test/post-test, design consisting of two evaluations, one midway and another at the end of the semester. The design instrument was created using a standards-based rubric identifying process and

delivery consideration of portfolio work on a point scale as evaluated by teacher raters. The data was correlated for several factors including correlation of pre-test pos-test groups and rater reliability using analysis of variance. The conclusion from the data presented was that there was indeed no significance in difference of evaluations of actual or digital student work. It showed that digital representations of student work could indeed be viewed as legitimate representations for both transportability to various media and academic assessment. The author claims that the designed instrument used in the study, “multi-judge scoring process”, can continue to be used as a reliable assessment in the art-classroom. What may certainly be taken from the study is that accomplishment of learning goals and objectives are easily recognizable in digital representations of student work. Student familiarity with digital incorporation of handmade art is an important step in understanding common visual communication strategies that facilitate visual literacy.

Yeh and Cheng (2010) did a study exploring the use of established visual literacy practice involving a convenience sample 86 pre-service teachers from four separate courses to investigate if established design principles applied to visual media affected comprehension of message. The research design was described as a nonequivalent control-group quasi-experimental design with students separated into four groups, one of which being the control. A pretest and posttest were administered on interpretation of content regarding a variety of diverse visual subject matter such as math problems and party invitations. Design principles were intentionally formulated in the media to better identify levels of comprehension of message in relation to visual design interpretation. The comparison groups received computer application lessons while the control group

received lessons (treatment) including instructions on established design principles. An independent samples t-test was performed on the pretest to reveal no real difference in the two groups. Repeated ANOVA was run on both posttest groups to analyze statistical differences. The results were significant in finding that integration of visual design instruction positively affects comprehension of digital media communication. This demonstrates that it has become crucial that the vast and abundant availability of visual resources today must be interpreted and carefully managed by the educator in the educational environment to facilitate appropriate and meaningful synthesis of learning goals and objectives. The art teacher now has the opportunity and responsibility to investigate and selectively include a wide variety of technological media available to enhance the art educational environment.

Delacruz' (2009) review observes that art education has always been an inclusionary field accepting of diverse viewpoints and media. Technology integration as a tool for processes in art education is inevitable as graphic arts and the study of design becomes more recognized as culturally relevant and resources become more available. Familiarity with these technology generated images and interpretation of them inside and outside the classroom obviously builds several cases of importance for the art educator other than technology application of process for product generation. One such case for inclusion of technology in art education can be discussed on the basis of a change we see currently happening in art teaching pedagogy, the concern with "cultural citizenship in an age of global media".

In conclusion, this paper provides insight for opportunities to explore the various aspects and questions that one must consider while determining how technology is affecting art education today. One such question that needs further examination is, “What are art teachers’ attitudes regarding integration of technology in K-12 American public school art programs?” A qualitative research approach to this could begin with identifying a sample that adequately represents the population for use in a large-scale national cross-sectional survey design. A large random survey of the NAEA (National Association of Art Educators) membership could effectively meet this need. A questionnaire instrument based on the Likert scale could be developed to address issues related directly to the topic while providing insight into related areas for further investigation. The returned data could be analyzed to examine attitudes towards technology integration in art education programs and provide beneficial information for dialogue on this timely topic.

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