Why Technology in the Music Classroom?

Can a Computer Do Your Job Better Than You Can?
Jay Dorfman

Introduction

As music educators, most of us feel that our experience, patience, caring, and above all, our musicianship make us the best at what we do. We spend our formative years finding the best and most effective methods of teaching our students, then use the rest of our careers to hone our craft.

In the modern education world, we are constantly faced with new situations that we may either welcome with open arms, or we may choose to turn away from them. Integrating technology into our traditional music classrooms is just such an opportunity.

School districts throughout our nation are currently dedicating large portions of their budgets to technology. Teachers across the curriculum are encouraged to use and teach the technology of their specific field. But while teachers in many subject areas view technology as a time saver, music teachers have been somewhat resistant to the available technology.

Recent research has examined the merits of technology in the music classroom. The focus of much of this research has been to determine to what extent computers or other technological devices can replace traditional methods of music education. The purpose of this article is to examine the results of that research, and to draw some conclusions to help us use technology to our advantage.

Is technology an effective tool for today’s music teachers? Can a computer do what you do, as well as, or better than you can?

The Research

The use of a game—like piece of software—and its motivational benefits toward music learning were observed and analyzed in a study by Simms (1998). Four male beginning piano students, who all had certain motivational deficiencies toward the acquisition of basic piano skills, were used as the population for this study and were observed using the Miracle Piano System as an alternative means of obtaining minimum performance levels. The author based her observations on Mehr and Braskamp’s Theory of Personal Investment, which observes 5 patterns of behavior: (1) direction of attention, (2) level of activity, (3) persistence, (4) continuing motivation, and (5) performance.

As a result of utilizing a technological approach to teaching these beginning piano students, improvements in the 5 observed behaviors were present. Simms concluded that rather than choosing to challenge themselves, students remained at the beginning levels of the program’s game-like structure.

The small population for the study allowed the author to make concrete observations about each individual participant, taking into account their initial levels of interest, skill, and motivation (both intrinsic and extrinsic). Four weeks after the conclusion of the study, all students still showed signs of raised levels of interest and motivation and gained the skills that the program focused on during their period of exposure to it. The author concluded that the technological approach used in this study would have long-lasting effects on the students. Of interest would be the comparison of this study to a similar population exposed to the same skills in traditional studio lesson format and a comparison of the lasting motivational effects of each.

Repp (1999) studied technological methods as they related to applied voice lessons of undergraduate students. Three types of technology were
employed in this study: (1) accompaniment software (SmartMusic), (2) Internet functions such as the World Wide Web and e-mail, and (3) spectral analysis software. These types of technologies were used in each of 8 45-minute voice lessons for 6 students.

Students were exposed to the technology both in the lesson setting and outside of the lesson. The author collected 3 forms of data, only 2 of which measured the effectiveness of the technology. The students were asked to complete questionnaires regarding their reactions to the technology at the end of each of their 8 lessons. Then, students completed an online Likert-style questionnaire about the effectiveness of the technology implementation outside of the lesson environment. Finally, the author, who was also the voice teacher, recorded a journal of his own reactions to the uses of technology in his studio.

The spectral analysis portion of the data collection proved to be less effective over time. The author concludes that this portion of the study was affected by the “novelty” of the analysis device. Students found it interesting and useful at the beginning of the study, but their interest waned as the semester progressed.

The integration of the Internet into lessons proved slightly more favorable throughout the course of the study. The author reported problems of students not checking their e-mail regularly and the speed of Internet connections in his studio as a hindrance to this technique.

SmartMusic software contains functions for accompaniment, a chromatic tuner, and a warm-up device that allows user-controllable pitch selection through a footswitch attachment. All three areas of the software were employed in this study, and each proved a feasible tool for use in and out of the studio setting. The author says that the software is relatively inexpensive and easy to use, securing the status as appropriate and feasible in both environments. The author intends to repeat the study in a future semester using other types of technological tools.

Bush (2000) studied the effect of hypermedia on learning style and gender. The author first organized the population for the study into groups using the Group Embedded Figures Test (GEFT), a test that measures the degree to which subjects are affected by the organization of data with which they are presented. This test reveals two groups: (1) Field dependent (FD) individuals are influenced by the organization of data with which they are presented; (2) Field independent (FI) individuals perceive elements embedded within a background. Test results placed 41 students in the experimental group and 43 in the control group. Subjects (N = 84) were sixth- and seventh-grade Canadian music students.

During the two-week data collection time, experimental group subjects had 40 minutes to review the hypermedia lessons about steel drum ensembles that the author had compiled using Hypercard 2.2, CD Audio Toolkit, and other scanning and utility software. Students also received a tutorial about how to use the hypermedia lessons. A 40-minute lesson was presented in more traditional lecture format to the control group that included the same information as the hypermedia lesson, and in fact used the same video and audio clips. By the end of the two-week time period, each student had been given a 20-question multiple-choice test about the information in the lessons. The post-test was readministered six weeks later.

The data indicated significant differences in test scores. The control group that did not use the hypermedia lessons scored higher than the experimental group. The students labeled as FI scored higher than those who tested as FD. Test scores dropped significantly between the two administrations. There was no significant difference in test scores between males and females.

The differences between the experimental and control groups may be due to a lack of validity in the testing instrument. Bush refers to previous research that claims no significant differences between the achievement of students who learn using the two different methods and is therefore surprised by the outcome of his study. The “richer learning environment” used in the hypermedia instruction may not be compatible with the author-designed test.

The variance between the scores of FI and FD supports research that when exposed to hypermedia material, field independent students will score higher than control groups. The lack of significant differences between the test scores of male and female subjects for both the first and second post-tests indicate that males and females “are equally capable of learning in a music classroom through hypermedia and traditional instruction.” The author also includes his observation that the hypermedia instruction used less classroom time than did the traditional expository teaching.

Bush suggests that further research is needed in the area of long-term retention levels of students who are exposed to hypermedia, and that a longer testing instrument may have rendered different results.

Orman (1998) studied the use of technology as a replacement for traditional instruction for
beginning saxophone students. An experimental group of 20 sixth graders used a computer program designed by the author using Macromedia's Authorware Professional for 8 to 15 minutes a day over a period of 15 to 17 days. The program contained 11 instructional units relating to various topics of interest to beginning saxophonists. A control group of 24 students was not exposed to the program, but instead had only traditional instruction. Upon completion of the computer program, the experimental-group students were given a Lykert-type survey that examined their attitudes toward the program. Both groups were given a post test regarding the information they learned during the time of the experiment. Also, students were videotaped demonstrating their abilities to assemble and disassemble their instrument, and the performance of long tones.

Attitudes toward the computer program revealed that the students were in favor of the program's use. The post-test data indicate that students who used the computer program learned the information better than those in the control group. The videotape data, as analyzed by 2 experts, revealed that the computer-instructed students were more successful than the traditionally-instructed students in the executive skill areas.

From these analyses, the author concludes that similar types of multimedia programs would be effective for use in other areas of instrumental music education.

Meeuwen, Flohr, and Fink (2000) used a computer program to help predict the rhythmic abilities of 30 students who were from various elementary schools in the Denton, Texas area. The program, designed by the authors, was designed to test the rhythmic abilities of those students to perform in synchronization with prerecorded MIDI excerpts and to retain and imitate similar excerpts. Subjects took the test twice over a two-week period.

The Rhythmic Performance Test-Revised (RPT-R) was theoretically based on the Rhythmic Competency Analysis Test (Weikart, 1989). The first part of RPT-R was designed to test rhythmic synchronization by playing an Irish folk song at varying tempi; the second part was designed to test imitation by playing 20 rhythm patterns of varying length, meter, and tempo, to be imitated by the subject.

The data collected were measurements, in milliseconds, of the subject's deviations of accuracy. Three types of deviation measurements were collected. (1) Constant Error (CE) is the length of time that a respondent varied from the given beat when performing a synchronization exercise. Measurements were recorded as positive if the respondent was late, and negative if he/she was early. (2) Absolute Error (AE), therefore, is the absolute value of the CE measurements. This measurement is necessary because the negative and positive values cancel each other out in the data collection process. (3) Variability Error (VE) is the standard deviation or consistency in the performance of the respondents.

The data were presented as a comparison between the results of the first test and the second. The authors state that future research will develop norms to which these scores can be compared, which would certainly make the data more useful and relevant. However, the data as presented shows only small changes in the percentage of AE between the first and second tests.

The author concluded that the RPT-R may be useful for diagnosing a student's rhythmic aptitude or a student's ability to play in synchronicity with an ensemble, and to determine the progress a student makes while being instructed in rhythmic performance.

Conclusions
Considering the availability of technology as a part of today's educational community, it is important that we ask ourselves how we can use that technology to enhance the experiences we provide our students. All 5 of the studies examined herein conclude that technology integration into the music education environment provides a positive change. These authors agree that students learn as efficiently as do students in a more traditional environment, students view the use of technology with a positive attitude, and they enjoy learning using it.

We must, however, take a careful look at the drawbacks to the uses of technology that were tested in these 5 experiments. In one case, students chose to avoid challenging themselves. Rather, they viewed the technological integration as game-like. Some of the uses of technology proved to become less effective over time, while a lack of retention of information was a problem in another case.

Certainly, as suggested by the authors, more research is needed in this area to help music teachers use technology as a tool. Dawson (1995) states, "The way music was taught 20 years ago will not work with today's students. Technology is a part of nearly every discipline. It is not a fad and it is not going to go away." It may help us teach more effectively and our students learn more efficiently.
Efficiency and Transformation: The Impact of Technology on Music Education. A response to Carlesta Spearman’s article “How will societal and technological changes affect the teaching of music?” Vision 2020: The Housewright Symposium on the future of music education

Maud Hickey

In her Vision 2020 chapter, Carlesta Spearman accomplishes the exceptional task of providing readers with answers to questions about how societal and technological changes will affect music teaching in the future. She begins by providing us with statistics about looming societal changes and then reminds us that technology is one of those changes. Societal and technological changes are advancing at a pace too fast for us to sensibly comprehend even the immediate, much less future implications.

Although Spearman acknowledges that the “computer has become central to our way of life,” she points out the potential problems this causes, such as personal isolation, greater stratification of the “haves and have nots,” and inequity in education. Trends on the horizon that Spearman predicts include more growth in computer-assisted instruction (CAI) for music teaching and learning, the development of new cultural symbols created via computer animation, and a growth of technology in such abundance and complexity that it will create a growing sense “that music surrounds us and is simply a part of life” (2000, p. 161). Her point that “quantity is not synonymous with high quality” (p. 161) however, is an important, yet often overlooked warning. Spearman then offers a list of positive developments that technology will or has already brought to music teaching: direct commerce from composers and performers to consumers; more creative and animated teaching tools; distance education; interactive, computer-based instruction; music accompaniment programs; cyberspace communication and dissemination of information; and less gender stratification. Spearman also recognizes that CAI will offer programs that “stimulate music experiences associated with composition and improvisation” (p. 161).

In this essay, I will expand upon two points that Spearman briefly mentions: one point pertains to computer use in music composition and the other examines the related area of music literacy. In adjacent sentences Spearman refers to both: “Having the computer resources to make it possible to create original music does not mean the user will become an expert composer. Furthermore, an intelligent consumer of this musical information requires a high level of music literacy and maturity” (p. 161). I will argue that musicians as well as consumers do not necessarily need a “higher” level of music literacy—in the traditional sense—but a different kind of music litera-