

TECHNOLOGY AND THE PIANO STUDIO: A TEACHER'S NEW TOOLKIT OF AUDIO AND VIDEO RECORDING AND INTERACTIVE GAMES

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The current student generation is one that has grown up surrounded by technology: an environment where computers are no longer easily separated from day-to-day life, where the internet, interactive games, digital gadgets, social networks and information connectivity and sharing are defining characteristics of the technological age.

Until 2006, when I began to use technology to support my interactions with my pre-tertiary piano students at the Young Conservatorium, Griffith University, my own private teaching practices had only rarely involved any technological components, despite my own contact with a range of technology daily and my understanding and appreciation of successful technology integration in primary/ secondary music classrooms. This paper discusses some of my experiences, intent, observations and outcomes following the implementation of selected technological tools, including audio and video recording and interactive customisable computer games, in the one-on-one lesson.

With technology playing an increasingly present role in learning, technology has been described by Roblyer (2006) as “a channel for helping teachers communicate better with students.” (Preface, v). The term itself has broad applications and definition: as it is most commonly applied to music education, ‘technology’ may encompass computers, a wide range of computer programs, electronic devices, and other items of hardware such as microphones, recording equipment and electronic instruments (including but not limited to digital keyboards and pianos).

Within the piano studio, the incorporation of technology has long been discussed and encouraged, but the percentage of teachers utilising technological elements within their practice remains in the minority. Technology may have previously been dismissed as a novelty addition, avoided due to the unknown or a stigma of unreliability, a sense of lowering expectations, the fear of unmusical performance, expense, and in a curriculum which is already time-compressed, deemed inefficient or unnecessary. Or, like the author of this paper, one may have been open to the possibilities afforded by technology, but have taken (or will take) time to get started.

Until 2006, when I began to use technology to support my interactions with my pre-tertiary piano students at the Young Conservatorium, Griffith University, my own private teaching practices had only rarely involved any technological components, despite my own contact with a range of

technology daily and my understanding and appreciation of successful technology integration in primary/secondary music classrooms. My students – aged between four to final-year high school students, with levels varying from those at the tutor book/elementary stage to advanced diploma/tertiary-equivalent students – were achieving good results. Lessons were one-on-one and acoustic grand pianos were used. In retrospective analysis, I had largely been teaching using the (successful) methods and in an environment that I myself had been taught, going back over 20 years.

As teachers, we have been questioned “Are piano students really different today?” (Lancaster, 2006). Within my cohort of pre-tertiary piano students, part of the so-called ‘Y’ and ‘Z’ generations, I had noticed seemingly minor changes. More students were sending emails and messages with links to visit ‘this website’, mostly containing a video performance of a piece they wanted to know if they were allowed to learn. If they did this, they had usually also downloaded the corresponding score from a website offering ‘free sheet music’, and printed off the pages to bring to lessons. They would discuss the performances of the Bach Prelude and Fugues that they were learning and had watched on YouTube, or the recording that was downloaded from iTunes. When opening the door to welcome the next waiting student, it was common to be greeted by the hurried motions that accompany the pulling out of earphones. And instead of watches and wallets being placed on the piano music stand or nearby chair, it seemed most students had some sort of iPod, MP3 player or media-capable mobile phone taking pride of place.

Having noticed their near constant engagement with technology, I was encouraged to utilise aspects of this in my individual teaching practice. For these generations where technology is deeply integrated into their lives, the fact that their piano teacher may draw upon a toolkit of technological tools within lessons was not going to be new or surprising to them. If there was any risk of ‘trivial novelty’ or a time-wasting activity as I had feared, it was unlikely to be on the part of the technology itself, but rather in the way it was utilised. This paper will discuss some of my experiences, intent and observations in the implementation of these tools.

Technology for the sake of including technology, or simply because there was a technological product available that could theoretically do ‘x’, was avoided. An analysis of where I felt technology might successfully support my teaching led to investigations of sound and video recording, and an exploration of commercial music theory/general knowledge applications. Recording was an obvious choice, as a valuable tool in encouraging further self-reflection/awareness and deeper listening, in addition to providing a record of performance that could be used as a motivation or goal post. Theory and general knowledge exploration

arose from the desire to see students continue and consolidate their learning outside of the weekly lesson.

In addition to fulfilling pedagogical needs, any technological tool that was considered would also have to fulfil the following general criteria:

- a) easy to use, thereby also workable by my students (if applicable);
- b) quick/transparent to setup, not likely to consume most of the lesson time in ‘fixing’;
- c) for computer software, available at modest cost, if students/parents were to be advised to purchase items.

After researching computer software possibilities, it became apparent that there were many programs (albeit of drastically varying quality and standards) available to ‘drill and practice’ music theory and aural concepts; several of the programs investigated could be useful for individual students for ongoing work outside the lesson.* There were considerably fewer programs that could reinforce repertoire knowledge, the most pertinent being general overviews of music history. Much of this information could already be found online via databases and reputable websites. Furthermore, these commercial music history programs tended to either be: not specific enough; focussed on a parallel topic (i.e. interaction of music and art in the Baroque); or were encyclopaedic in nature and thus targeted at an older audience. For older students, with teacher guidance, this type of tool may have helped develop research skills, but for younger students who happened to be tackling advanced repertoire, this style of resource would be too difficult to use.

For consolidating general knowledge and providing a means of testing specific to the pieces and composers students were learning, there was no commercial solution (currently) available.† Given the diverse possible nature of a student’s repertoire, teacher preferences and student needs, it was perhaps unrealistic to expect that there could be such a program at this point in time. The resolution was to personally develop a

* Some of these programs included *Auralia* (ear-training: covering areas including intervals, scales pitch, rhythm, harmony, chords, dication, singing), *Musition* (general music-theory, similar areas to *Auralia* and also instrument knowledge, terms; written input approach), *Music Ace* (music theory/musicianship for younger students), and the *Groovy Music* series (basic music concepts, starting with *Groovy Music Shapes* for youngest students). Having been developed in Australia, *Auralia* and *Musition* have various Australian state music education syllabi built in to the program, as well as offering customisable training for individual students.

† *The Pianist*, a program developed by PG Music and released in 1993, did provide informative background information on many major piano works and composers. The program is no longer available.

series of short, simple and highly-focussed individual programs, covering a specific or single topic.

Customised Interactive Games and Quizzes

Prior to the development of interactive games, I had a small bank of paper-based revision quizzes which were primarily concerned with a single work, composer or era. These consisted of ten questions, with a question sheet handout for the student and an answer sheet for a family member/friend. These resources generally achieved their purpose, but were reliant on having a partner to test with, and once the questions were answered, students often considered them 'finished'.

Most students of this generation regularly play computer games. In a computer game environment, students are usually stimulated by the element of competition (against the clock, against one's self) and the challenge of difficult levels or a problem to solve. Instead of giving up, these challenges are repeatedly attempted with determination and enthusiasm until the problem is conquered. Within this entertaining, colourful and interactive environment, students can see tangible evidence of their improvement. High scores, successfully reaching new levels, unlocking the 'reward' at the end of a scenario all become powerful (and possibly addictive!) motivating factors. Applying computer game concepts to existing paper-based music theory and general knowledge seemed a logical step.

Taking an existing set of quiz questions, a series of short games was developed. Game-generating programs were used to quickly develop the applications, allowing one to concentrate on the content of the quiz, rather than the technical building of the program. Of the range of options explored, the programs from www.contentgenerator.net were flexible, visually engaging and were easy to use, and included generators in the style of multiple-choice quizzes, match-up, key term revision and games in the style of 'Who wants to be a Millionaire'. After downloading and installing the program, my first interactive general knowledge game was ready in five minutes.

These quizzes were able to test all of the general knowledge areas one had hoped to consolidate. Text-based questions only were permitted in the generators, meaning musical examples (graphic and/or audio) were not used; this could be quickly overcome with careful question design. For example, testing aspects of note-reading comprehension and score familiarity were achieved by referring to specific points in the score, i.e. "In bar 7 of 'x', the right hand plays what note on beat 3?"; "Beethoven commences the Development section (b.48) in which key?" This method worked well to tie the technology back to tangible, familiar objects - their

music books and also served to make a link between analysis/theory and the practical.

Quiz questions and ordering of answers are able to be randomised in most activities so that students remained challenged, and were not merely remembering sequences of responses. Time-limits for responses could be set by the teacher or selected by the student; setting a shorter time-limit became very useful as the students became more comfortable with the material. Additionally, most of the quizzes allowed a bank of questions to be input and the required number of questions randomly presented. As the teacher is responsible for writing the questions, the quizzes could be made to be as specific and pertinent (i.e. around a single item of repertoire, personalised to the student,) or as general in nature as desired.

Figure 1: Match-up Quiz



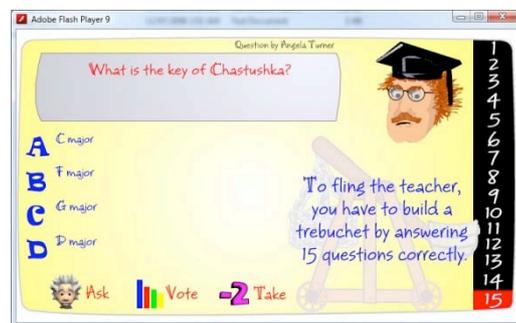
An adaptable, timed match-up quiz.

Figure 3: Half a Minute word revision quiz



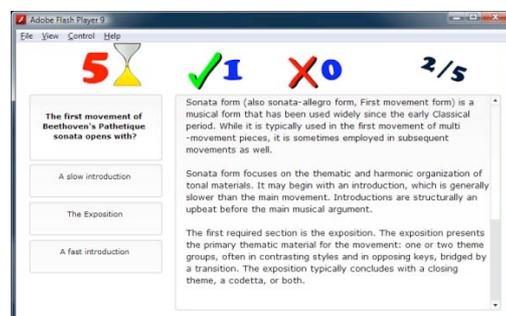
Definition of a key term is provided and the term presented in a randomly jumbled manner. Students are required to respond within a time-limit.

Figure 2: Fling the Teacher Quiz



Quiz in the style of 'Who wants to be a Millionaire'; questions are presented in a fixed order allowing the teacher to start with easier questions, then progressively more difficult. An incorrect question resets the quiz to the beginning.

Figure 4: Multiple-Choice Quiz (with reading)



An adaptable, timed, multiple-choice quiz which can be prefaced by an essay or reading excerpt (meaning comprehension of standard written sources can be tested), or presented as

with no reading and quiz questions only.

It would be an understatement to say that this cohort of students had enthusiastically engaged with these games and learning through this medium. There was an obvious increase in accuracy (specificity), confidence, and enthusiasm (that comes with knowing) in responding to general knowledge and theory questions. Precious lesson time was saved. Compared to the commercially available programs available which were able to successfully drill ‘generic’ music knowledge, the customised game experience was viewed as more relevant. Additionally, smaller factors such as the student’s name appearing on the first screen of the game, i.e. “Sarah’s General Knowledge Quiz”, tended to give the activity added meaning.

From this teacher’s perspective, the initial time required to develop these games was not in the technology, but in the devising of questions (and alternate answers, where applicable). In these particular game-generators, the questions and answers could be cut-and-pasted directly from a word processor into the programs. To save more time, questions could also be written into a formatted text file, and these questions automatically loaded into a quiz, or multiple quizzes. One could therefore utilise the same set of questions, but present them in a different quiz game for variety and/or to test another learning style. Now that they have been developed, these quizzes will be re-used with future students.

In terms of cost, several of the game generators from www.contentgenerator.net, including all four of the examples illustrated above, were free downloads.

***“Do I really sound like that?”* Sound recording in the piano studio**

My students’ first introduction to technology in the piano studio environment was via sound-recording. Initially, I worked to record those at late-intermediate/advanced levels, mostly in the latter stages of performance or exam preparation. With the intent of creating a quasi-performance setting, having their performances recorded ‘pressurised’ the environment more successfully than a regular play-through of their program would have. Though the creation of this environment was alone a valuable tool, the primary purpose was however to try and have these developing musicians hear themselves more objectively.

For musicians at all levels, the ‘subjective’ ear versus the ‘objective’ ear is a life-long challenge. More so in developing students, the perceived sound in the internal mind/ear and the auditory reality infrequently correspond. Even for more accomplished musicians, often the first hearing of one’s own recording can be deeply unsettling, just as

a person (musician or not) may be startled in hearing their own voice recording for the first time.

Similarly, most of my students were very shocked (occasionally pleasantly, mostly otherwise!) upon hearing themselves. Where there may have been the illusions of a stable tempo, a performance filled with dynamic contrast, a real sense of space after a phrase or point of heightened intensity, etc., students were able to better reflect upon their performances as an external listener may have, and were able to practise accordingly, motivated by their own observations.

As Boris Berman (2000) states, “Practicing of the higher artistic order is governed by three questions the pianist should be constantly asking himself:

- 1) “How do I want it to sound?” [...]
 - 2) “Does it sound the way I want?” To answer this question the pianist must listen carefully to his playing.
 - 3) “If not, what should I do to make it sound the way I want?” [...]
- (p.116)

In encouraging my students to analyse their own performances and to verbalise their observations and possible remedies, the teacher’s role becomes more of a guide and fellow-explorer, either re-affirming the student’s thoughts, querying further, or suggesting alternative (or more efficient ways) to go about the process. Via analysis of the recorded sound object, students began to more actively and consistently reflect upon their learning. Significantly, it could be observed that this reflective practice was being applied to all their music learning, and thus other items of repertoire were also experiencing the benefits.

With elementary students, recording had been used similarly: as a means to develop more objective listening and as a tool in the creation of a quasi-performance environment. However, beyond these applications, I have found that the visual representation of sound waves on screen has been an exciting way to demonstrate a work’s musical elements, such as structure/form, rhythmic patterns, and dynamic contrasts.

Case study: Sound recording with an elementary student

The following examples were performed by an eight-year-old student during his weekly lesson, in what was his first experience with recording.

Figure 5: Joseph Haydn, *Quadrille*

From *Getting to Preliminary*, ed. Milne, Hal Leonard Australia, 2004.

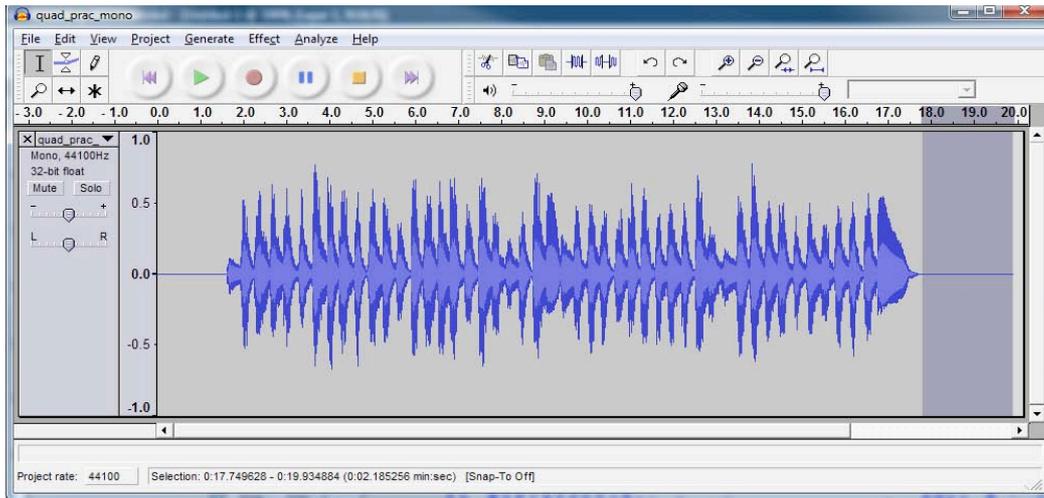
The image shows a musical score for Joseph Haydn's *Quadrille*, measures 1 through 14. The score is in 3/4 time, marked 'Allegretto' with a tempo of 126. The key signature has one flat (B-flat). The score is divided into four systems, each with a measure number in a box at the beginning: 1, 5, 9, and 14. The first system (measures 1-4) starts with a forte (*f*) dynamic. The second system (measures 5-8) continues. The third system (measures 9-12) starts with a mezzo-forte (*mf*) dynamic and ends with a forte (*f*) dynamic. The fourth system (measures 13-14) continues. The score includes treble and bass staves with various musical notations such as notes, rests, and fingerings.

sufficient dynamic contrast was being delivered, though the external reality was otherwise.

The work performed was a Haydn *Quadrille*, a short piece with a simple structure, where we had explored the repeating patterns, and focussed on the differences found in line 3. The dynamic contrast in this line had been repeatedly expressed (via numerous different strategies), and though the concept was understood, the student's realisation of this contrast in performance was negligible, resulting in a dynamically flat level throughout.

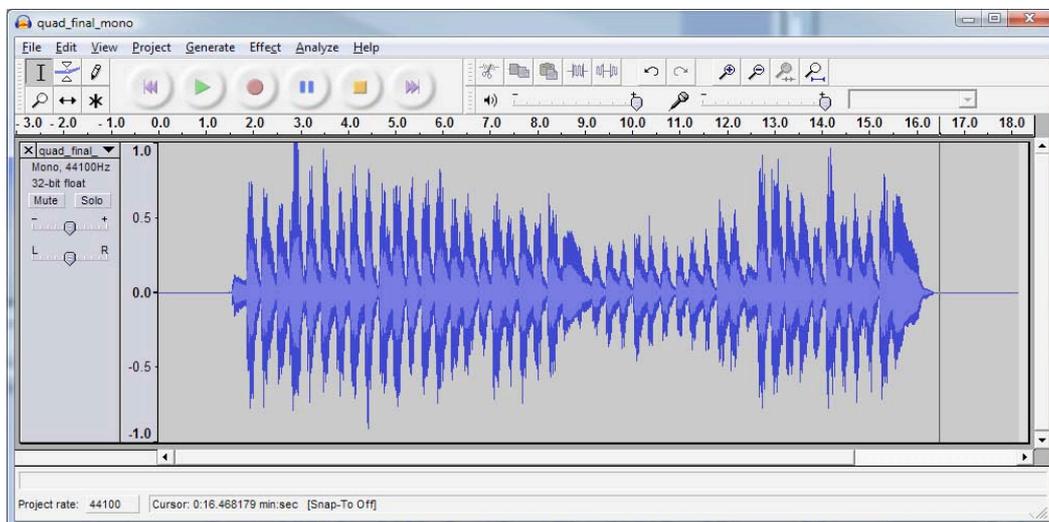
The student had believed and internally perceived that

Figure 6: Haydn *Quadrille*, initial performance lacking in dynamic contrast



After this first recording, the student was shown the image of the sound waves and the performance played back, to considerable excitement. The performance's dynamic uniformity was both aurally and visually illustrated, and the visual representation of this performance immediately clarified his perception of contrasts. The student requested to attempt another recording, as presented below.

Figure 7: Haydn *Quadrille*, subsequent performance



As was heard (and can be seen above), the improvement in contrast was immediate. The student was pleased to 'see' these results as confirmation of his perceived actions.

Whilst the remainder of the lesson continued, a CD with this recording was burned, and the student was able to take this home to play to his family. The following week, the student's parents advised that the CD had been played regularly, and that the change in dynamic contrast

had been mentioned by the student to other listeners as a listening feature. Several weeks later after another experience with recording in the lesson, the student informed me that he and his older sibling had downloaded *Audacity* (the free sound recording program used in lessons), and was experimenting with recording and listening at home.

Broadly speaking, in this studio environment, sound recordings and the discussion of such would generally occur no more than once every three weeks, and mostly towards the final stage of preparation. Though there will always be exceptions according to how different students respond and learn, my concern was that recording too frequently in ‘play-throughs’ would not be an efficient use of the lesson time. In any case, after a few experiences with recording in the studio, most students were arranging to record themselves at home. When recordings were completed in the studio, the process of listening and reflection would be upheld so that students would have a working model to follow, reminding them of why it was happening in the first place.

It was observed, and particularly in the younger students, that recording in the middle of the learning process was rarely a successful strategy. The sense of a recording being ‘final’ meant that they were unwilling to commit a performance that they themselves knew was not as good as they could deliver.

When students are preparing to listen to themselves for the first time, it has been an effective strategy to mention one or two overview points related to their performance, before playback, to help focus their listening. With younger students, these overview points may be things like “listen for the changes in dynamics; try to find where you think the softest/loudest point in this piece is”, or a more active task, such as “follow the score with your finger as you listen”, and so forth. During first playback, it is attempted to keep discussion to an absolute minimum. Students may be listening with amazement or writhing in disbelief. Having them articulate their own understanding before hearing their teacher is a crucial part of the process.

There are numerous methods and tools available to record audio in the studio. In the past twelve months, magazines like *Clavier* and its successor, *Clavier Companion*, have included useful articles focussing on the technical options available. My own setup of a laptop computer (equipped with a CD burner) and a reasonable microphone has been reliable, and using the free (open-source) audio recording software *Audacity* to capture the audio, my students have also been able to observe and utilise the program. Using *Audacity*, one is also able to save the files as MP3s (a compressed file format popular for downloadable audio) and these files can be emailed to students.[‡] Students often place these recordings on their iPods or media players, and one has even observed them in use as ring tones for their (or their parent’s) mobile phone.

[‡] *Audacity* is available with various free plug-ins and processing effects. These ‘extras’, including the MP3 plug-in, are separate downloads to the main program. Links are available from the *Audacity* website.

Other portable recording devices (including a mobile phone which captures low quality but workable audio) have been used from time to time. Some students choose to bring their own iPods with a microphone attachment. Others have brought a USB memory stick to transfer their recording from the laptop.

Admittedly, the available options can be overwhelming. If the sound quality is adequate and the student's reflective process is unaffected, I have personally found that the best approach has been to work with what is most comfortable for the teacher (or student) to operate.

Video-recording: beyond student recitals

Like sound recording, video can be used for the purposes of practicing performance and for self-evaluative reflection, additionally capturing the visual element and gesture of performance. General posture and movement, through to finer finger/thumb/wrist use can be analysed.

Figure 8: Camera angle setup to capture thumb movements in scales



Of course, in these matters, regular teacher guidance and demonstration is invaluable. However, video recording can help make a point more memorable: nothing quite beats the impact of the point when the subject is one's self.

Video recording has also been a useful tool in getting students to practise their presentation skills by verbally introducing pieces and the composers, and any background information about the piece. Students seem more comfortable presenting to the camera. These recorded presentations also serve dual purpose as an identification tag, giving the student's name, age and piece, composer, etc. for later reference.

When the camera starts recording, younger students tend to become energised and then more focused; older students more ‘serious’. The reactions are similar when watching the footage back for the first time. Under the age of 13, an initial burst of the ‘giggles’ is a common reaction, followed by an attentive viewing. Older students tend to fain a degree of initial disdain for their performance or themselves, generally followed by a more earnest and conscientious attempt to observe.

Again, I have been astounded by the rapid improvement in students once they have seen themselves through the eye of the lens. Self-awareness, particularly of counter-productive body movements, has been greatly enhanced. As a teacher looking through the lens or watching the video later, it is a surprisingly different experience as compared to ‘standard’ observation.

In the same way as sound recording in the studio, video has also been a motivating factor in maintaining preparation goals (i.e. “next week/in two weeks time/etc., let’s aim to record these pieces”). The provision of DVDs/footage to students and parents at the end of a semester have become treasured keepsake items.

Again, there is a potentially overwhelming range of products that can accomplish video recording in the lesson. The equipment is no different to consumer video technology. My own setup involved one of the entry-level cameras available at the time which recorded onto removable SD cards.[§] I chose this option over hard drive or tape as the SD camera has less moving parts and therefore longer battery life – less chance of needing to setup and tape down power cables in the lesson. It would also be quick to transfer the footage from the card to a computer without the need for extra cables. This particular camera could be controlled by remote, meaning one did not have to walk to-and-fro between the camera and piano to start and stop recording. Using the camera’s built-in screen, footage could be immediately played back without having to transfer to computer or DVD.

More simply, however, a mobile phone which is capable of capturing video (as most models equipped with cameras can do), is also capable of demonstrating a point.

Overall, I have been both surprised and pleased at the introduction of these technological tools into my teaching practice, particularly in the ways that it has been able to support my teaching without overwhelming it, or myself. Video and audio are of course not new to this student generation, but seeing and hearing themselves perform through such

[§] Manufacturer and model: Canon FS100. Two years ago, this was available for between \$450-550.

media has made them more inquisitive as to how and why they do certain tasks at the piano, encouraged deeper listening and creativity, whilst also giving them the self-motivation to do even better.

Alone, the increased self-awareness and thus greatly improved musical independence has made this exercise worthwhile. Similarly, the use of interactive customised games to quiz students on aspects of their pieces and context, has allowed students to actively continue and reinforce learning outside of the studio in an engaging way.

From a teacher's perspective, these tools have also provided an opportunity to review students' progress over extended periods of time without the bias of distant recollection or personal feeling.

Though technology has certainly become "a channel for helping teachers communicate better with students", my experiences thus far have found it to be an even more valuable tool in allowing students to develop the skills to realise and to build confidence in communicating their own musical thoughts.

References

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- Lancaster, E. L. (2006). Are Piano Students Really Different Today? *American Music Teacher*, 56 (2, Oct-Nov 2006), 30-34.
- Robyler, M.D. (2006). *Integrating Educational Technology into Teaching* (4th ed.). New Jersey: Pearson Education.

Further Reading and Resource List

Audacity (sound editor). <http://audacity.sourceforge.net/>

Content Generator (educational games). <http://www.contentgenerator.net>

Readers wanting more technical information on how to record sound and video in piano lessons can consult the following articles:

- Sisler, M. (2008). Recording Audio. *Clavier*, 47 (4, April 2008), 34-38.

Cremaschi, A. (2008). Video Recording in the Studio. *Clavier*, 47 (5, May 2008), 8-10.

Cremaschi, A. (2008). Creating and Editing your Movies. *Clavier*, 47 (9, September/October 2008), 20-21.

Cremaschi, A. (2009). Publishing your movie: DVDs and Internet. *Clavier Companion*, 1 (2, March/April 2009). Accessed April 28, 2009 at <http://www.claviercompanion.com/mar-apr-09/video/video-production.html>

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