

Using the IBM PC to Teach Music to Deaf Children

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Introduction

Computers in schools are a "growth industry". More and more of them are being installed in school after school, as educationalists realise that the age of the computer is here to stay. The media bombards us with tempting offers of better and cheaper machines with which to organise our lives. More and more software pours onto the market. The choice is bewildering.

It is because computer familiarity is becoming necessary for everyone that these machines are finding their way into special schools as well as "non-special" schools. In my own field of work, the education of deaf and hearing-impaired children, the computer has arrived also. The Mary Hare Grammar School for the Deaf, situated in beautiful countryside just north of Newbury in Berkshire, has its own computer room where all pupils receive basic instruction in their use. This in itself may cause some surprise, but what may well surprise even more is that the same school, which caters only for children with hearing problems, has a music department and in that music department is a computer, used solely to assist in the teaching of music! Keyboard fundamentals, elementary music theory and a rapid piano course, are all available on software for the pupils' use. I would be so bold as to state that we are probably the only school for the deaf anywhere that uses a computer in this way, though I would be delighted to be proved wrong.

Music and the Deaf

Within schools for deaf children music is becoming more and more common. Whereas until ten years or so ago music was little used, and then only as an aid to speech, it is now being used for its own sake. Deaf children are, after all, children, and have an innate need to express themselves musically. The problem has always been how to develop this need. At the Mary Hare School I have, over the past ten years, evolved methods which are enabling even profoundly deaf children to play recorders, guitars, drums, and melodicas, to name but a few of the instruments in use. The basic idea is to develop a strong rhythmic sense through bodily movement and then gradually to harness this rhythmic sense in the playing of firstly percussion, and then pitched instruments. The School has a senior and a junior band, a recorder consort, and a budding clarinet quartet. Most of the

recorder consort members have hearing losses of up to 90 or more decibels in their better ear.

We place great emphasis on the use of hearing aids in both ears. Hearing tests are carried out regularly on all pupils to monitor any deterioration in residual hearing, and appropriate hearing aids are provided to cater for each individual need. Any little scrap of residual hearing, no matter how slight, is seized upon and used to make the pupils sound conscious and music obviously has an important role to play in this. Pupils are encouraged to respond to music by bodily movement, by clapping, by "singing" the lyrics of popular and folk songs. Every pupil in the first and second year of the school has one period of music on his or her timetable, of forty minutes. This music period consists of groups of between ten and twelve pupils participating in musical activities so structured as to develop any innate musicality. Not all deaf children are musical. Not all hearing children are musical for that matter. But all deaf children need the opportunity, like hearing children, to discover whether or not they have the ability to play a musical instrument.

But where, you may well be asking, does the computer come into all this? It all happened by chance, at Innsbruck in Austria, in July 1986. The Senior Band and Recorder Consort, plus a Junior group of four pupils from the Mary Hare School were "on tour" in Germany and Austria, demonstrating the use of music with the deaf. At Innsbruck we participated in the International Society for Music Education's seventeenth international conference, with encouraging results. As in all conferences there were trade stalls displaying musical wares from all over the world. Among these wares was a computer firm displaying music software and its uses. Some of my deaf musicians became fascinated with all this and to cut the story short, on our return I managed to persuade the Principal of the School to purchase the necessary equipment to set up a system in the Music Department.

Once the equipment was installed I decided to "log" the reactions of every pupil as they used the software. It made fascinating reading and was very informative. The best way to illustrate this is to use the logs of some of the pupils' reactions.

The first "victim" was Jason, a fifth form pupil with considerable residual hearing. I persuaded him to try the basic keyboard instruction course, or at least the first few lessons. Jason is a percussionist in the school band and a music enthusiast. With the use of my programming notes, Jason set up the software himself. (Some of the younger pupils needed assistance in this later). He looked over a couple of disks, containing lessons 1-4 and 13-15 of the elementary keyboard course for some three-quarters of an hour. On completion I asked him to jot down his reactions on a piece of paper. This is what he wrote. "Disk 1-4 - very interesting. Learnt things I had never dreamed of! Disk 13-15 Wow! I thought I played music for enjoyment, now this has thrown a new light on the matter!" By this remark I understand that Jason had come to realise that music was a far wider subject than he had hitherto imagined.

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Jason did not become a regular user of the system but my second candidate, Janet, did. Janet, another fifth former but with a more severe hearing loss than Jason, is a recorder player in both the school band and was, until the end of the previous academic year, a member of the Senior Recorder Consort. So many members left school last summer that that particular consort broke up. However, Janet is a keen musician and wanted to know something about keyboard playing and more music theory, before she in turn leaves school in a year's time. Her initial reaction to Lesson 1 was "Learnt first five notes by ear and a bit by fingering. Learnt to be able to recognise the notes by listening, before could only do it by reading the notes. Good for learning keys on the keyboard." To interpret these remarks a little, Janet was discovering that by paying more attention to listening, that is, by using her residual hearing through her hearing aids more acutely, she could distinguish the pitch of notes more accurately than before. In her recorder playing she had, it seems, relied more on her ability to read the notation on the score than on actually listening to her maximum ability. This was, to me, a very interesting point since it brought home the fact that even in our aurally conscious school, we had not been able to persuade all our pupils to use their residual hearing to the full. It had taken a computer to do the job for us!

My personal observations on Lesson 1 of the Keyboard Fundamentals course are that it thoroughly covers the treble and bass clefs, the staff, and the initial notes: "Middle" C, D, E, F, and G. Again, in Janet's case, she had previously learnt the use of only the treble clef in her recorder playing. Now, new fields were being opened up to her.

When Janet returned for her second session she again remarked to me that it made her listen more acutely. On completing lessons 2 and 3 she wrote: "Helps to learn the keyboard and makes me distinguish the notes. (I) always get E and F wrong and D and C. Have to keep repeating the time and play keyboard with it to get the right notes and then remember them! Is this cheating?" No Janet, it is not cheating. In fact, it is another great advantage when using a computer, that it is possible to go over and over again what is found to be difficult. No human teacher could possibly have the time (or, probably, the patience!) to give so much help to one individual. Her problems with distinguishing the difference in pitch between neighbouring notes, particularly semi-tones, are of course what we would expect with someone with hearing problems. But Janet persevered in her efforts to do so. She has not had complete success but then I never expected that she would. However, her excitement compelled her to bring one of her severely deaf friends to the music room to give her a demonstration. She remarked that the computer "might encourage a lot more to play music." Praise indeed for the machine! By now Janet had become "hooked" and wrote of lessons 3 and 4, "Learnt how to use my left hand. Learnt how to read notes on the F clef. Start lesson 5 next week." She has continued to come regularly week by week and is now working on lesson 14.

The basic idea of the Keyboard Fundamentals course is to teach accuracy in reading musical notation, to listen to melody and rhythm with discrimination and to reproduce printed notes on the keyboard. Fingering techniques are introduced. Co-ordination between the fingers and the mind, between the mind and the ear, and between the ear and the fingers, are all aspects of music which need to be worked on by any budding keyboard player. For a hearing impaired person this requires great effort and patience. Problems obviously do arise. Computers can help in this. One young pupil from the third form remarked "I think it more fun for people who can't hear the music. Looking at the screen helps one to understand. It is very useful to have things explained over and over again."

One problem which many of the pupils experienced was their inability to hear the rhythmic "clicks" in the exercises on note values. This was overcome in several cases by connecting a powerful amplifier to the system. Many more pupils were able to pick up this amplified sound on their hearing aids and so receive additional help.

Difficulties in distinguishing all the notes of the chromatic scale were experienced by one advanced pupil. She wrote "It is easier for hearing persons to do this exercise because they can hear all the sounds. A deaf person like me has problems."

From my own point of view as a teacher of music, there are many useful aspects to emphasise. Firstly, the computer can take over the spade-work of basic instruction and give the pupil infinite opportunities to correct mistakes and to further knowledge. It is an extra pair of hands. I can be teaching one pupil the piano in one room and next door another pupil can be working constructively with the computer. Also, the pupils with useful residual hearing can practise a keyboard using headphones, in the same room as another pupil using the computer, thus making maximum use of available room space. The computer is also a useful backup to work done in the classroom.

I have also found the software programs useful, in that the progression of work in them is so thorough that any gaps or steps inadvertently left out in my own course of instruction, can be corrected as a result of being made aware of such gaps. New ways of expressing elementary matters of music can be learnt by the teacher by watching the programs being used. They can be useful refresher courses. I know that I personally have become much more conscious of the need to prepare each step thoroughly so as not to leave out even the smallest item. While the computer can never totally replace the teacher, a combination of teacher and computer can produce beneficial results.

The work which I have described so far has taken place within the space of one term, and thus the use of the computer has been limited because of the short period of experimentation. What of the future? Well, there appear to be many areas of development to explore. Even with pupils with hearing problems, some aural training is possible, thanks to the marvellous hearing aids now available. The normal ear

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can discriminate very fine differences of frequency - less than 1%. The damaged ear does not perform so well as this but research has found that after training, a group of deaf children with an average hearing loss of 90 db could discriminate a 5% change at 500 Hz (one octave above Middle C) while a group of hard-of-hearing children (average hearing loss around 60 db) could discriminate a 3% change at the same frequency. Normally hearing children discriminate to 0.8%. Using this information it is obviously worth while to attempt aural training with hearing-impaired pupils and even, maybe, improve their voice pitching and so encourage singing. Profoundly deaf children may have difficulty with semi-tones and tones, but many of them will discriminate larger intervals. The totally deaf can perceive rhythmic information but not melodic information.

Another area in which hearing impaired youngsters can be assisted by computer programs in music is that of composition. I have had two or three students during the past ten years who have composed music at the keyboard but have not written it down. These compositions were real compositions. One student, Nicholas, a partially hearing boy, performed one of his own compositions before an audience at the Royal Academy of Music in London, during one of my lecture-demonstrations there. One of the Academy's professors came up to me after the lecture and said "That was a real piece of music!" My ambition is that future composers be able to write down what they compose so that nothing is lost and forgotten. A computer course in composition has obvious relevance here. The potential is exciting. Only time will show whether success will follow.

A further development is possible since the appearance of music processors. These are software for the input, editing, storage and origination of musical notation and can be used in conjunction with the IBM PC. Through the use of a simple code, manuscripts can be reproduced as printed music. I can see here a potential use by budding composers at school, and also in reproducing high quality scores for the school band and for the beginner groups. It is a practice of mine to begin the use of music scores as soon as possible, even before pitched instruments have been used. After basic work on rhythmic exercises such as clapping and tapping, I introduce "scores" of unpitched crotchets and minims on plain sheets of paper which are divided by bar-lines into quadruple time. These scores move from unison to part-rhythms and poly-rhythms before moving on to pitched rhythms using recorders, melodicas, and xylophone. All these scores would be more professional in appearance for the pupils if they were properly printed instead of being hand-written, and many a time the complaint is voiced that my hand-writing does not clearly show an E from an F on the score. The music processor removes this criticism and lack of clarity. This equipment is next on my list.

The number of pupils using a computer in a music department is bound to vary from year to year, or even from term to term when used on a voluntary basis. This is also the case with the number of pupils learning any musical instrument. But be it two or twenty, I do believe that every well equipped music department should have one,

since, as I stated at the beginning of this essay, the computer is here to stay.

William G Fawkes

After graduating from the History School at Leeds University in 1958, Bill Fawkes began teaching the deaf at the Yorkshire School for the Deaf in Doncaster. Moving to the Mary Hare Grammar School for the Deaf in 1962 he successively became Junior English teacher, Head of History, House Master, and Deputy Principal. In 1975 he began experimenting with music and the deaf. On taking early retirement in 1985 he continued as part-time teacher of music at the same school. One year later he became self-employed as Music Consultant and Teacher.

Bill's interest in computers began in 1986 whilst touring with the Mary Hare School Band and Recorder Consort in Germany and Austria. Since then the school music department has obtained its own computer equipment.