

Creative use of the computer and computer  
aided learning for the Undergraduate Music Curriculum,  
Computer Aid and Applications for Undergraduate  
Music Courses.

Innovation in Undergraduate Teaching in Music

The Music Department has offered Music 2  
and Music 105 since it began instruction  
in 1967. Music 2 is a fundamentals  
course concentrating primarily on reading  
and writing music with practice in sight singing,  
dictation and simple melodic composition.  
Almost invariably, students wishing to become  
music majors, even if they can play an instrumen-  
t fairly well, are lacking, or deficient in  
these skills. This is also true of transfer  
students. Although, students have had  
certain theory courses, they have not learned  
to associate notation with the correct sounds  
and rhythms. It is essential for the music  
student to read notation at sight, or  
to be able to notate what he or she is  
hearing mentally or actually. Without these  
skills it is not possible to read and interpret  
scores. <sup>nor to progress through the theory program.</sup> Music 2 serves the function of  
providing such skills not only for the prospective  
music major but for the general student  
who wishes to learn to read <sup>play & sing</sup> music for  
recreational purposes. Music 2 has been  
taught with the help of T.A.s in order  
to form smaller laboratory groups for drill  
in sight singing and dictation. The groups  
are formed roughly as <sup>mus</sup> Majors, <sup>mus</sup> Minors, General

student with some background and beginners. It is not always possible to maintain consistent groups of the same level. Beginners tend to be intimidated by those who already play an instrument. Music 2 <sup>is limited to</sup> ~~has~~ an enrollment of about ~~130~~ <sup>105</sup>. <sup>many more students wish to enroll.</sup> In order for students to progress and attain the necessary skill for reading music, he, or she must practice daily and receive immediate feedback on the correct sounds and notations. After working with John Andrews on the TA training program in Music 2 the course was re-organized so that more, <sup>and smaller</sup> groups could work and that Music 2 would continue for a student until the necessary ~~skill~~ proficiency was attained. (It is possible to do a theoretical exercise on paper correctly and not be able to hear it mentally. We believe that the student must be able to perform any such exercise.) The success of the work with ~~with~~ J. Andrews has convinced us that self paced learning in Music 2 is an essential goal. Self paced learning would relieve the tension produced by discrepancies in student's education and enable more students to work in Music 2. We would like to begin a pilot project on Computer aided sight singing and dictation. Computer aid would allow a student to work on his or her own time and within his or her

own capacity. Although computer aided learning of these skills are in operation at the University of Illinois and other Universities, these programs have met with great enthusiasm on the part of students and faculty. We think our intended program will meet the same enthusiasm from students, however our program will have an innovative aspect. We know of ~~no~~ no computer aided learning system which places the student in an active role with the computer "hearing"

accurately and responding instantly with corrections. <sup>Usually the computer simply plays back like a tape, with the</sup> the essential thing for any music student is instant feed back from a teacher who hears the imperfections in intonation, pitch

student in a passive role.

pattern, ~~and~~ tempo, ~~and~~ rhythm and dynamics. <sup>the acceptable response, from the student could also be scaled from coarse to fine.</sup> Obviously this type of training for a large number of students <sup>with instructors</sup> is prohibitive. With all of our music courses <sup>have had to be limited for this reason.</sup> computer aid of this type, a student can work on his or her own time without emotional pressure and large numbers can be accommodated.

Students could work alone or in small groups. Not only would music majors, ~~and~~ minors, benefit and the general student benefit but students of all levels could be involved in <sup>achieving</sup> increasingly more difficult skills. The computer could be programmed to generate exercises of any type. The time saving for instructors would be tremendous. Exercise would no longer have to be written and collected. The

need for text books would be minimized.

Computational principles for generating  
music 2 exercises

	A	B	C
105 -	Electro-acoustic	Analog	Digital Computer

Basic Technical understanding  
operation of existing equipment  
Conceptual framework

What a computer system is,  
What are the functional characteristics

1 RA just to enter the sound

Full time  
1 month

Develop an on line editor for CAS synthesizers systems  
for naive users - type Help get feedback

Maintenance contract for the computer \$2000 per year

Increasing prevalence of computer music systems

Rittenbach

Analog preprocessing to make digital analysis easier  
Sensing devices for student input

The creative use of the computer as a resource for sound generation is no longer in its infancy. In October 1977 the Center for Music Experiment in cooperation with the Dept. of Music will host the 2nd International Computer Music Conference. We expect ~~about~~ attendance by <sup>approximately 300</sup> composers and technologists. Our own team of <sup>technical</sup> experts from CME and Departmental composers will be heavily involved in the conference. ~~into~~ the conference will be oriented toward composers concerns, and interdisciplinary dialogue between composers, performers, ~~and~~ Computer Scientists and Psycho Acousticians.

~~In order that our~~ The Department of Music will sponsor two concerts of Computer Music involving performers and real time computer output. Also an ongoing "Museum" of taped computer music.

In order that our students may take full advantage of this opportunity, and so that CME <sup>research which has</sup> ~~research~~ <sup>already accomplished</sup> may be utilized in our instructional program, we wish to offer a pilot course in Computer Music during Spring Quarter 1977.

Since its inception the Dept. of Music has been committed to an exploration of technology in relation to music. Music 105, "Electronics in Music," a two quarter sequence has been included in the curriculum for 10 years. Its purpose has been to give undergraduate Music Majors a thorough foundation in the analog generation of <sup>electronic</sup> sounds for musical purposes. <sup>Also to provide technical</sup> Many of our students have claimed that their overall <sup>conceptual framework</sup> ~~conceptual framework~~ for new ideas in musical technology.

understanding of the basic construction and operation of equipment

perception of all music has been considerably enhanced by their analytical, <sup>and experiential</sup> work in Electronic Music. It is necessary to understand the structure of <sup>acoustic</sup> sounds in order to approach their electronic analogs.

A Computer <sup>Music</sup> ~~Sound~~ Synthesis facility has been developed at CASE during the past 4 1/2 years. A small number of <sup>undergraduate & graduate</sup> students have gained access to this facility for research projects. As a result there is a demand from the <sup>undergraduate</sup> students for ~~an~~ a <sup>formal</sup> course of study in computer music. The present curriculum would be vastly improved by this addition. Mus. 105 Electronics in Music now provides Electro-Acoustic techniques and Analog Synthesizer techniques. The Computer Music Course would provide a needed complement of digital techniques. It is our firm belief that our Music Students must be provided with the most current tool of technology. ~~as well as any other students.~~ Music Majors in theory + Composition would receive the most benefit from the above course.

In order to reach a larger number of students, lift the limit on enrollment, effect a cost benefit by fully utilizing <sup>interdisciplinary</sup> ~~and~~ team effort, <sup>our faculty + T.A.</sup> ~~we wish~~ <sup>to</sup> introduce computer aided learning into our ~~course~~ Curriculum. It is most logical to begin with Music 2 since the skills from this course are required for any musician and in order to participate in the music program.

the most essential thing for any music student at any level is instant feedback from a teacher who hears ~~the~~ accurately the imperfections in intonation, pitch pattern, tempo, rhythm and dynamics. The student must have this feedback until he or she develops the ability to correct him or herself. Obviously this type of

training for a large number of students of the <sup>who come with a wide variation in background,</sup> ~~same, but on~~ <sup>more advanced</sup> mixed levels is <sup>cost</sup> prohibitive in our University. All of our music courses have had to

be limited for this reason. So far there has been no substitute for this kind of training relationship.

Such a substitute is most likely, however, since

Although auto tape recorded training techniques <sup>and provide a model of correctness</sup> are available, the student remains ~~in a passive~~ uncorrected ~~role~~ since the tape cannot tell the student where <sup>or what</sup> his or her mistakes are.

Computer aids for music learning in other Universities have also not provided this kind of feedback. We know of no computer aided learning system which <sup>allows</sup> places the student <sup>vocal or instrumental input</sup> in an active role with the computer "hearing" accurately and responding instantly with corrections of the required parameters ~~with~~ as either, ~~or both~~, graphic <sup>or</sup> and auditory feedback or both and with <sup>frontout</sup>, we propose to develop this kind of training program with <sup>in interdisciplinary</sup> any team of specialist and faculty.



Since its inception the Dept of Music has been committed to active music making and an exploration of technology in relation to music. Active music making requires that skills be developed and used creatively in performance and composition.

The Dept. of Music wishes to introduce Computer aided learning <sup>and the creative use of computers.</sup> into the undergraduate music curriculum.