Learner-Centered Education Program
Arizona Board of Regents
INSTITUTIONAL SUPPORT FORM

Proposal Title: A Digital Self-Tutorial for Piano and Music Study

Institution: University of Arizona DEPT/Unit: College of Fine Arts School of Music and Dance

Multi-Campus/University Projects
(check other campuses or universities participating)
___ ASU Main ___ UA
___ ASU East ___ UA South
___ ASU West ___ NAU

List other participating agencies:
College of Fine Arts Digital Arts (Treistman Center for New Media)

Briefly describe the program and the development plan.
This project will develop an interactive instructional CD-ROM that will facilitate a learner-centered approach to study of the piano and music through studied linking of the performance of a musical composition with a graphic representation of the musical score. The project is defined in three stages, all enhanced by user assessment and feedback: Stage 1 will include the design of a prototype with one piano piece, which will then be field tested and assessed. Stage 2 will take assessment data and accomplish development of remaining eleven compositions. In Stage 3 we will accomplish major revisions and enhancements based on evaluation and assessment results.

Funding Category
Indicate a primary (P) and, if applicable, secondary (S) funding category:

Professional Development _____ Program or Course Development/Modification _P___
LCE Research _____ Improved Assessment of Learning Outcomes _____

Authorizations

Project Director Dr. Lisa Zdechlik
Signature: _____

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Department Chair / Unit Director/ College Dean/Provost

Name: Dr. Maurice Sevigny Title Dean, College of Fine Arts

_____
Signature
Name: Rex Woods Title Interim Director, School of Music and Dance

_____
Signature

Official Authorized to Enter into Contractual Obligations

Signature _____

Name: _____ Title: _____

Phone: _____ Fax: _____ Email: _____

A Digital Self-Tutorial for Piano and Music Study
The Arizona Board of Regents Learner-Centered Education Grant Program, 2003-2004
Submitted by Dr. Lisa Zdechlik University of Arizona, College of Fine Arts

Part 1: ABSTRACT

In music learning environments, the acquisition of performance and technical skills is generally the primary focus of attention. While the learner may grow as a performer with this approach, it is not a given that critical analytical and listening skills will have developed through performance study alone. There are many layers of musical meaning that often escape the student's awareness. Involving students in learning a musical score from the multiple viewpoints of performer, listener, analyst, and composer heightens their awareness and understanding of the music. The goal of this research project is to develop an interactive self-instructional CD-ROM that actively engages the learner from these multiple viewpoints. This instructional tool is being proposed for the Tier Two General Education music course MUS 101A, *Exploring Music through the Piano for the General Education Student*, at the University of Arizona and the applied studio piano lesson.

The aim then is to provide a compelling instructional resource that links visual and aural thinking so that learners can actively and directly interact with the music. For the untrained music learner, the complexities involved in decoding traditional music notation can create barriers to developing critical analytical and listening skills. The graphic representation of the musical score (see p. 9) proposed for this interactive CD-ROM offers a more visually intuitive format, making the music itself more accessible to the learner and creating a dynamic reciprocal process between listening and seeing. When a musical score is translated into an iconic, graphic representation, the learner is able to critically and creatively explore the musical score in its entirety and as an organic interaction of sound events. With digital technology, this graphic representation of a musical score can be directly and intrinsically linked with the sound events, i.e., a musical performance. What this means is that a learner can interact with a musical score and a musical performance on a computer screen as a global, inter-active structure rather than as a series of discrete, individual notes.

This CD-ROM-based software will consist of a series of interactive screens displaying a graphic representation of a piano composition linked with a musical performance of the composition. Users will click on single or multiple layers of one of the compositions while listening to the musical performance in order to explore its musical design and content. In this way, the learner will be able to isolate and concentrate on specific aspects of the music, such as the melody, the chordal layer, or the bass line. Twelve intermediate level piano compositions will comprise the CD-ROM.

At three different stages during the process, students from the MUS 101A piano course, as well as a panel of consultants, will test and assess the project. Adjustments and fixes of the software will be incorporated according to these results. Although the design of this learner-centered software will initially be intended for the piano student, the aim of the project is to develop an interface that can be applied to learners at a variety of educational levels, i.e., pre-K through university as well as to different instruments, styles, and genres of music. For instance: in a secondary school choral setting, this tool could be used to assist the choir both in learning parts and hearing/seeing how the different parts interact so that students are not only learning how to perform the music but are also developing an awareness of compositional aspects. Along with utilization by the mentioned University of Arizona music course, this software will be incorporated into the university's private applied piano studio and will ultimately complement online instruction in music and the piano, reaching out to a greater population of learners in the state of Arizona.

PART 2: IDENTIFICATION OF NEED

This project will develop an interactive instructional CD-ROM that links the performance of a musical composition with a graphic representation of the musical score. Short-term funding is needed to secure the services of specialized personnel in multimedia creation, music performance, and digital arts design. In addition, specific software authoring tools are needed and professional studio recording time is required. Individuals and organizations involved in the project will provide one quarter of the funding as an in-kind match.

This proposal strongly supports the Learner-Centered Education initiative. In the existing course, MUS101A: *Exploring Music through the Piano for the General Education Student*, students actively participate in the musical experience from multiple perspectives including techniques of playing the piano, music reading, composition, and critical music listening and analytical skills. In general education music courses, there is a need for innovative and diverse approaches that fully engage students to firsthand explore the musical performance and the musical score. The proposed interactive CD-ROM tutorial will transform the routine processes of listening to and analyzing a musical composition into a dynamic, interactive process of learning that will promote more profound student research and discovery. This project will allow learners to directly interact with the different layers of the music. For instance:

> A learner is seated in front of the computer screen ready to listen to the musical composition, *From Foreign Land and People*. With a click of the button, a screen pops up that displays a graphic representation of the composition. The computer prompts the learner to select the *red line* and listen to the melody while simultaneously viewing the contours and shape of the melody in real time. The computers inquires of the student, "Where do you hear and see the melody change its shape? Click on this area and re-listen, noting the differences." The learner further explores the music by next selecting the blue layer, now hearing the melody together with the accompaniment. The computer questions the learner, "what expressive effect does the accompaniment create?" "Where do you hear and see the changes in harmony?"

What appears to be a simple exploration of sounds evolves into the ability to manipulate and listen to the different aspects of the music, stimulating problem-based inquiry learning and an interactive music laboratory. Students are guided to freely play with the musical score while critically examining the choices the composer made in creating the composition. In addition, the self-tutorial allows each learner to discover the music at his or her own pace according to the level of complexity that the learner chooses as s/he moves through the self-tutorial.

An advanced application of this music tutorial will be its implementation in the student-faculty applied music studio in the university environment and for professional music study in the community. Traditionally, learners in the private music studio receive instruction and feedback on their music performance by the performance model of the studio teacher. Rarely, does the student explore his or her own interpretation or develop interpretive independence from his or her instructor. The proposed CD-ROM provides an instructional activity in dynamic score study linked with guided listening so that the learner is encouraged to creatively explore his or her own interpretation. Currently no such product exists. The proposed tutorial will enhance these students' understanding of the piano score and facilitate a unique, individualized musical performance, created by the students themselves.

Part 3: TECHNICAL NEEDS

In order to accomplish this project, the following software will be used. Adobe Photoshop™, Adobe Illustrator ™, MOTU Digital Performer™, CODA MUSIC TECHNOLOGIES' Finalé™, Inspiration™, and Macromedia Director MX. Participating staff members and student workers will utilize Treistman Center Macintosh G4 computers. The UA's Peter Treistman Fine Arts

Center for New Media will house the project. Student workers focused on related studies, including graphic design, Web development and programming, will perform the work and full-time professional staff members will oversee them.

SOFTWARE	MOTU Digital Performer (educational) + TAX	$400
	Finalé (educational) MATCH	($219)
	TOTAL	$400

Part 4: WORK PLAN

The project, accomplished in three stages, will be completed between January 1, 2004 and June 30, 2005. The first stage will consist of identifying one of the twelve piano compositions as a mini-prototype, which will be used to develop the interface in the following process: 1) the composition will first be recorded in the University of Arizona School of Music recording studio; 2) between three and five audio layers (i.e., melodic layer, chords and bass line) will then be extracted, using the Digital Performer™ software; 3) these audio layers will be inter-mixed into pre-determined combinations such as bass line + melody, melody + chords, bass + chords, etc.; 4) the extracted audio layers will then be converted to a visual graphic format after which both the graphics and audio layers will be imported into the *Macromedia Director* timeline and synchronized. A team of consultants including experts in educational design, multi-media, and music will initially test the mini-prototype. The mini-prototype will then be refined and changed as this formative evaluation is conducted.

At this point, the mini-prototype will be implemented in the *MUS 101A* piano course at the University of Arizona. The procedure for listening to and viewing the composition will be carried out and assessed by the *Music 101A* students. Learners will also complete a test to assess specific learner outcomes in regards to musical concepts and the learning objectives of the interactive program. Adjustments based on feedback from the student assessment and learner outcome testing will be incorporated into the process for the remaining eleven compositions. The procedure for this initial piece, and potentially for the remaining eleven will follow the same plan of action described above with changes, depending on assessment and learner outcome results.

The second milestone of the project will consist of applying the process above with the remaining eleven compositions. The graphic design stage will begin after carrying out an information and data workflow, based on user process. The visual components of the actual software structural elements or framework will be designed and multiple screens based on the process will be produced. For instance, when a user launches the program, s/he is first presented with a welcome screen and the prompt to choose a composition for studying. After choosing a composition, the program opens a subsequent screen that will contain the interactive elements of the piece. On this screen, additional elements will be available to the viewer enabling him or her to interact and discover further concepts about the piece, such as properties of rhythm, form, dynamics and texture.

Timeline

January 1, 2004 **Stage 1**	Design of a mini-prototype for Composition #1 involving these processes: 1) Digital Recording of Composition #1. 2) *Digital Performer* - Develop process for extraction of separate layers of the music. 3) Sound layers combined into all possible user-chosen combinations 4) Conversion of musical lines to graphics. 5) Importing of graphics into *Director* timeline. 6) Synchronizing the music to the graphics.
March 1, 2004	A team of consultants including experts in educational design, multi-media

	and music will test the mini-prototype. The prototype will be refined and changed as this formative evaluation is conducted. Consultants: Dr. Linda Beckman, Associate Professor of Piano Performance/Pedagogy, John Brown University, Siloam Springs, Arkansas Dr. Carl Hancock, Assistant Professor of Music Education, University of Arizona. Tucson, Arizona Kevin J. Kenefick, *Dimensions Imaging*. Graphic Design and Multimedia. Denver, Colorado Dr. James O'Brien, Professor Emeritus, University of Arizona, Tucson, Arizona
April 1, 2004	Field testing involving: 1) students in the MUS101A general education class at the University of Arizona, 2) Two university studio piano students at the 3) Two university graduate piano pedagogy students, 4) Two intermediate piano students from the community, 5) students in a general education classroom in the public schools. •Students will assess the mini-prototype by means of interacting with it and answering a questionnaire on usability, procedure and efficiency. •Additionally, an evaluation instrument will be administered to assess learner outcomes.
May 1, 2004	Gather results and assess. The prototype will be refined and changed after this formative evaluation with students and consultants (see above) is conducted.
June 1, 2004 **Stage 2**	Begin development of remaining eleven compositions, utilizing a method similar to the 6-stage process from stage 1 (see above), depending on assessment outcomes. The graphic design stage will begin after carrying out an information and data workflow, based on user process. The visual components of the actual software structural elements or framework will be designed, and multiple screens based on the process will be produced.
October 1, 2004	Beta or prototype of remaining compositions ready for testing. Summative evaluation involving the same cross section of students as in Stage 1.
November 1, 2004	Gather results from testing and evaluation of all pieces (until Dec. 1)
December 1, 2004	Compile assessment results from second evaluation.
Stage 3 January 10, 2005	Summative evaluation complete. Begin to incorporate results of assessment into the software product.
April 1, 2005	Project completed. CD-ROM implemented in MUS 101A piano course. Follow-up evaluation from students and consultants.
May 1, 2005	Begin package design of CD-ROM for potential distribution.

PART 5: KEY PERSONNEL

Principal Investigator: Direct and oversee the project. Development of the musical and pedagogical framework for the software. Recording of piano compositions and development of process for extracting the layers. Oversee implementation in the classroom.
Dr. Lisa Zdechlik, Assistant Professor of Music, University of Arizona, College of Fine Arts
School of Music and Dance Music Bldg., 154, 520.626.9523 FAX: 520.621.8118
zdechlik@email.arizona.edu
(Faculty Release time – see attached departmental Letter of Support)
$23 / 750 hours + ERE ($5088.75) = $22,338.75

College of Fine Arts Assistant Dean of Technology: Provide strategic input and direction and attend project milestone meetings.
Mike Holcomb, Peter Treistman Fine Arts Center for New Media, 520.621.1272
jholcomb@u.arizona.edu

Digital Arts Design Manager: Provide main project oversight and management. Hire and manage student and staff workers and maintain project timeline and budget goals and milestones.
Thomas Hapgood, Peter Treistman Fine Arts Center for New Media, 520.621.1272,
thapgood@u.arizona.edu

Digital Arts Technical Manager: Provide computer technical support of Treistman Center during the project.
Joseph Beals, Peter Treistman Fine Arts Center for New Media, 520.621.1272, jbeals@u.arizona.edu

Digital Arts Network Services Manager: Provide software and network support during the project.
Cynthia Barlow, Peter Treistman Fine Arts Center for New Media, 520.621.1272, ccb@u.arizona.edu

Digital Arts Programming Manager: Provide information architecture, data organization and programming principles oversight and consultation to staff and student workers.
James Smith, Peter Treistman Fine Arts Center for New Media, 520.621.1272, jksmith@email.arizona.edu

Student workers: Peter Treistman Fine Arts Center for New Media, 520.621.1272

- Assistant Project Manager: Provide daily consultation to student workers, project management and art direction. 5 hours/week
  $10 / 375 hours + ERE ($543.75) = $4,293.75
- Graphic design/Interactive student
  Information design and architecture and visual/graphic design duties, plus content and navigation organization.
  $10 / 1500 hours + ERE ($705.00) = $15,705.00
- Music student worker
  Assist in extracting layers from original music recording in Digital Performer and recombining them in various possible combinations
  $10 / 500 hours + ERE ($235.00) = $5,235.00

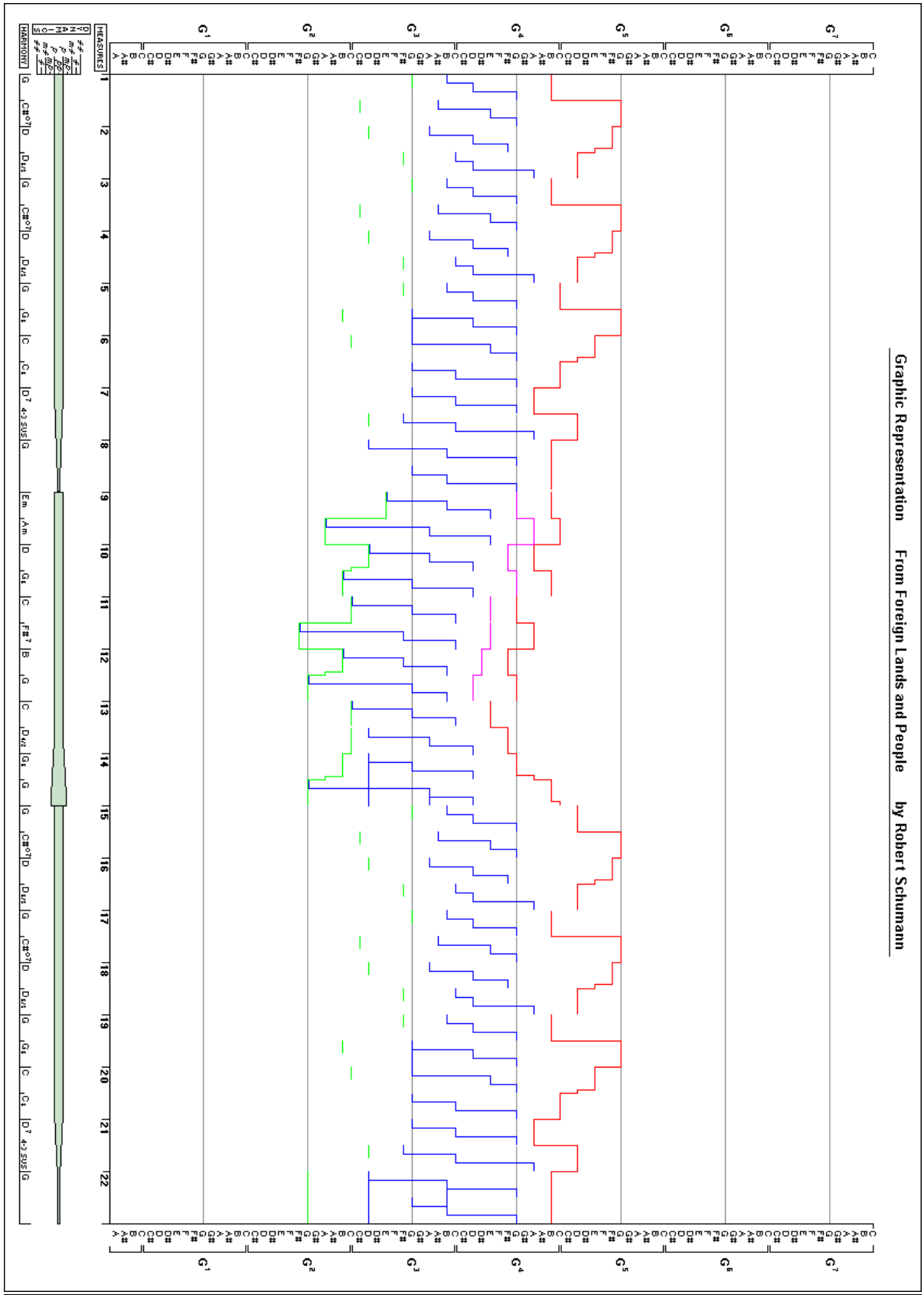
PART 6: EXPECTED RESULTS AND OUTCOMES

The final result of this research project will be a packaged CD-ROM of twelve intermediate piano compositions that can be used in university, secondary, and elementary general music education classrooms or the applied piano studio. A prototype interface that can be applied to different instruments, styles, and genres of music will also be developed.

A standard researched-based creativity assessment tool will be administered in a pre- and post-test format in all phases of the development of this project. Consultants will provide qualitative assessments of student learning outcomes. Further, a survey administered to students in each of the stages of the project will assess usability, procedure, and efficiency of the software as well as self-evaluation of individual growth and learning. An assessment tool will be made available to practitioner teachers in K-12 public education.

This instructional tool will be integrated into the MUS 101A general music education piano course, effectively dovetailing with the goals of the university's general education courses in music. Additionally, the CD-ROM will be implemented in the applied music studio in the university setting as well as the professional music community of private piano instructors. Graduate students in piano pedagogy will benefit by having the opportunity to experience and implement instructional applications of technology unique to the piano.

The Principal Investigator will present the CD-ROM and the results of this research study in presentations to music organizations such as Music Educator's National Conference, Music Teachers National Association and the National Conference on Keyboard Pedagogy. An outgrowth of the project will be the development of a supplementary textbook for use in coursework at the University of Arizona and public schools in the state of Arizona.


Graphic Representation From Foreign Lands and People by Robert Schumann
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