Student interaction with instructional activities: Comparing successful and unsuccessful students

Summary of Original Proposal
Michael Stucker (Music – Recording Arts)

The purpose of this investigation is to measure the effectiveness of instructional methods used in A111, the first of four courses in the Analog Audio Electronics Certificate. We will start this first phase of the research with two questions: (1) How do successful students interact with course activities? (2) Do unsuccessful students interact differently from successful students? If so, how?

A111 was developed in a short timeframe at the request of the Provost as part of the IU Online initiative. This course integrates a number of instructional methods to create a more complete immersion of students in the course content. This integration also provides a variety of engagement techniques to fulfill the diverse needs of students enrolled in the course. Students experience the course material through 5 distinct required activity types in each of the 6 units of the course. Each of these activities builds upon the previous activities while focusing on the content central to each unit.

This investigation will look at the methods used in the course and identify effectiveness of the combination of all instructional methods as well as the individual activities. We will do this by comparing how successful and unsuccessful students interact with the instructional activities within the course. Success in the course will be measured with midterm and final exam scores. This project will identify which specific activities or combinations of activities are associated with higher exam scores, so that we can study them further in future phases and adjust design decisions as appropriate in subsequent courses.

Scholarship of Teaching and Learning Grant Application

Student interaction with instructional activities: Comparing successful and unsuccessful students.

Michael Stucker – Jacobs School of Music, Department of Recording Arts
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Funding level requested: Phase I
Duration of project: 1 year

Abstract:

The purpose of this investigation is to measure the effectiveness of instructional methods used in A111, the first of four courses in the Analog Audio Electronics Certificate. We will start this first phase of the research with two questions:

1. **How do successful students interact with course activities?**
2. **Do unsuccessful students interact differently from successful students? If so, how?**

A111 was developed in a short timeframe at the request of the Provost as part of the IU Online initiative. This course integrates a number of instructional methods to create a more complete immersion of students in the course content. This integration also provides a variety of engagement techniques to fulfill the diverse needs of students enrolled in the course. Students experience the course material through 5 distinct required activity types in each of the 6 units of the course. Each of these activities builds upon the previous activities while focusing on the content central to each unit. These activities are:

1. Online reading including:
   a. Content substantive graphics
   b. Authentic audio examples
   c. Instructional videos
   d. Varied assessments
2. Interactive online games
3. Hands-on labs
4. Virtual lab simulations
5. Peer Investigation Groups

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In this first phase of the project we will be focusing on both analyzing the wide range of data already being collected (e.g., time, level of completion, and score in each activity). In addition to the standard student data available from Canvas, complex data on student interactions is being collected for the interactive online games. We will also look for other sources of data that would be of use in understanding how student interaction with the course activities relates to success.

Overview:

In January of 2014, in answer to a call from the IU Provost, the IU Vice Provost for Strategic Initiatives requested that I create an online certificate in electronics. This was based on some exploratory work that was done with Online Instructional Design and Development in the Fall of 2013. The first course in the certificate, A111, had to be available for students starting Fall of 2014, only 6 months after the development of the certificate began. With this accelerated development timeline there has so far been a lack of focus on research into the effectiveness of the instructional methods used in the course.

The purpose of this proposal is to research how effectively this online certificate is answering the learning outcomes of the first course in the sequence A111. At this first stage I am looking to refine the specific research questions that will drive the research. Because of the number of different activities that are used in the course, all working toward the same content and learning objectives it has been difficult so far to distinguish how the activities and student success relate. I want to look at how the combination of the activities as well as each individual activity relate to student success.

What is A111?

A111 is the first course in a four semester sequence of courses that make up the Certificate in Analog Audio Electronics. These courses are taught in two ways—entirely online and face-to-face with a hybrid use of online materials. The face-to-face section of the course is restricted to Recording Arts majors in the Jacobs School of Music, while the fully online version is open to non-Recording Arts majors

A111 covers the fundamentals of analog electronics including: voltage, current, resistance, inductance, capacitance, vacuum tubes, and the interactions of those when combined.
The learning outcomes for A111 are:

- Apply mathematical and engineering principles to define the function of fundamental analog electronic components.
- Recognize the basic physics behind fundamental analog electronics.
- Model electronic circuits with simulations and interpret the resulting data.
- Collect, analyze, and interpret the data from experiments with electronic components and circuits.
- Determine the resulting output of an electronic circuit given an input, through analysis and calculation.
- Apply the scientific method to solve complex electrical problems:
    - independently create a hypothesis
    - defend and extend that hypothesis with a group of peers

- work with peers to form a group hypothesis
- design experiments to prove the hypothesis
- collect, analyze, and interpret the resulting data

Course Development History:

Development of this curriculum began in 1999 and first diverged from typical electronics courses so that more focused material could be covered in the four electronics courses required for Recording Arts majors. The curriculum was built to work toward the fourth semester course which would focus on troubleshooting of analog audio systems. Because the students were not working toward being electrical engineers, formulas were left out where possible. Students worked toward an understanding of how components and circuits functioned instead of how to design them. I built the curriculum based on my experience as a studio technical engineer, including what I felt was necessary for troubleshooting and repair while getting through as much material as possible in the four semesters.

During that development I became dissatisfied with the typical lecture-homework model and discovered the work of Eric Mazur and his use of Peer Instruction [1]. With that I began developing more online content to distribute the course information to the students outside of class in the flipped classroom model. This was particularly necessary as I found a lack of textbooks with an appropriate focus. This was the status of the courses when development of the online courses began.

The development of the entirely online courses, as well as the large online content for the hybrid courses, began with a call from the Indiana University President asking for every Academic School of the University to develop an entirely online degree or certificate. My set of electronics courses was chosen as the offering from the Jacobs School of Music and I began development in the spring of 2014 with the first course in the sequence to be ready within 6 months. For our department, these online courses meant the opportunity to offer our courses to a larger audience as we had previously restricted enrollment to Recording Arts majors. With the selection of these courses for development came support from IU's eLearning Design and Services, a department of instructional designers and developers created to assist in the development of IU Online priority courses and programs.

Problems, Challenges, and Solutions

Student-to-Student Interaction: Peer Investigation Groups

For the face-to-face version of these courses, class time is spent working through complex problems. Based on Mazur's Peer Tutoring model [1], students first individually hypothesize a solution to the posed problem. A typical problem would be to provide a schematic and ask "What will an oscilloscope show at the output?" Once the students have formed their individual hypothesis they meet in small groups and compare/defend/discuss to form a group hypothesis. These group answers are then presented to the entire class where the process continues to form a class hypothesis. During this time, the instructor is working to keep the discussion from going too far wrong while staying out of the discussion as much as possible. This synchronous discussion is impossible to create in a non-synchronous online course, but is important to the student experience. This illustrates what I consider one of the most difficult parts of designing online courses: the fostering of meaningful student-to-student interaction.

In order to create something similar to this for the online course, I was first drawn to Team Based Learning [2]. It was a natural progression from Peer Instruction to TBL so that seemed like a good place to start. TBL requires the creation of questions where there are answers that "could be correct." These questions are the basis for stimulating discussion. I wanted students focused on actual working circuits, and was providing them both lab kits where they could build physical circuits and access to simulation software where they could build and test simulations. That meant they could test any circuit I gave them and find the correct answer. This led me to develop a version of TBL that I have named Peer Investigation Groups. After developing the idea, the P.I.G.s became a version of Team Based Learning that will work with STEM material. In addition to using the P.I.G. process for the online section I also have integrated it into the face-to-face course to expand the peer tutoring into more in-depth problems.

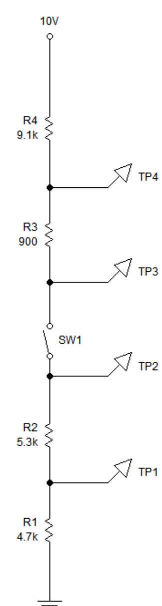

Figure 1

The P.I.G. process, whether for online or face-to-face courses, utilizes small groups of 3-6 students. The groups are presented with a problem. As an example, the second P.I.G. focuses on what happens to the voltages in a voltage divider circuit (*circuit shown in figure 1)* when you have an open switch in the middle of the circuit. This is not intuitive for students and it would typically take a great deal of class and lab time to build that understanding. Each student in the group answers a set of questions about what will happen in the circuit. They are not graded on the correctness of their answers, only that they have submitted them. They then take those answers to their groups to compare, discuss, and defend until they come up with a group answer which they submit to the instructor. Then, as a group they design a way to prove their answer using either the lab kits or the simulation software. The next step is to prove that their answer is correct. If their answer is not correct they go back to discussion and come up with another group answer and then prove it through experimentation. They repeat this process until they have proven their answer. They then submit that final proven answer as well as their proof. All of the groups share their answers and a class discussion of any differences takes place before the instructor's interpretation of the correct answer is revealed.

For each of the P.I.G. problems I chose concepts that were historically extremely difficult for students, with exam questions that received roughly 60% correct responses. With the implementation of the P.I.G.s, the same questions are getting roughly 90% correct responses on exams. Students have also responded positively to the process. Each P.I.G. problem takes an entire week of class time, however, so it is not a solution for every concept.

Active Learning: Hands-On Labs

The hands-on labs in the course have been very important and engaging for the students. Historically I got to experience the most "light bulb" moments with students during these labs. There are some new difficulties in teaching current students at the university level, well described in Jan-Olof Gullö's paper "Desktop Music Production and the Millennials" [3]. One of the issues is that these students tend to be less interested in the equipment and how it works [4]. These labs build student interest in the equipment by giving them an understanding of how it works as they build circuits and listen to the results. The experiments and learning outcomes were already defined for these labs but the written versions depended on instructor involvement which would not be possible for the online students. An online version of these labs had to be created in order to retain an online course that was both asynchronous and allowed off-campus students. Circuit simulations were a possible solution for this, but I did not feel that a simulation would be an adequate replacement for the hands-on labs.

These hands-on labs are built with active learning in mind. Prior to the lab assignments a student will have been reading about new components or sub-circuits and exploring them through interactive games and circuit simulations. Each experiment in the labs starts by describing the experiment and asking the student what they expect to happen. They then build the circuit and test to see if their answer is correct. If it is incorrect they are asked to reflect on where their thinking was wrong in the initial answer. It is important for each student to retain these answers as they serve as insight into likely misconceptions when reviewing the material later in the course.

The first hurdle to creating a hands-on lab experience was the equipment needed. For this I designed a "lab kit" that contains everything a student needs for all the lab experiments. This includes a 4 voltage power supply, oscilloscope, function generator, digital multimeter, breadboard, and all the necessary components. After this was prototyped a vendor was found to manufacture them at a cost of $528 per unit. Even though students could get four semesters of use out of these kits, it was still not acceptable to require them to purchase the kits. Instead we were able to add a lab fee that allowed us to provide the kits to the students on a semester by semester basis and recoup the cost within four years. Students sign a contract when they receive their kit that details the charges if they do not return the kit or return it damaged. This solution ensures that all students are using exactly the same test equipment and simplifies support for the instructor.

The next hurdle was to create a way to give the students support while they were doing the experiments in the labs, even if that was 11pm on a Sunday. Here the fact that all students were using exactly the same equipment made a big difference. I also had access to programmers though eLearning Design and Services, without which this could not have been done in the time allowed. I first tried writing the labs inside of Canvas, our learning management system. I was able to add all images and directions into Quizzes in Canvas and give the students feedback based on their answers. I built one lab this way but, in order to give the students feedback when I wanted, it ended up taking eleven different quizzes. This made a mess in the gradebook that confused both me and the students.

The development team to which I had access through eLearning Design and Services was able to create a JavaScript-based question and feedback system that allowed the labs to be delivered through html pages.

Initially these were simple multiple choice questions with text feedback for each answer choice, but they were able to add questions with a numeric answer and feedback based on answer ranges. The feedback can now also contain images and videos as well as text. Though this took more development time it was valuable in giving more precise feedback and allowing the student a wider range of answers. The one difficulty with this was that there was no record of the student's answers, as there had been with Canvas quizzes. The student experience was what I wanted, though, and the detailed feedback provided the support to allow the students to complete the labs at whatever time they were working on them. The lack of stored responses requires the student to make notes that they can refer to later and they are prompted to do so.

After this was fully implemented there were very few students contacting me with questions as they worked through the labs. This was one of the times where I had to make the choice between an assignment being practice or assessment. In this case there was no question in my mind that it needed to be practice instead of assessment. Of course, as educators we know that we need something to ensure that students are doing the work that we ask them to do. For the labs I have students upload a photo of the finished lab, or of each experiment in more complex labs. That serves as proof and gives them credit for the assignment. Cell phone cameras are good enough that I have been able to check that the lab circuit has been built properly. On one occasion, though I expect more, the student had not built the lab, instead they had just placed the components on the breadboard. I gave them a grade of zero with an explanation and they then did the lab properly and turned in a new photograph.

Are these a complete replacement for labs with an instructor available to the students? No, they are not, but I am very happy with the result. There are, in fact some benefits over a lab with instructor supervision. Because the online labs allow students to work through them in isolation, they have provided a safe place for students to experiment and make mistakes without concern for what their instructor or classmates will think. I always push students to experiment with things outside of the actual lab circuit and they have been doing that more with these online labs. Students are also able to repeat the labs for review or after a concept "clicks." They also have the option of bringing the kits in for instructor help.

Software Access: Circuit Simulations

In order to create additional active learning I have built in additional low setup and risk practice using Circuit Wizard [5] simulation software. This software allows students to create and experiment with simulations of electronic circuits. The simulations focus the student attention by removing the complexities of dealing with actual components and lab equipment. With the face-to-face classes we had a lab space with this software installed. Because we were building the course for distance students, it was not possible to use this space for the online students and it was too expensive to ask them to purchase the software themselves.

The solution we ended up using was very simple for me as an instructor, but has a large support commitment from the university. I was one of the first faculty members to take advantage of a virtual windows platform that Indiana University offers called IUAnyWare [6]. In the particular version of it that I am using for my courses, students log in and have access to a virtual Windows desktop. There are limited "seats" available that are determined by the number of licenses to the software installed. We currently have twenty five licenses for Circuit Wizard available through the virtual desktop so at any time twenty five students can log on and use the software. This allows students to use this Windows only software from Mac or even a tablet. This system also integrates with Box which has been chosen by the University for Cloud Storage. Students open and save their files to Box directly from the virtual desktop.

Low Risk Practice: Games

One of the issues, even with the face-to-face classes, is getting the students enough time actually working with circuits. Physical circuits are practiced through the hands-on labs but more practice is needed. Measuring and solving for voltage and current in circuits is a specific area that required more practice than I had been achieving in the face-to-face courses. The repeated practice required to master this concept so easily becomes “busywork” that I had tended to not include enough practice time. Incorporating more hands-on labs for this would be helpful but the amount of student time involved made that not feasible. In addition, there is a risk of errors that come with building physical circuits or even circuit simulations that make it difficult to create a focused assignment. I have found that those errors are often unrelated to the desired focus of the assignment.

To build practice that focused on a single set of concepts I worked with the developers to create interactive games. The first of these was a simple game where the student is given two electrical charges at opposite ends of a wire and is asked to determine which direction an electron in the middle of the wire would move. There is a time limit, a number of repeats, and graphics to make it engaging. This was built with Adobe Edge Animate and does not store or send player results. Later games were built with Construct 2 and are able to communicate to the learning management system through LTI (Learning Tools Interoperability) so that results and all student responses are available to the instructor and the students. These games include practice measuring voltage and current, solving voltage and current in series and parallel resistor circuits, and drawing output waveforms from a power supply circuits.

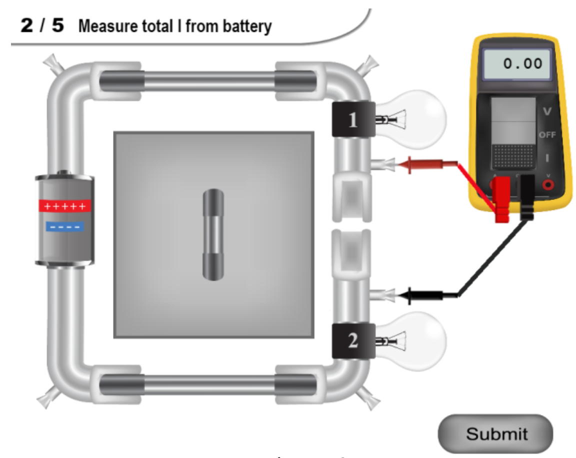

Figure 2

The game to practice measuring voltage and current (*shown in figure 2)* was very successful and well received by students. The next two games were based on that but also required calculating some values. The initial designs of these games involved component values that created very complex math, which was not the focus I wanted from the practice. This made the games much more a long homework assignment than meaningful practice, instead of creating meaningful practice I had built busywork. To remedy this I removed that component values that created complex math and changed the response to an incorrect answer. This is one of those situations where I had to define which was more important, practice or assessment. Practice was more important in this case. Now, when a student answers a question incorrectly they are given the solution, including the formulas and math. This has reduced the time for the assignment which has improved student engagement. Whether the time spent by the student is having an effect worth that amount of time is one of the questions I hope this research will help answer.

Relation to Current Literature

There is a large body of literature and research into the use of both active learning and games in higher education. While there is also a large body of work related to cooperative learning and specifically Team Based Learning, I know of none describing cooperative learning as done in the Peer Investigation Groups. There is also a lack of information regarding the combined use of activities as done in A111. This project will allow a more thorough search of current literature as well as the addition to it of this work.

Sharing the Work

I have already shared preliminary results from this work at IU Statewide IT conference in 2014 and I presented a paper at the Audio Engineering Society 139th International Convention at the end of October 2015. The AES shares my experiences creating the curriculum but is still lacking data on the success of the methods. If this SOTL grant is awarded I will be able to follow up with that data at future convention. At a broader level, and due to the current interest in gamifying learning, the results of this research are of interest to online educators in other disciplines as well and so I will look for additional opportunities to share (Educause, OLC, AECT, etc.)

Previous Research

Though this is the first phase in the research portion of this project there has been some preliminary work done. Data is currently being collected as students play the interactive games included in the course. This data is used to adjust the design process of future games to create a better student experience. The game data shows how much time each student is playing the games and allows me to adjust to get a good amount of practice without overburdening the student's schedules and losing their interest.

This data is being used as new interactive elements are created as a basis for student engagement and workload. I am also using the data to define the amount of other work given to students in an effort to balance their time with the effectiveness of the many elements of the course.

Research Question

The fundamental questions for this research project are:

1. **How do successful students interact with course activities?**
2. **Do unsuccessful students interact differently from successful students? If so, how?**

In order to answer these questions the course assessments must be matched to the activities where those learning outcomes are practiced for that course content. There are two main assessments in A111, a midterm and final exam. The questions on these exams will be correlated to the responsible course activities. This process has already begun but will require more time for a thorough correlation. Once this correlation is complete an analysis can be done to indicate if any of the separate course activities show a relation to correct exam answers. Score in the activity as well as time on task will be compared to exam results.

Two additional factors make this process challenging.

- Multiple activities work together to build most of the learning outcomes for any topic in the course. Research time will be spent in looking for methods to differentiate the effect of each activity.
- Some historical exam data is available, however prior to 2014 that data is for Recording Arts majors only. In 2014 the course was opened up as an entirely online course, to all students at IU Bloomington. The Recording Arts majors in A111 are entirely undergraduates and predominantly students in their first semester. The online course has so far been predominantly undergraduates in their third or fourth year. The online course is also offered to graduate students as A511. This homogeneity of historical students compared to current students as well as the comparison of entirely only and hybrid student experiences may mean that the historical data will not be useful.

In addition to the fundamental questions and possibly in an effort to answer those fundamental questions, some more specific questions will be posed. These may be left for future phases of this project but will at least be considered as we decide what data should be collected. Some possible more specific research questions that would be addressed to both the combinations of activities as well as the individual activities:

- How does time on task affect student success?
- Does student success on the individual activities affect overall success? (Success on individual activities would need to be defined.)
- Does student background (demographic, academic, and other?) affect which activities affect overall success?

- Do students tend to choose a certain type of activity to focus more time on? If so, are there patterns as to which students choose which activities?
- Does student engagement in the other activities lead to more sophisticated discussion and interaction during the Peer Investigation Groups?
- Is the data currently being collected meaningful toward answering these questions?
- Is there additional data that could be collected to help answer these questions?
- Is there relevant literature that has not been drawn from?

How the Grant will be spent.

Grant funds, if awarded, will be applied to a graduate student position for support in data collection, analysis, and planning. It is anticipated that the chosen student will average 3 hours per week over Fall and Spring semester on this project. It is anticipated that the graduate student will be compensated at $20.hr. Any remaining funds will go toward travel expenses for conference presentations of the research results.

Works Cited

[1] Eric Mazur "Peer Instruction: A User's Manual", Series in Educational Innovation, Prentice Hall, Upper Saddle River, NJ, 1997

[2] Michaelsen, Larry K., Arletta Bauman Knight, and L.Dee Fink, "Team-based Learning: A Transformative Use of Small Groups in College Teaching", Westport, Conn.: Praeger, 2002.

[3] Jan-Olof Gullö "Desktop Music Production and the Millennials: a challenge for educators, researchers and the audio equipment and music software industry", AES 127th Convention paper #7833, 2009

[4] Gullö, J-O. "Desktop Music Production: Remediation in a music education perspective," The Virtual; Designing Digital Experience. 2006, M3 research platform, Södertörn University College, Handen, 2007

[5] New Wave Concepts Limited "Circuit Wizard" [computer software] V2.00 www.genieonline.com

[6] Indiana University "IU Online Virtual PC" [computer software]

Michael Stucker

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Curriculum Vitae

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EXPERIENCE

1999-present Bloomington, IN — ***Indiana University Jacobs School of Music***

Senior Lecturer- Recording Arts Department, director Konrad Strauss (812) 855-1900
previously: Visiting Lecturer and Part-time Lecturer

Current courses

A111: Basic Electricity- fundamental electron behavior theory, passive components, vacuum tubes
**A hybrid section of this course for Recording Arts majors and an online section for non-majors are both being taught.*
A112: Electronics I- transistor theory and amplifier circuits
**A hybrid section of this course for Recording Arts majors and an online section for non-majors are both being taught.*
A201: Advanced Audio Theory- Digital audio theory and operation of Pro Tools
A211: Electronics II- advanced circuits and theoretical troubleshooting
A212: Audio Repair and Maintenance- troubleshooting, repair, electronics construction

Previously taught courses

A270: Studio Techniques I-Studio equipment usage and recording/mixing techniques
A325: Advanced Digital Workstation- advanced workstation use techniques
A321: Media Techniques- Audio for Video/film/television/internet, synchronization, surround, DVD
A312: Audio Repair and Maintenance II- advanced electronics design and construction
A340: Topics in Recording Arts- continuation of A312

Additional service

- *Development of "Certificate in Analog Audio Electronics" with grant a from the I.U. Vice Provost for Strategic Initiatives.*
- *Information Technology: administration of classroom technology workstations and networks*
- *Electronics: repair and maintenance of recording studio technical systems*
- *Design: design and supervision of new and upgraded audio system installation*
- *Lab: design and administration of electronics lab including equipment purchases*
- *Served on Recording Arts admission committee*

2008-present — ***Wolfgang Michael Sound*** — *Owner* — ***Bedford, IN***

(812) 325-6949

- *Company offering technical support for professional music clients*
- *Recording Console restoration and re-commissioning*
- *Console and equipment modification and repair*
- *Custom Electronics and wiring systems design*
- *Clients include: John Mellencamp, The Fray, Mike Flynn (V.P. Epic records) , Swinghouse Studios (CA), Aireborn Studios (IN), Echo Park Studios (IN), Harmony Studio (CA), and Russian Recording (IN)*

2002-2005 — ***Echo Park Training Center*** — *Director* — ***Bloomington, IN***

supervisor Mark Hood (812) 331-2762

- *Responsible for Indiana State accreditation through Commission On Proprietary Education*
- *Negotiated Digidesign Sponsorship*
- *Created curriculum (not including Pro Tools course, developed by Digidesign)*
- *Taught all courses*
- *Marketing, website development and Graphic design*
- *Responsible for all financial aspects*

1995-2008 **Echo Park Studios** *Operations Manager* **Bloomington, IN**

supervisor Mark Hood (812) 331-2762

- *Oversee all technical aspects of studio operation*
- *Electronic maintenance and repair*
- *Function as Studio Purchasing agent*
- *On call 24 hours a day/ 7 days a week*
- *Administrative*
- *First Engineering and assisting*
- *Financial*
- *Website design and maintenance (www.echopark.com)*

1995-present **Belmont Mall** *Technical Engineer* **Bloomington, IN**

(John Mellencamp's private studio) *contact Tim Elsner (812) 988-6681*

- *Wiring and Configuration of studio*
- *Restoration of 1950's tape recorder for "No Better Than This" project*
- *Electronic maintenance and repair*
- *Set-up and maintenance of Rehearsal PA system*
- *Recommend/ purchase new equipment*

1990-1995 **M.S. Audio** *Owner* **Bloomington, IN**

- *Custom wiring for sound reinforcement companies (Frazier Audio and Jackson Audio Prod.)*
- *Wiring and repair/maintenance for recording studios (Echo Park Studios and Belmont Mall)*
- *Customer and store stock repair of vintage amplifiers for Roadworthy Guitar & Amp*
- *Sound system sales and installation*

EDUCATION

Graduated 1990 **Indiana University School of Music** **Bloomington, IN**

- *A.S. Audio Technology*

Graduated 1986 **Maconaquah H.S.** **Bunker Hill, IN**

COMPUTER SKILLS

PROGRAM	SKILL TYPE	LEVEL	EXPERIENCE
Pro Tools	operation, set-up and troubleshooting	expert	23 yrs.
Windows	set-up and troubleshooting	advanced	27 yrs.
Windows/PC Networking	set-up and troubleshooting	advanced	27yrs.
Windows/ intel hardware	set-up and troubleshooting	advanced	27 yrs.
MAC OS	set-up and troubleshooting	advanced	23 yrs.
MAC hardware	set-up and troubleshooting	advanced	23 yrs.
MAC Networking	set-up and troubleshooting	intermediate	15 yrs.
Photoshop	operation	advanced	17 yrs.
Dreamweaver	operation	advanced	13 yrs.
Fireworks	operation	advanced	13 yrs.
Web and HTML	programming	advanced	17 yrs.

www.wolfgangmichaelsound.com
www.keevaandmichael.com
www.echopark.com

REFERENCES available upon request

Michael Stucker Discography

Year	Artist	Album	Label	Credit
2015	John Mellencamp	Ithaca: Film Soundtrack		Technical Engineer
2014	John Mellencamp	Plain Spoken	Island/Republic	Technical Engineer
2014	John Mellencamp	Performs Trouble No More: Live at Town Hall	Universal	Technical Engineer
2013	John Mellencamp	Ghost Brothers of Darkland County	Hear Music	Technical Engineer
2010	John Mellencamp	No Better Than This	Hear Music	Technical Engineer
2010	John Mellencamp	On The Rural route 7609	Hear Music	Technical Engineer
2010	International Harp Festival	Harp Dreams	WTIU/PBS	Engineer/Mix
2010	Eric Brengle	Accounting for Curvature		Prod/Eng/Mix
2009-1997	National Concert Band Festival	Bands of America	Music for All	Engineer/ Edit
2009	Jason Wilber	Ghosts of Summers Past	Wilbertone Records	Engineer/Mix/Mastering
2009	Jason Wilber	Live and Otherwise Volume 2	Wilbertone Records	Engineer/Mix/Mastering
2008	Grand National Marching Band Competition	Bands of America	Music for All	Engineer/Mix/Edit
2008	John Mellencamp	Life Death Love and Freedom	Hear Music	Technical Engineer, Additional Recording
2007	John Mellencamp	Freedom's Road	Universal Republic/UMe	Recording Engineer
2007	John Mellencamp	Storytellers	VH1	Technical Engineer
2007	Jason Wilber	Lazy Afternoon	Wilbertone Records	Engineer/Mix/Mastering
2006	Stoll Vaughan	Love Like a Mule	Shadowdog	Engineer
2006	Jason Wilber	Live and Otherwise Volume 1	Wilbertone Records	Engineer/Mix/Mastering
2005	Grand National Marching Band Competition	Bands of America	Music for All	Engineer/Mix/Edit
2005	Beaux Arts Trio	Beaux Arts at 50	WTIU/PBS	Engineer/Mix
2004	Grand National Marching Band Competition	Bands of America	Music for All	Engineer/Mix/Edit
2004	Hells Half Acre	Under a Whiskey Moon		Engineer
2004	John Mellencamp	Words & Music	Island/ UTV	Technical Engineer
2004	Stoll Vaughan	Hold On Through Sleep & Dreams	Shadowdog	Engineer
2004	Jason Wilber	King for a Day	Wilbertone Records	Engineer/Mix/Mastering
2003	Buselli Wallarab Jazz Orchestra	Heart & Soul: The Music of Hoagy Carmichael		Assistant Engineer
2003	John Mellencamp	Trouble No More	Columbia	Technical Engineer
2003	Over The Rhine	Ohio	Back Porch/Virgin	Technical Support
2003	Paging Raymond	Bridges Left To Burn		Engineer/Mix
2003	Some Girls	Feel It	Koch	Engineer
2002	Robert Mirabal	Music From a Painted Cave DVD	Mirabal/Scalem	Engineer/Surround Mix
2002	Carrie Newcomer	Gathering of Spirits		Engineer
2002	Silvercrush	Stand	Redline	Assistant
2001	John Mellencamp	Cuttin' Heads	Columbia	Technical Engineer
2001	Robert Mirabal	Music From a Painted Cave	Silver Wave Records	Engineer
2001	Over the Rhine	Films for Radio	Back Porch/Virgin	Engineer/ Mix
2000	Blast!	An Explosive Musical Celebration	RCA Victor	Engineer
2000	Farm Aid: Keep America Growing, Vol. 1		Redline	Technical Engineer
2000	James Horner/ John Mellencamp	Perfect Storm	Sony	Technical Engineer
2000	B-town Sounds		WTIU/Echo Park	Engineer/ Mix

Michael Stucker Discography page 2

Year	Artist	Album	Label	Credit
2000	Over the Rhine	Give Me Strength	NBC "Third Watch"	Engineer/Mix
2000	Jason Wilber	Behind the Midway	Flat Earth	Engineer/Mix
1999	Blast!	London Theatrical Production		Assistant Sound Design
1999	Gordon Bonham Blues Band	Low Down and Blue	Slipery Noodle	Engineer
1999	Johnny Socko	Quatro	Rock & Roll Rampage	Editing, Mastering
1999	Marmoset	Today It's You	Secretly Canadian	Assistant Engineer
1999	John Mellencamp	Rough Harvest	Mercury	Technical Engineer
1999	Jimmy Ryser	Every Day Is You	Holl & Daise	Prod/Eng/Mix
1999	Jimmy Ryser	Let It Go	Holl & Daise	Engineer/ Mix
1998	Gregory Barrett	The finnish Clarinet	Alba records Oy	Editing
1998	Deb Bartley	These Small Rooms	Egg	Engineer
1998	Gordon Bonham	Get Back Home		Engineer/ Mix
1998	David Cutler	Chestnut Branches in the Court		Engineer/ Edit/ Mix
1998	DNA-12	It's Almost Midnight		Mixing
1998	Fear of Pop	Volume I	550 Music/ Sony	Assistant
1998	John Mellencamp	John Mellencamp	Columbia	Technical Engineer
1998	Mysteries of Life	Come Clean	RCA/ Flat Earth	Assistant
1998	Carrie Newcomer	My True Name	Philo/ Rounder	Engineer
1998	Uvula	Smarm		Engineer/Mix
1998	The Why Store	Two Beasts	Way Cool/ MCA	Technical Engineer
1998	Jason Wilber	Lost In Your Hometown	Flat Earth	Engineer/Mix
1997	Bottle Rockets	24 Hours a Day	Atlantic	Assistant
1997	Fabric	Woolly Mammoth	Scrimshaw	Engineer/ Mix
1997	Kim Fox	Moon Hut	Dreamworks	Assistant/ Mix
1997	House Marys	Anti-Bus		Engineer/Mix
1997	Johnny Socko	Full Trucker Effect	Asian Man	Engineer/ Mix
1997	John Mellencamp	The Best That I Could Do	Mercury	Technical Engineer
1997	Robert Mirabal	Mirabal	Warner Brothers	Assistant Engineer
1997	Mysteries of Life	Focus on the Background	RCA/ Flat Earth	Assistant
1997	Mysteries of Life	Anonymous Tip	RCA/ Flat Earth	Assistant
1997	Son Volt	Straightaways	Warner Bro.	Assistant
1997	Star of Indiana	Brass Theater III: Blending Brass and Broadway		Assistant Engineer
1997	Superchunk	Indoor Living	Merge	Assistant
1996	The Canadian Brass and Star of Indiana	Brass Theater II	Core	Assistant Engineer
1996	George Harris	Zippy Torture	Hinge Pin Production	Engineer
1996	Thin Lizard Dawn	Thin Lizard Dawn	RCA	Assistant
1996	The Why Store	The Why Store	Way Cool/ MCA	Technical Engineer
1995	Black Olive	Verge	Goblin 9	Engineer/Mix
1995	Craig Brenner	Play It Again, Professor!		Engineer
1995	Robert Mirabal	Land	Warner Western	Assistant
1995	Nationalgalerie	Meskalin	Sony Germany	Assistant
1994	Pencil	Skantron	Grass	Engineer/Mix
1992	Ron Markman	Mukfa a Fun Place	Indiana Arts Council	Engineer/Mix/Edit

INDIANA UNIVERSITY
JACOBS SCHOOL OF MUSIC
Bloomington

November 2, 2015

Letter of support for Michael Stucker
Scholarship of Teaching and Learning Grant Application

Please accept this letter of support for Michael Stucker's Scholarship of Teaching and Learning Grant Application. Mr. Stucker has been doing innovative work creating a fully online four-semester course sequence and certificate in analog audio electronics. With the assistance of UITS eLearning Design and Services he, has incorporated state-of-the-art methodologies such as educational gaming, online peer tutoring, student discussion, and simulation software, into a groundbreaking and original approach to teaching electronics.

Mr. Stucker will have completed development of all four online courses by the Spring semester of 2016. While student response has been positive, Mr. Stucker is interested in measuring student success and determining which activities contribute to this success. Mr. Stucker plans to compare the habits of successful and unsuccessful students. This data will become a valuable tool both for Mr. Stucker as he revises and updates course content, and as a case study for educators at IU and other universities as they develop their own online course content.

Once again, I am happy to support Mr. Stucker's application for the Scholarship of Teaching and Learning Grant.

Konrad Strauss
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